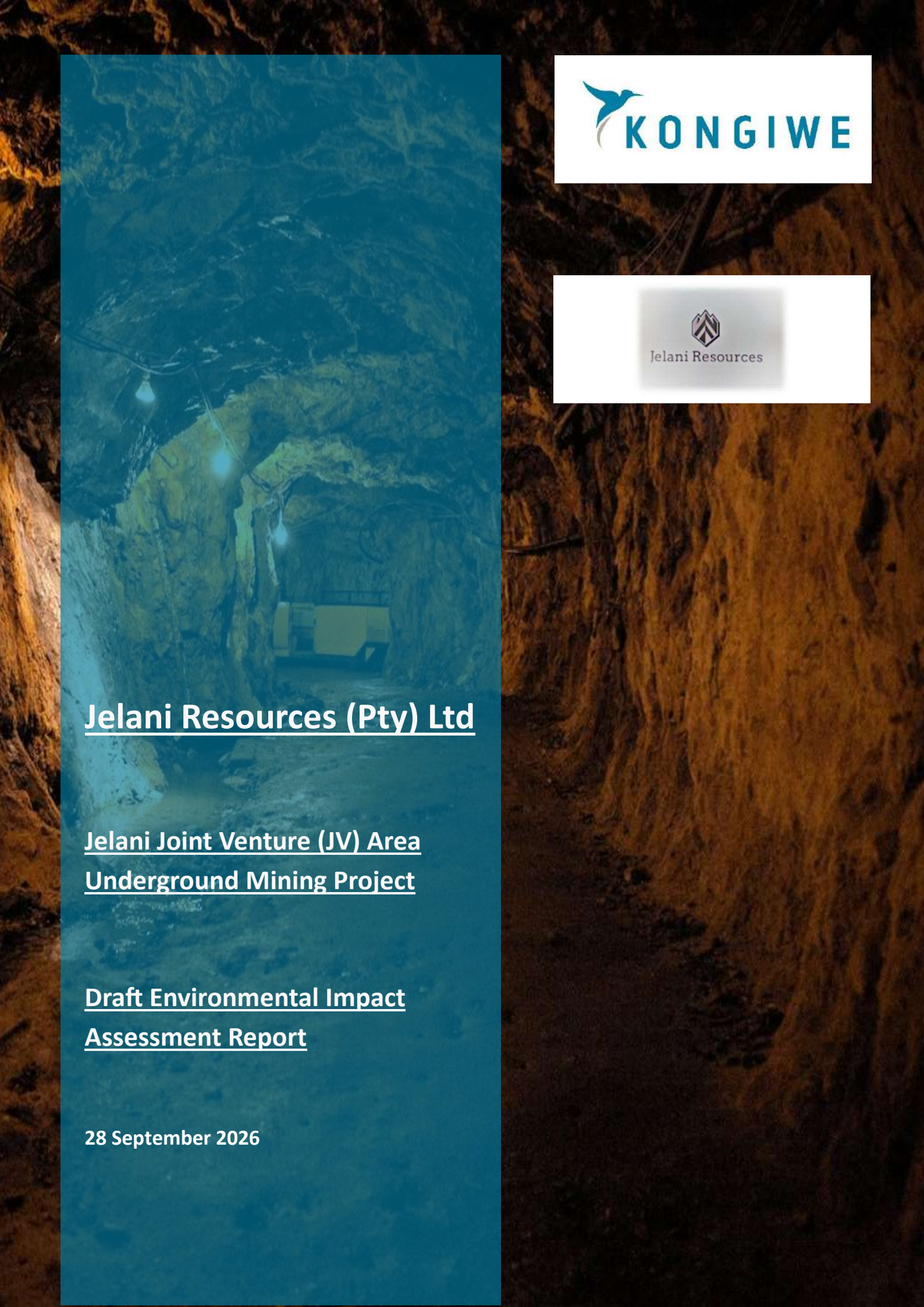


Jelani Resources (Pty) Ltd

Jelani Joint Venture (JV) Area Underground Mining Project

Draft Environmental Impact Assessment Report

28 September 2026

Report Preparation By

Kongiwe Environmental (Pty) Ltd	
Registration Number	2016/135562/07
Telephone Number	+27 (10) 140 6508
Email	info@kongiwe.com
Registered Address	150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Website	www.kongiwe.com

Report Information

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Approval

Verification	Capacity	Name	Signature	Date
By Author	Environmental Consultant	Ripfumelo Macevele		11 September 2026
Reviewed by:	COO	Grant Cornish-Bowden		16 September 2026

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Important Notice

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of Regulation 16 (3) (b) of the Environmental Impact Assessment Regulations 2017, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of Regulation 17 (1) (c) the Competent Authority must check whether the application has considered any minimum requirements applicable or instructions or guidance provided by the Competent Authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an Environmental Authorisation for listed activities triggered by an application for a right or permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulations and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner (EAP) must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

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Objective of the Environmental Impact Assessment Process

The objective of the Environmental Impact Assessment process is to, through a consultative process —

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
(c) identify the location of the development footprint within the preferred site based of an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint risk focusing on geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
(d) determine the –

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
(ii) degree to which these impacts –

- can be reversed;
- may cause irreplaceable loss of resources; and
- can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
(g) identify suitable measures to manage, avoid or mitigate identified impacts; and
(h) identify residual risks that need to be managed and monitored.

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Public Review Period for the EIA/EMPr Report

Members of the public, local communities, and stakeholders are invited to comment on the Draft Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPr) which will be made available for public review and comment from Tuesday, **29 September 2026** until Wednesday, **28 October 2026**.

The Draft EIA/EMPr will be submitted to the Department of Mineral and Petroleum Resources (DMPR) and made available at the following location.

Location	Physical Address	Contact Person
Hard Copies		
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063 Monday – Friday Open: 08H00 - Close: 15H30
Nyakallong Public Library	Nyakallong, Allanridge, 9492	Ms Vivian Dasheka (081) 761 1620 Monday – Friday Open: 08H00 - Close: 16H00
A non-technical summary of the Draft EIA/EMPr will be compiled and distributed through community representatives and couriered to stakeholders who send a request to the stakeholder engagement team.		
Website Name	**Website Address**	**Contact Person**
Electronic Copies		
Kongiwe Environmental website	http://www.kongiwe.com/publications-view/public-documents/	Vanessa Viljoen/Jean-Mari Williams
An electronic copy of the Draft EIA/EMPr will be made available upon a request directed to the stakeholder engagement team. Stakeholders are encouraged to contact the stakeholder engagement team (Vanessa Viljoen/Jean-Mari Williams), Tel: (012) 003 6627, Email: stakeholders@kongiwe.com should they require assistance with accessing the Draft EIA/EMPr have queries regarding the Proposed Project.		

Comments received from the public throughout the Scoping and Environmental Impact Assessment phase of the project will be included in Appendix C10 of the Comments and Responses Report.

Comments received during the 30-day public review of the draft EIA/EMPr will be considered and incorporated into the Final EIA/EMPr.

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Executive Summary

Kongiwe Environmental (Pty) Ltd ("Kongiwe") has been appointed by Jelani Resources (Pty) Ltd ("Jelani"), as the independent Environmental Service Provider and tasked with conducting the Scoping and Environmental Impact Assessment (S&EIA) process, which is aimed at critically evaluating the potential environmental and social impacts of the proposed **Jelani Joint Venture (JV) Area Underground Mining Project** ("Proposed Project").

The application for Environmental Authorisation (EA) was submitted to the Department of Mineral and Petroleum Resources (DMPR), which is the Competent Authority (CA) for the Proposed Project, on Tuesday, 21 April 2026. The Final Scoping Report (FSR) was submitted, on Wednesday, 01 July 2026. The Draft Environmental Impact Assessment and Environmental Management Programme (Draft EIA/EMPr) will be made available for public review from Tuesday, 29 September 2026 until Wednesday, 28 October 2026.

Project Introduction and Background

Jelani Resources (Pty) Ltd is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

The Proposed Project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

Ore will be transported to the shaft ore pass system using conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

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Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mines life, be used for the movement of men, material and rock depending on which phase the mine is in.

Project Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area. Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory and operational functions associated with the respective underground mining operations/targets. A layout of the proposed Target 3 shaft surface infrastructure which either needs to be refurbished or constructed is presented in the Figure 1-10. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished.

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated Proposed Project will be relocated to this shaft.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m^2), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project (and application) being undertaken by Harmony Gold.

Environmental Impact Assessment Process

The proposed underground mining operation will require environmental authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and will follow a Scoping and Environmental Impact Assessment (S&EIA) process in accordance with the EIA Regulations, 2014, as amended[1]. These regulations impose a strict timeframe and require the Competent Authority, the DMPR, to issue a decision within 300 days from the date of submission of the Environmental Authorisation (EA) application.

[1] The most recent amendment is GN R517 of 11 June 2021. This S&EIA takes these amendments into account.

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An Integrated Water Use Licence Application (IWULA) will be prepared and submitted in accordance with the Water Use Licence Application and Appeals Regulations 2017 published in GNR 267 on 24 March 2017 and will be supported by a Technical Report and Integrated Water and Waste Management Plan (IWWMP).

The nature and extent of the Proposed Project, along with the potential environmental impacts associated with an activity of this nature, have been assessed and are presented in this EIA Report.

Legal Background and Requirements

Jelani Resources Ltd (Jelani) is a joint venture (JV) company formed by White Rivers Exploration (WRE) and Harmony Gold Mining Company Ltd (Harmony). WRE holds various prospecting rights for gold, coal, and other minerals, and currently operates as a project company with no active operations. Harmony is a gold-focused mining company with operations in South Africa and Papua New Guinea. The JV partners have vested a range of prospecting and mining rights in Jelani over an area designated as the JV Area for the proposed Underground Mining Project.

White Rivers Exploration (WRE) holds a Prospecting Rights (PR) for various minerals within the JV area. This PR (Ref: (FS) 30/5/1/1/2/10350 PR) was notarially executed on 21 June 2017 and registered in the Mineral and Petroleum Titles Registration Office (MPTRO) on 11 December 2017 under registration number 95/2017. The rights entitles WRE to prospect for Silver ore, Gold ore, Uranium ore, Sulphur, Platinum Group Metals, Rare earths, Alluvial diamonds, Copper ore, Cobalt ore, Manganese ore, Molybdenum ore, Nickel ore, Lead ore, Tungsten ore, Zinc ore, and Iron ore occurring in, on, and under various farms situated in the District of Odendaalsrus. Additionally, the renewal application was granted for a further period of three years by the Deputy Director-General on 30 May 2023, ending on 29 May 2026. This renewal was executed on 5 March 2024 and registered in the MPTRO on 30 April 2024 under registration number 17/2024.

Jelani submitted a Mining Right (MR) application for the areas currently covered by the Prospecting Rights. In accordance with the requirements of the Mineral and Petroleum Resources Development Act (MPRDA) and the NEMA Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), the company is obligated to undertake a comprehensive Scoping and Environmental Impact Assessment (S&EIA) process prior to the granting of the Mining Right.

The Environmental Impact Assessment (EIA) Report has been compiled in terms of the provisions of Appendix 3 of the EIA 2014 Regulations, as amended, and the Directive set out in the template prescribed by the DMPR. The alignment of this EIA Report with the requirements of Appendix 3 of the EIA Regulations is outlined in Table A.

Table A: Structure of the Environmental Impact Assessment Report in line with the Appendix 3 of the EIA 2014 Regulations, as Amended

No.	Regulation Requirement	Report Section
(a)	**Details of -**	1.4
(i)	The EAP who prepared the report and	
(ii)	The expertise of the EAP including a CV	Appendix A
(b)	**The location of the activity, including –**	1.5

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No.	Regulation Requirement	Report Section
(i)	The 21-digit Surveyor General code of each cadastral land parcel	
(ii)	Where available, the physical address and farm name	
(iii)	Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property or properties	N/A
(c)	**A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is -**	1.5 Appendix B
(i)	A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken	
(ii)	On land where the property has not been defined, the coordinates within which the activity is to be undertaken	
(d)	**A description of the scope of the proposed activity, including –**	1.7
(i)	All listed and specified activities triggered and being applied for; and	1.9
(ii)	A description of the associated structures and infrastructure related to the development;	1.7
(e)	**A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context**	2
(f)	**A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;**	3
(g)	**Amotivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;**	5
(h)	**A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:**	5
(i)	Details of the development footprint alternatives considered;	5
(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs	6 Appendix C
(iii)	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	1.10
(iv)	**The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects**	7
(v)	**The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts –** **(aa) can be reversed.** **(bb) may cause irreplaceable loss of resources.** **(cc) can be avoided, managed or mitigated**	8
(vi)	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and	8.1

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No.	Regulation Requirement	Report Section
	risks	
(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	8.2
(viii)	The possible mitigation measures that could be applied and level of residual risk	8.2
(ix)	If no alternative development footprints for the activity were investigated, the motivation for not considering such; and	5
(x)	A concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	5
(i)	**A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including -**	8
(i)	A description of all environmental issues and risks that were identified during the environmental impact assessment process; and	8
(ii)	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures	8
(j)	**An assessment of each identified potentially significant impact and risk, including–** (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	8
(k)	**Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;**	8.3
(l)	**An environmental impact statement which contains** (i) A summary of the key findings of the environmental impact assessment, (ii) map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	8.3

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No.	Regulation Requirement	Report Section
(m)	**Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;**	9.2
(n)	**The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;**	5
(o)	**Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;**	9.2
(p)	**A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;**	9.1
(q)	**A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;**	9.5
(r)	**Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;**	1.7 4
(s)	**An environmental impact statement which contains** (i) the correctness of the information provided in the reports (ii) the inclusion of comments and inputs from stakeholders and I&Aps (iii) the inclusion of inputs and recommendations from the specialist reports where relevant (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties	1.10.2 Appendix C
(t)	**……**	
(u)	**An indication of any deviation from the approved scoping report, including the plan of study, including-** (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	N/A
(v)	**Any specific information that may be required by the competent authority**	Appendix C7
(w)	**Any other matters required in terms of section 24(4)(a) and (b) of the Act**	N/A

Environmental Impacts associated with the Proposed Project

The table overleaf provides a summary of the significance of impacts identified for each environmental aspect throughout the life cycle of the Proposed Project. The identified impacts are expected to occur predominantly during the operational phase of the Proposed Project.

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Table B: Risk Matrix of Assessed Project Impacts

Impact	Rating Pre-Mitigation	Construction Phase	Operation Phase	Decommissioning Phase	Rating Post Mitigation	Construction Phase	Operation Phase	Decommissioning Phase
Positive (+)	Moderate (medium)				Moderate (medium)	• Social	• Social	
Positive (+)	Minor (low)	• Social	• Heritage • Social	• Heritage	Minor (low)		• Heritage	• Heritage
No Impact	No Impact				No Impact			
Negative (-)	Minor (low)	• Social • Hydrological • Hydrogeological	• Social • Hydrological • Ground Vibration	• Social • Hydrological • Hydrogeological	Minor (low)	• Heritage • Social • Hydrological • Hydrogeological	• Agricultural • Biodiversity • Freshwater • Social • Hydrological • Ground Vibration	• Biodiversity • Freshwater • Social • Social • Hydrological
Negative (-)	Moderate (medium)	• Heritage • Climate	• Agricultural • Biodiversity • Freshwater • Social • Hydrogeological	• Freshwater • Social • Climate • Hydrogeological	Moderate (medium)	• Climate	• Agricultural • Hydrogeological	• Climate • Hydrogeological
Negative (-)	Major (high)		• Agricultural • Biodiversity • Climate	• Biodiversity • Social	Major (high)		• Climate	

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Conclusions

An impact assessment has been undertaken using qualified specialists, which has incorporated extensive consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management, alternatives were firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. Where impacts were found to be potentially significant, various mitigation measures to manage and monitor the impacts of the project have been proposed.

Although mining activities often generate positive social and economic benefits, they also result in notable negative environmental impacts. Prioritising environmental stewardship, complying with relevant environmental legislation and implementing specialist recommendations and sustainable operational practices will be required to minimise its environmental footprint and reduce ecological impacts as far as possible while balancing the economic and social benefits.

The findings of the impact assessment indicate that the Proposed Project would result in several negative environmental impacts, primarily during the operational phase, however, none of the specialist studies identified any fatal flaw to the project. Scientific specialist mitigation measures have been included into this EIA and EMPr report to reduce the significance of all the identified negative impacts. Most of the negative impacts from the Proposed Project can be reduced to low negative through the implementation of mitigation measures.

Based on the findings outlined in this report, the EAP concludes that the potential negative environmental impacts associated with the Proposed Project can be mitigated to acceptable levels. Therefore, it is recommended that the Proposed Project be authorised to proceed. This opinion holds provided that all the recommendations proposed in the specialist studies and the EIA and EMPr report as well as legislative requirements are implemented and adhered to.



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Appendix E – Environmental Management Plan report (EMPr)

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Abbreviations and Units

Abbreviation/ Symbol	Description
AMD	Acid Mine Drainage
BID	Background Information Document
BRP	Bio Regional Plan
CA	Competent Authority/Authorities
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
CBA	Critical Biodiversity Area
CRR	Comments and Response Report
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEFF	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
DMPR	Department of Mineral and Petroleum Resources
DoH	Department of Health
DPWI	Department of Public Works and Infrastructure
DSR	Draft Scoping Report
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIP	Environmental Implementation Plan
EIR	Environmental Impact Report
EMF	Environmental Management Framework
EMPr	Environmental Management Programme Report
ESA	Ecologically Sensitive Areas
FSR	Final Scoping Report
GDP	Growth Domestic Product
Ha	Hectare
IDP	Integrated Development Plan
IWULA	Integrated Water Use Licence Application
JV	Joint Venture
Km	Kilometre
m	Metre
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MR	Mining Right
NBSAP	National Biodiversity Strategy and Action Plan
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)
NEM:PAA	National Environmental Management Protected Areas Act, 2003 (Act No 57 of 2003)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEMLAA	National Environmental Laws Amendment Act, 2014 (Act No. 25 of 2014)

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Abbreviation/ Symbol	Description
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NNR	National Nuclear Regulator
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PA	Protected Area
PAIA	Promotion of Access to Information Act (Act No. 2 of 2000)
PR	Prospecting Rights
PPP	Public Participation Process
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
S&EIA	Scoping and Environmental Impact Assessment
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SIA	Social Impact Assessment
SLP	Social and Labour Plan.
SPLUMA	Spatial Planning and Land Use Management Act (Act No. 16 of 2013)
SRP	Surface Right Permit
STR	Screening Tool Report
TSF	Tailings Storage Facility
WRE	White Rivers Exploration
WMA	Water Management Area
WML	Waste Management Licence

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1. Introduction and Background

1.1 Project Background and Motivation

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa.

Jelani intends to initiate underground mining operation within the JV area, to extract various minerals, primarily focusing on Gold ore, along with Silver, Uranium, and other associated minerals. The Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development.

In addition, the project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new infrastructure is planned within the project area.

1.2 Overview of the Environmental Impact Assessment Process

1.2.1 Application Relevant to the S&EIA Process

Kongiwe has been appointed by **Jelani Resources (Pty) Ltd** (the Applicant) to undertake a Scoping and Environmental Impact Assessment (S&EIA) process which evaluates the environmental impacts associated with the Proposed Project as part of an Environmental Authorisation (EA). The S&EIA and specialist studies to be undertaken will support the applications for the required approvals. The following applications will be made to the DMPR for the Proposed Project:

- **EA Application** for listed activities triggered in Listing Notices GN R983, GN R984 and GN R9852 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

In addition, the following application will be made to the relevant Competent Authority:

- **An Integrated Water Use Licence Application (IWULA)** in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) will be submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project.

The EIA findings, including specialist findings, are used by the applicant and authorities to obtain an objective view of the potential environmental, social and cultural impacts that could arise due to the Proposed Project. Measures for the avoidance or mitigation of negative impacts will be proposed, and positive impacts will be enhanced.

[2] These Listing Notices have been amended by GN R327, GN R325 and GN R324 of 7 April 2017 and GN R 517 of 11 June 2021

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1.2.1.1. The National Web Based Environmental Screening Tool

According to Regulation 16(1)(b)(v) of the EIA 2014 Regulations (as amended), it is a requirement for an EA application to be submitted with a screening report generated by the National Web Based Environmental Screening Tool ("Screening Tool"). This requirement took effect from October 2019.

The Screening Tool allows the EAP to screen their Proposed Project site for any environmental sensitivities. It serves as a guide to identify related exclusions and/or specialist studies that may be a requirement for a Proposed Project.

The Screening Report for the Proposed Project, acquired through the Screening Tool, is included in this report as Appendix D1.

1.2.2 Methodology applied to conducting the Environmental Impact Assessment Process

The outcome of the first phase of the S&EIA is the Scoping Report, which provides the terms of reference for undertaking the EIA Phase of the project. Figure 1-1 indicates the methodology that is applied in conducting the S&EIA process.

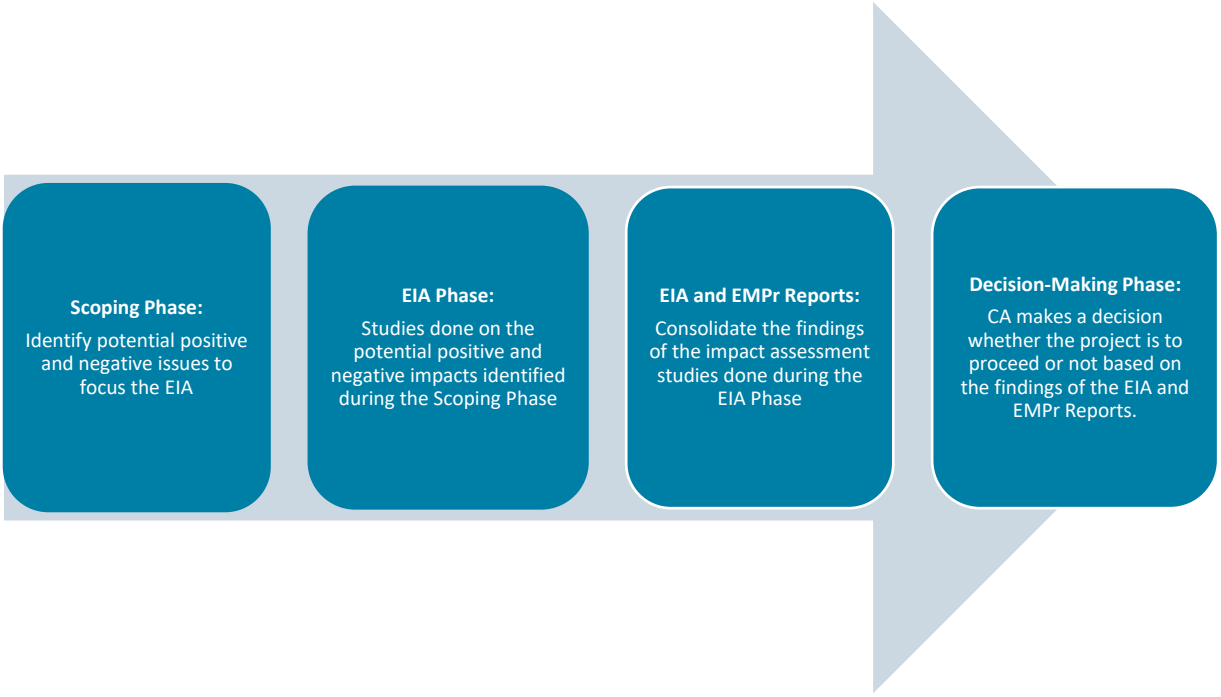


Figure 1-1: Methodology applied to conducting a S&EIA process

1.2.3 S&EIA Timeframes

The DSR will be submitted and made available for a 30-day public review period. The comments received during this period will be captured in a Comments and Responses Report (CRR) that will be submitted with the Final Scoping Report (FSR).

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Once the FSR has been submitted to the DMPR as CA, the Department must either accept or reject the Scoping Report within **43 days**. Once confirmation of acceptance has been received from the DMPR, the EIA Phase commences and will run for a period of **106 days**, in which time stakeholders will be afforded a **30-day** period in which to review and comment on the S&EIR documentation.

Upon submission of the EIA/Environmental Management Programme (EMPr) document, the CA will have **107 days** to reach a decision on the project (Record of Decision (RoD)). The RoD is otherwise referred to as the EA which authorises the project activities to proceed. The decision to grant the EA may be appealed (within **20 days**) by any party, including the Applicant, following the process outlined in the National Appeal Regulations (GNR 993 of 8 December 2014) published in terms of the NEMA.

If significant changes to the EIA/EMPr are required, which were not consulted on during the initial public participation process, a notice may be submitted to the DMPR stating that the EIA/EMPr will be submitted within **156 days** from date of acceptance of the Scoping Report. During the aforesaid **156-day** period, stakeholders will be afforded a further **30-day** period in which to review the amended EIA/EMPr documentation.

1.2.4 Public Participation Process

The Public Participation Process (PPP) has been designed to comply with the regulatory requirements set out in the EIA 2014 Regulations (as amended). The PPP provides the opportunity for communication between agencies making decisions and the public. This communication can be an early warning system for public concerns, a means through which accurate and timely information can be disseminated, and can contribute to sustainable decision-making (IAP2, 2006).

Kongiwe encourages stakeholders to provide input into the S&EIA. The sharing of information forms the basis of PPP, with an aim to encourage the public to have meaningful input into the decision-making process from the onset of the project. Stakeholders may participate at various stages of the S&EIA process. The key opportunities for input during the Scoping, Environmental Impact Assessment and Decision-Making phases are illustrated in Figure 1-2.

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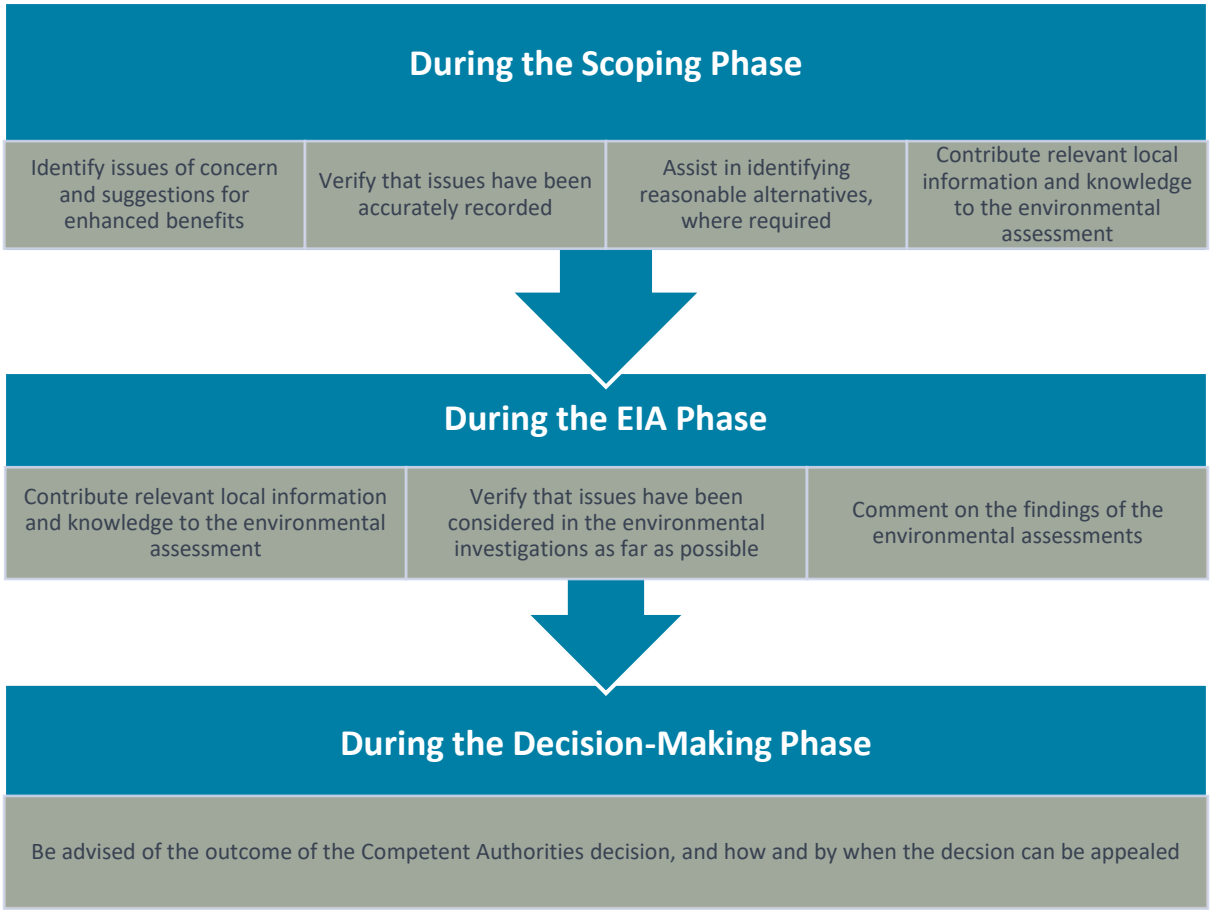


Figure 1-2: Stakeholder Engagement Opportunities During the Scoping, EIA and Decision-Making Phases

The Draft Scoping Report (DSR) was made available for public comment from Thursday, 21 May 2026, to Monday, 22 June 2026. The project team conducted an Open Day with stakeholders at S.A. Mokhothu Primary School on Saturday, 30 May 2026, from 11:00 to 13:00. In addition, an online meeting with stakeholders was held on Wednesday, 27 May 2026, from 10:00 to 11:00 via Microsoft Teams. During these consultation meetings, the contents of the DSR were presented and discussed. Comments received during the DSR comment period were captured in the Comments and Responses Report (CRR) and incorporated into the Final Scoping Report (FSR).

The FSR was submitted to the Competent Authority (CA) on Wednesday, 1 July 2026, and acceptance of the FSR was received on Monday, 3 August 2026. Following acceptance of the FSR, the Environmental Impact Assessment (EIA) phase commenced. The Draft Environmental Impact Assessment Report (DEIAR) will be made available for a 30-day public review period from 29 September 2026 to Wednesday, 28 October 2026.

1.3 Details of the Applicant

Jelani Resources Ltd (Jelani) is a joint venture (JV) company with participants White Rivers Exploration (WRE) and Harmony Gold Mining Company Ltd (Harmony). WRE is a privately owned company with shareholders in South Africa and Australia, the company is South Africa focused and has various prospecting rights for gold, coal and other minerals. WRE is currently an exploration company with no active mining operations. Harmony is a publicly listed company with a primary listing on the Johannesburg Stock Exchange (JSE) and secondary listings on the New York Stock Exchange and the Berlin Stock Exchange. The company is a gold focused miner with

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operations in South Africa and Papua New Guinea. The JV partners have vested various prospecting and mining rights in Jelani over an area identified as the JV Area for the proposed Underground Mining Project.

Table 1-1: Details of the Applicant

Project Applicant	Jelani Resources (Pty) Ltd		
Registration number (if any)	2014/099861/07		
Trading name (if any)	Jelani Resources (Pty) Ltd		
Responsible Person **(E.g. CEO, Director, etc.)**	Bernard Olivier		
Contact person:	Neels Hoek		
Physical address	HHK House North Corner Ruth Crescent Northcliff (Johannesburg) Gauteng 2115		
Postal address	HHK House North Corner Ruth Crescent Northcliff (Johannesburg) Gauteng 2115		
Postal Code	2115	Cell:	076 254 2506 / 082 071 7571
Telephone	N/A	Fax:	N/A
Email	nhoek@mera.co.za		

Jelani Resources is a joint venture company with participants White Rivers Exploration (Pty) Ltd, and Afgold Limited and Loraine Gold Mines Limited, both wholly owned subsidiaries of Harmony Gold Mining Company Limited.

White Rivers Exploration is a privately owned company with shareholders in South Africa and Australia. The company is South Africa focused and has various prospecting rights for gold, coal and other minerals.

During 2023, WRE was placed under business rescue proceedings. A combination of factors and events during the years preceding the commencement of Proceedings, all contributed to the Company's Financial Distress.

Lexington Gold (AIM: LEX), a gold exploration and development company, announced on 15 May 2023 to shareholders (published on 2 June 2023), the completion of its acquisition of White Rivers Exploration Proprietary Limited ("WRE"), an exploration and development company with significant gold assets in South Africa.

Accordingly, WRE exited its business rescue process with no creditors other than the Lexington Gold group, and the Company, through its wholly owned subsidiary Lexington Gold South Africa Proprietary Limited, subject to approval from the Minister of Mineral Resources and Energy in terms of Section 11 of the MPRDA, will be the sole shareholder of WRE, with a 26% in WRE to be issued to Lexington Gold's Broad-Based Black Economic Empowerment Partners ("BBBEE"), Masana Exploration.

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On 12 December 2024, the Deputy Director General, Mineral and Petroleum Regulation of the Department of Mineral and Petroleum Resources granted consent for the cession of 100% of the issued shares held in WRE to Lexington Gold South Africa (Pty) Ltd and Masana Exploration (Pty) Ltd.

Subsequently to Section 11 approval, 74% interest in White Rivers Exploration has been issued to Lexington Gold South Africa (Pty) Ltd, a subsidiary of Lexington Gold PLC (AIM:LEX); and 26% interest in White Rivers Exploration has been issued to Masana Exploration (Pty) Ltd, a subsidiary of Letsema Holdings (Pty) Ltd, a 100% Broad-Based Black Economic Empowerment Company.

1.4 Details of the Environmental Assessment Practitioner

Kongiwe is a contemporary, problem-solving consultancy specialising in solving real-world environmental challenges. We pride ourselves in using the latest technology available to realise pragmatic solutions for our clients. The company was created with the essential intent: 'To solve environmental challenges for a world driven towards a sustainable future.'

With offices in Johannesburg and Pretoria, South Africa, and in Canada and the United Kingdom respectively, our team of professional Environmental Scientists are highly trained in various environmental disciplines and have significant, hands-on experience in an array of projects across numerous industries. The company has extensive environmental and project management experience in multiple sectors, with significant experience in South Africa, as well as internationally. Kongiwe focuses on the integration of environmental studies and processes into larger projects. Moreover, Kongiwe provides clients with strategic environmental assessments and compliance advice, the identification of environmental management solutions and mitigation / risk minimising measures throughout the project lifecycle.

1.4.1 Contact Person and Corresponding Address

The report was compiled by Ripfumelo Macevele. The Environmental Assessment Practitioner (EAP) details are provided in Table 1-2.

Table 1-2: Details of Environmental Assessment Practitioner

Name of Practitioner	Ripfumelo Macevele, Kongiwe Environmental (Pty) Ltd
EAP Registration No.	2019/1051
Tel No	+27 (10) 140 6508
Cell No	079 178 9655
E-mail Address	rmacevele@kongiwe.com

Ripfumelo Macevele is an Environmental Assessment Practitioner at Kongiwe Environmental. He is EAPASA Registered Environmental Assessment Practitioner (2019/1051) as well as registered with SACNASP as Environmental Science Candidate Natural Scientist (128491) and has extensive experience in executing the process to obtain Environmental Approvals through Environmental Impact Assessment and conducting Environmental Monitoring, Auditing & Reporting and Developing Environmental Management Plans as well as Water Use Licence applications and Public Participation. Qualifications in Appendix A.

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1.4.2 Independent Specialist Team Members

A number of independent specialist consultants have been appointed as part of the Scoping and Environmental Impact Assessment (S&EIA) team to adequately identify and assess potential impacts associated with the Proposed Project. The specialist consultants who will provide input into the S&EIA are presented in Table 1-3.

Table 1-3: Details of the Specialist Team

Specialist Study	Specialist Company
Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.	SAS Environmental
Desktop Heritage and Palaeontology Impact Assessment	PGS Heritage
Air Quality Impact Quality Assessment	Rayten Engineering
Mine Closure Plan	CRPM
Hydrological Assessment	Kongiwe Environmental
Hydrogeological Assessment	Hydro B
Climate Change	Kongiwe Environmental
Blasting and Vibrations	Blast Management and Consulting
Socio-Economic Impact Assessment	Kongiwe Environmental

1.5 Project Location

The Proposed Project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 1,5km west of Allanridge town, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality. Refer to Figure 1-3 for the Proposed Project local orientation. Below is a summary of the location of the Project Site (Table 1-4).

Table 1-4: Summary of the Location of the Project Site

Province	Free State Province
Municipality	Matjhabeng Local Municipality
Ward Number	36
Nearest Town	Allanridge

Table 1-5 below shows the properties that are directly affected by the Proposed Project.

Table 1-5: Description of Directly Affected Properties

Farm Name	Farm ID	Farm Portion	SG Code
Welvaart No. 63	RD	0 (RE)	F02400000000006300000
Welvaart No. 63	RD	1	F02400000000006300001
Welvaart No. 63	RD	2	F02400000000006300002
Diamant No. 37	RD	0	F02400000000003700000
Graspan No. 40	RD	0 (RE)	F02400000000004000000
Graspan No. 40	RD	1	F02400000000004000001

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Swartpan No. 436	RD	0 (RE)	F02400000000043600000

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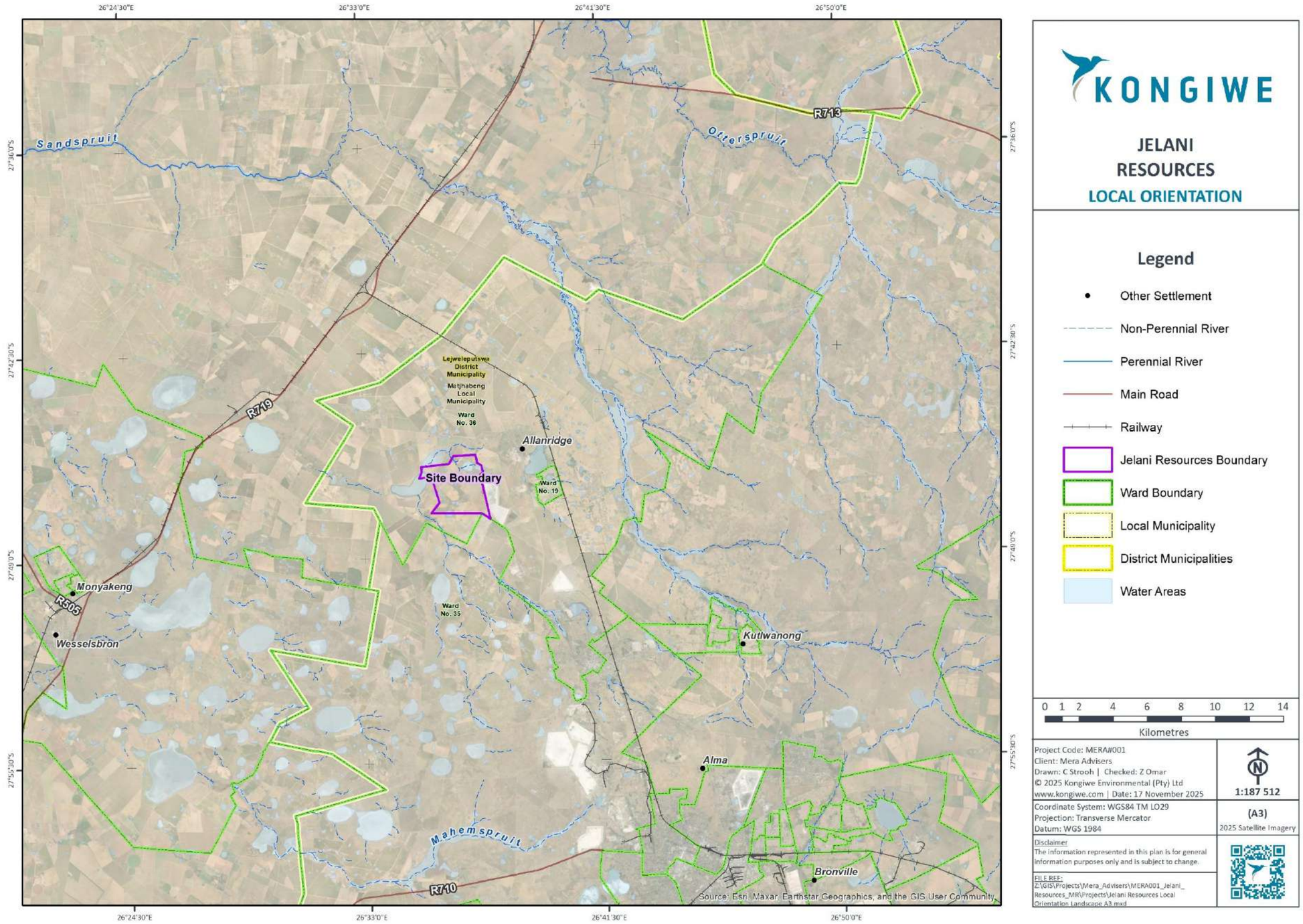
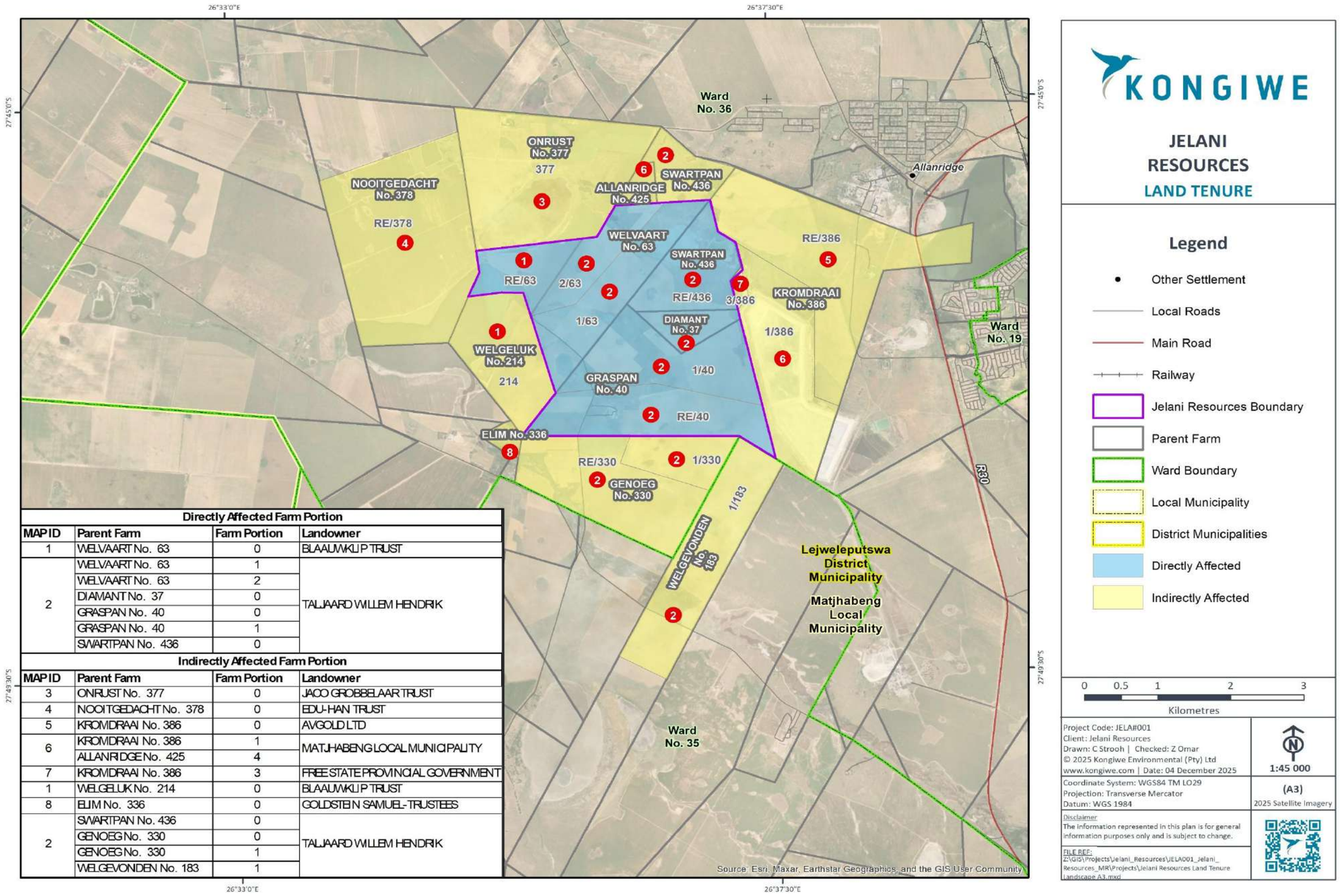


Figure 1-3: Local Orientation of the proposed JV Area Underground Mining Project

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Directly Affected Farm Portion

MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion

MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES
LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3
Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

1:45 000
(A3)
2025 Satellite Imagery

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
Z:\GIS\Projects\Jelani_Resources\JELA001_Jelani_Resources_MR\Projects\Jelani Resources Land Tenure Landscape A3.mxd

Figure 1-4: Jelani Underground Mining Project Land Tenure Map

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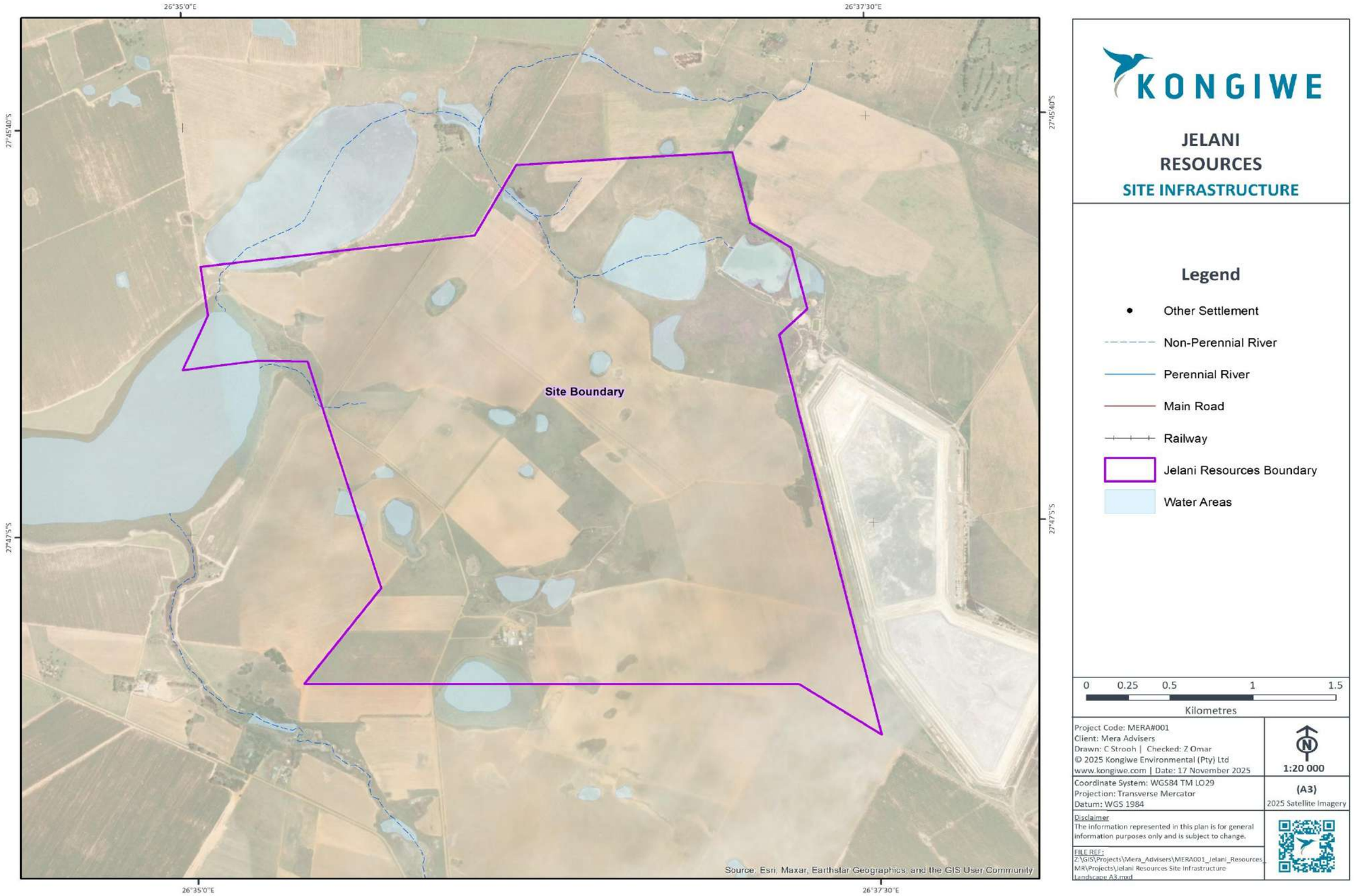


Figure 1-5: Jelani Underground Mining Project Infrastructure Map

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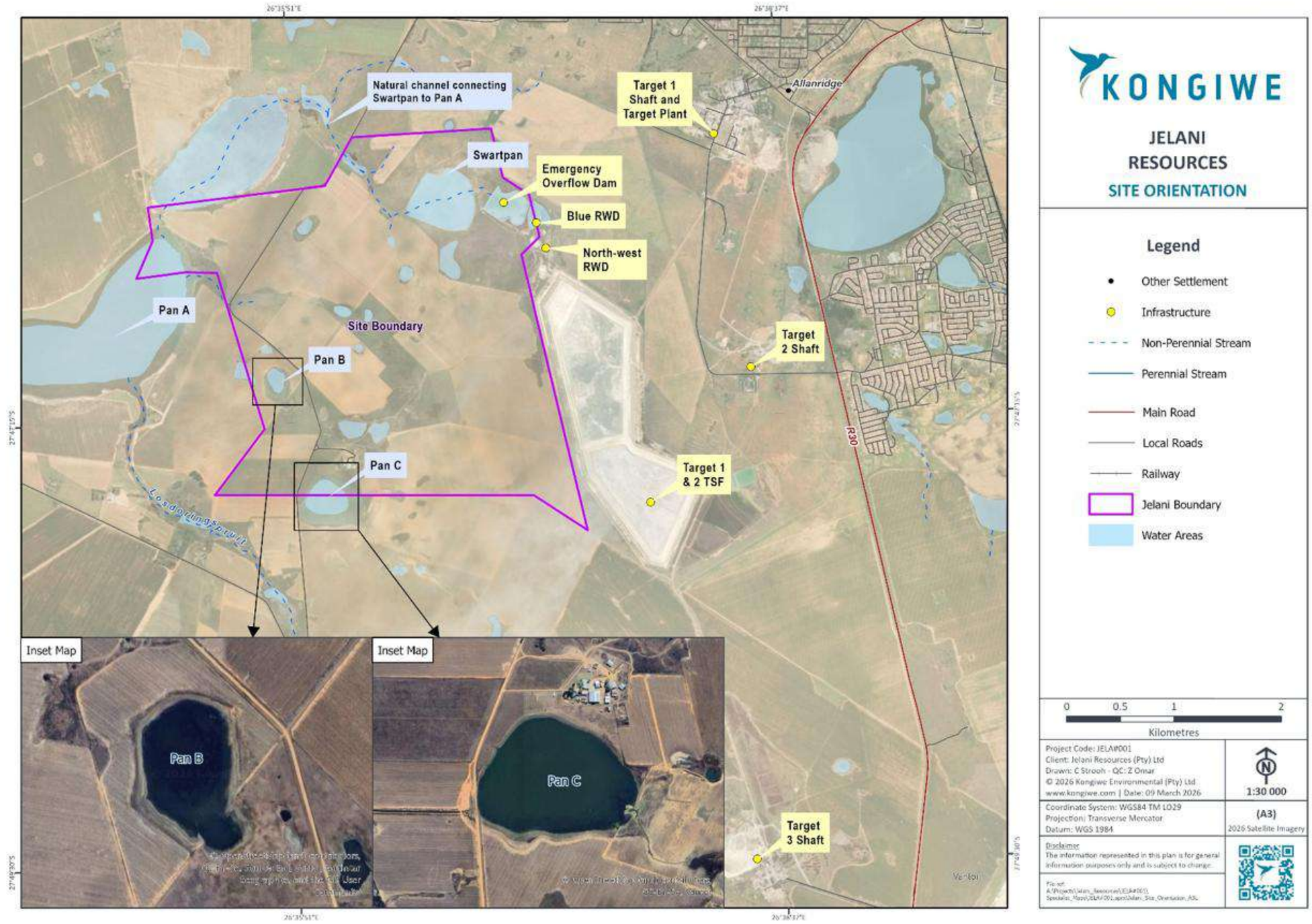


Figure 1-6: Site Orientation.

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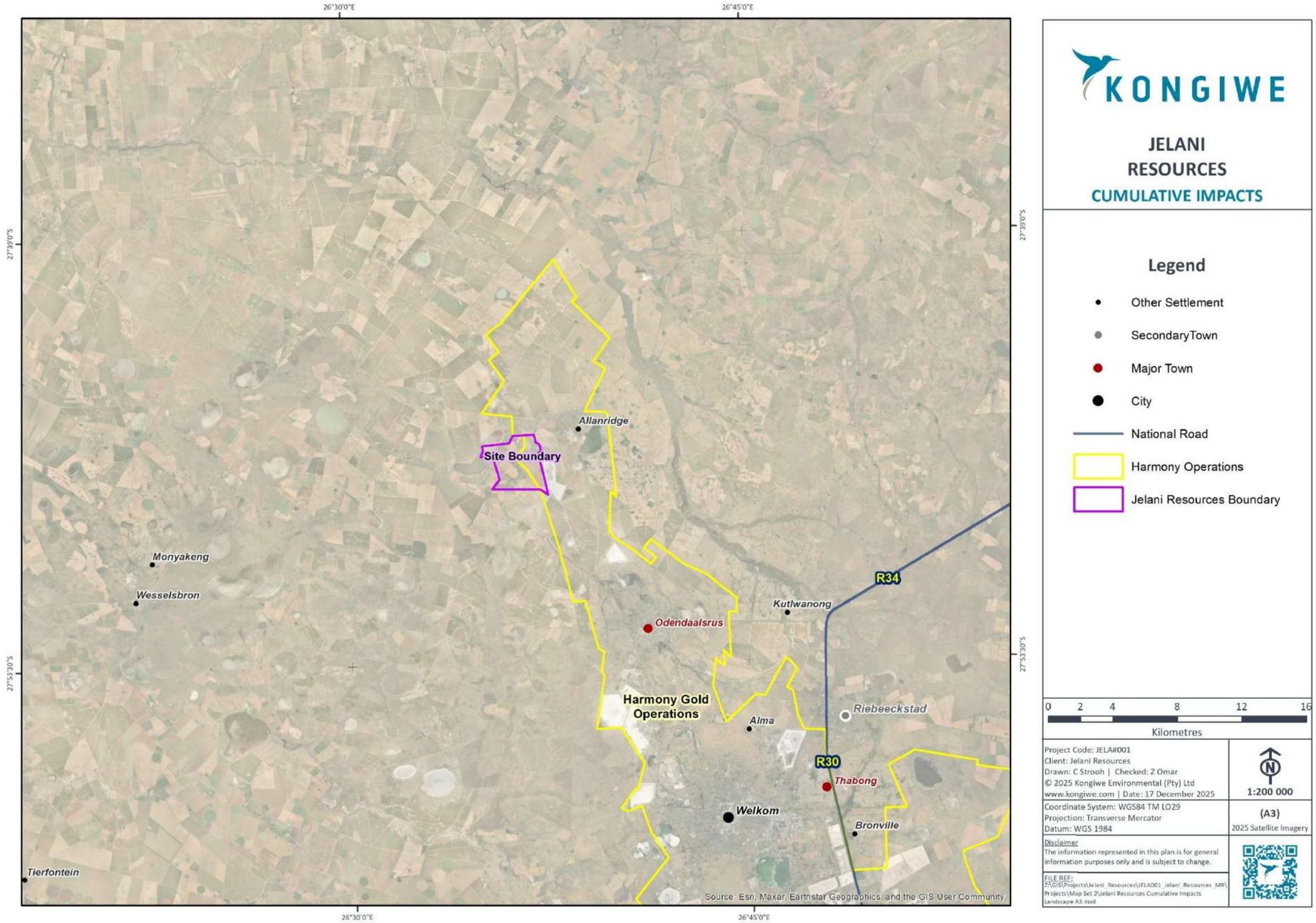


Figure 1-7: Map of the Jelani Boundary and Harmony Gold Operations

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1.6 Site Access, Access Control and Security

The Proposed Project is located within an area served by an established road network. Public routes in close proximity to the site include existing roads currently used for Harmony Target Mine operations as well as gravel roads used by the local farmers.

Only the development of gravel access tracks to facilitate the monitoring of potential mining-induced seismicity and boundary interactions is anticipated at the project site.

Vehicle access to the shaft site is via the R30 public road, connecting to the existing mine access roads, that will continue to be used. No additional refurbishments are required on these roads other than possibly cutting back the overhanging branches of the two rows of trees that run along the entire length of the road.

The shaft site perimeter is already fenced and assumed to be according to the Harmony Standard, as no other security measures or devices were observed. Access to the shaft complex is controlled through the main access security gate (Item 21 in Figure 1-10). Provision has been made to refurbish the system.

1.7 Project Description

Jelani Resources (Pty) Ltd is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

The Proposed Project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage).

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Conventional Breast Mining

Where the orebody dips below 55°, conventional breast mining will be used. Footwall drives will be developed in the strike direction, between 40 to 48m below the mining horizon. Crosscuts will subsequently be developed perpendicularly to the footwall drives, towards the reef horizon. Access to the reef horizon will be by travelling way, developed from the crosscut. Ore passes will be developed between the reef horizon and the crosscut for the removal of blasted ore from the stope. On the stope horizon, a raise or centre gully will be developed between levels up the centre of the mining block. Breast mining panels will be established off the centre gully. The panels will be mined approximately in the strike direction away from the centre gully to the stope block limit. An advanced strike gully (ASG) will be carried on the down dip side of each mining panel for access to the stope face and for clearing of blasted ore from the face. Typically, two stope ore passes will be situated in the centre gully which will connect the stoping areas to the footwall infrastructure. All ore produced in the stopes will be scraped into the ore passes for loading in the crosscut. Figure 1-8 shows a plan of a typical stope block.

The breast faces will be drilled using hand-held, hydro-powered rock drills and airlegs. Blast holes will be charged with packaged emulsion explosives. Scraper cleaning will be used in the stope horizon. Ore will be scraped from the face, into the ASG and then into the centre gully. From the centre gully the rock is scraped over a stope grizzly into the ore pass. The bottom of the ore pass is equipped with a boxfront with a hydraulically operated gate.

Where multiple reefs occur, and both are payable and are planned to be mined, the order of mining will be to extract the uppermost reef first, working downwards.

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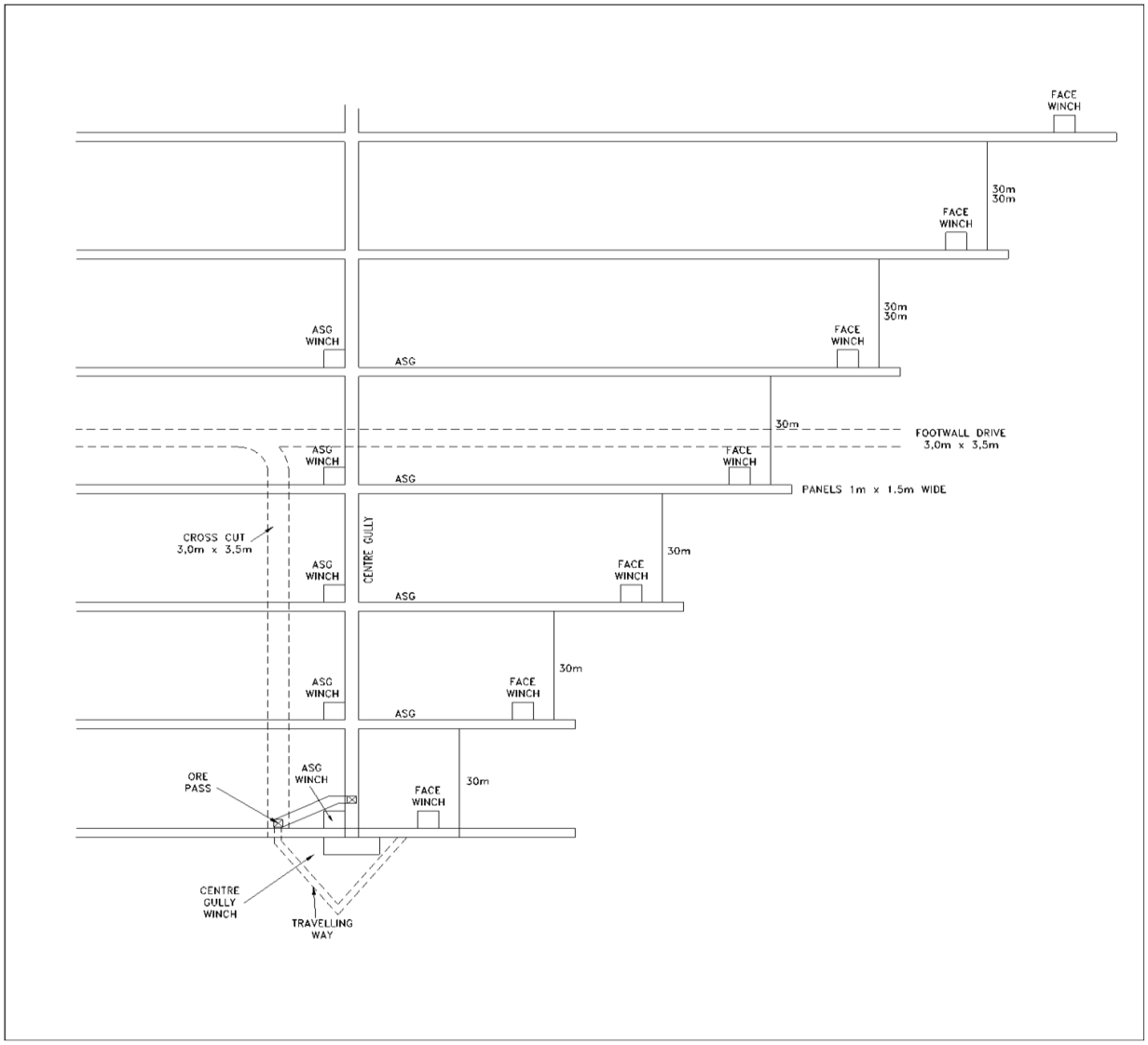


Figure 1-8: Schematic plan view of a conventional stope block

Shrinkage Stoping

Shrinkage stoping is an overhand mining method that relies on broken material being left in the stope to be used as the "working floor" and to support the walls. The shrinkage stope is accessed via a travelling way. The stope is established and accessed by the development of two raises, one on each end of the stope panel.

Two drives, separated by a sill pillar, are established at the bottom of the stope. Draw points are developed between the two drives for loading ore from the stope. Once the stope preparation development and equipping has been completed stoping commences by advancing the stope face up-dip from the sill drive. After each blast sufficient ore is drawn out to allow access between the new stope face and the top of the muckpile. Once the stope face reaches the upper limit, which is normally defined by a crown pillar, all men and equipment are withdrawn from the stope and the remaining ore is drawn from the stope. Ore is drawn out of the stope by operating the scraper winch in the reef drive. This clears rock from the draw points and allows the ore to continue to flow.

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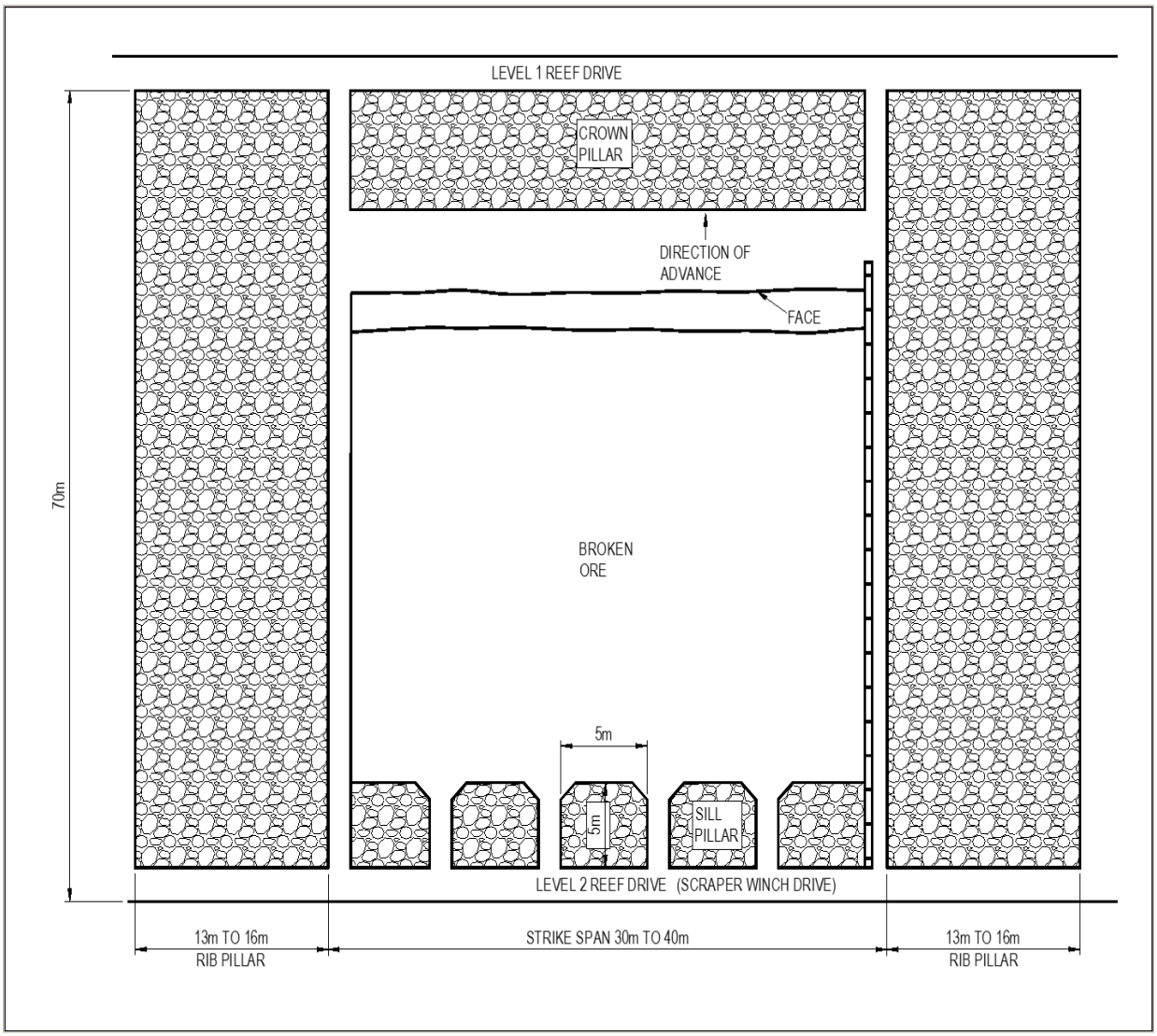


Figure 1-9: Schematic long section illustrating a typical shrinkage stope

Ore will be transported to the shaft ore pass system using a conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mines life, be used for the movement of men, material and rock depending on which phase the mine is in.

1.7.1 Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project

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area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4 and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations/targets. A layout of the proposed Target 3 shaft surface infrastructure which either needs to be refurbished or constructed is presented in Figure 1-10. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished. Mining activities during this phase will take place between 57 Level and 48 Level (Figure 1-11).

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Figure 1-10: Target No 3 Shaft surface infrastructure layout

The No 3 shaft surface infrastructure will compromise of the following (as numbered):

1. No 3 shaft
2. Shaft facilities
   (a) Lamp repair
   (b) Proto room
   (c) Lamp room
3. Change house facilities
   (a) Main laundry
   (b) Main change house
4. Compressor house
5. Waste rock dump (not on Figure 1-10)
6. Surface rock handling
7. Main substation
8. Parking area
9. Offices
   (a) Management, administration and technical services
   (b) Mining
   (c) Engineering
10. Man winder
11. Barlow winder
12. Rock winder
13. Fridge plant
14. Store building
15. Services/fitting workshops
16. Dirty water dam & pump station
17. Sewerage plant
18. Evaporation plant
19. Change house (not on Figure 1-10)
20. No 4 shaft ventilation fans
21. Security office
22. Explosives store
23. Conveyors
24. Laydown area and salvage yard
25. Walkway
26. Marshalling yard
27. Drop off area
28. Ablution block
29. Laundry
30. Change houses
31. Offices
32. Lapa
33. Parking (not on Figure 1-10)
34. Parking
35. Turnstiles
36. Waiting area
37. Lean to roof
38. Underground store
39. Pump house
40. Service boiler shop (not on Figure 1-10)
41. Services boiler store (not on Figure 1-10)
42. Rail line
43. Pipeline
44. Security
45. Timber yard
46. Electrical workshop
47. Flammable store
48. Old oil store

An overview of the Target 3 Shaft with level elevations, is shown in Figure 1-11.

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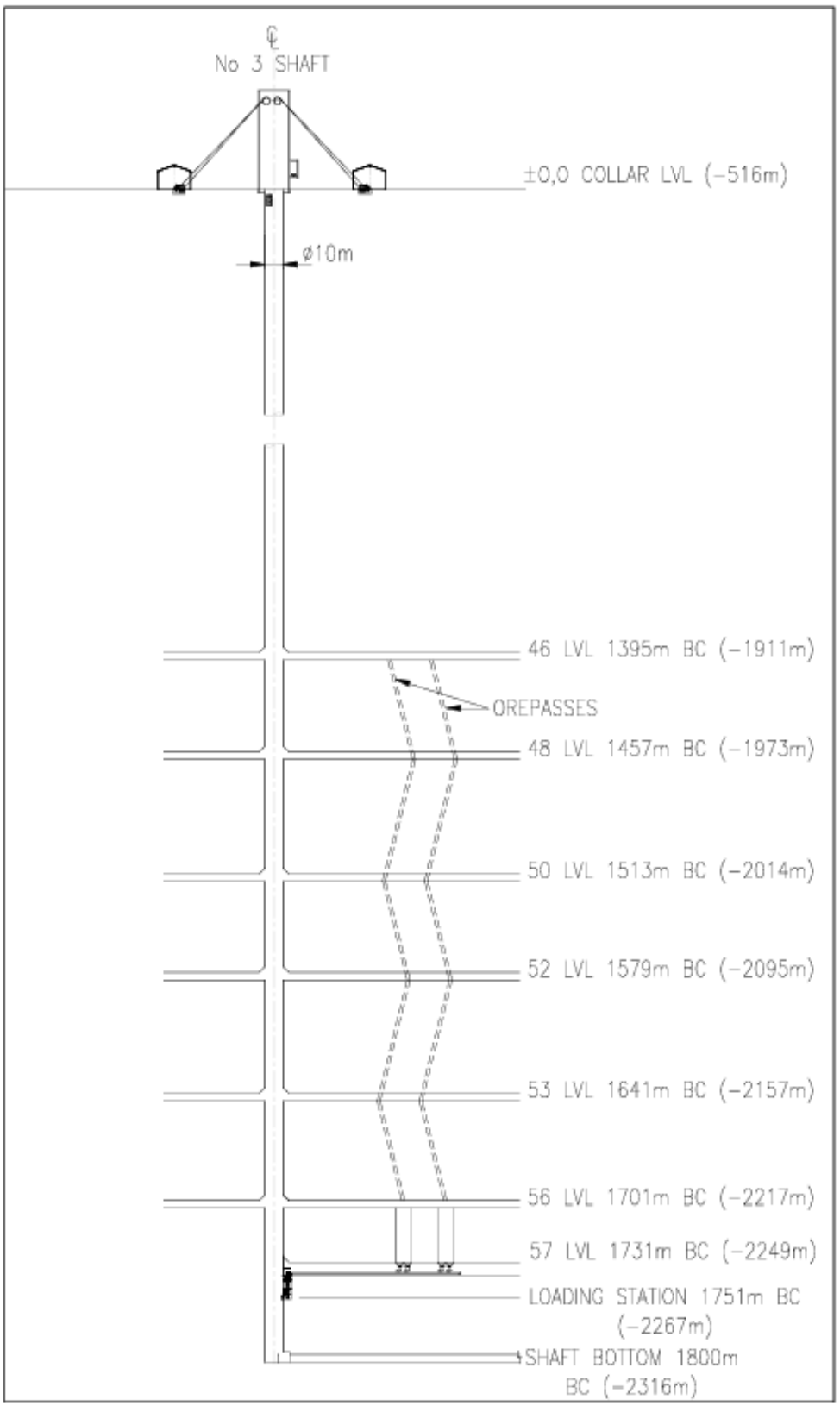


Figure 1-11: Target 3 shaft longitudinal arrangement

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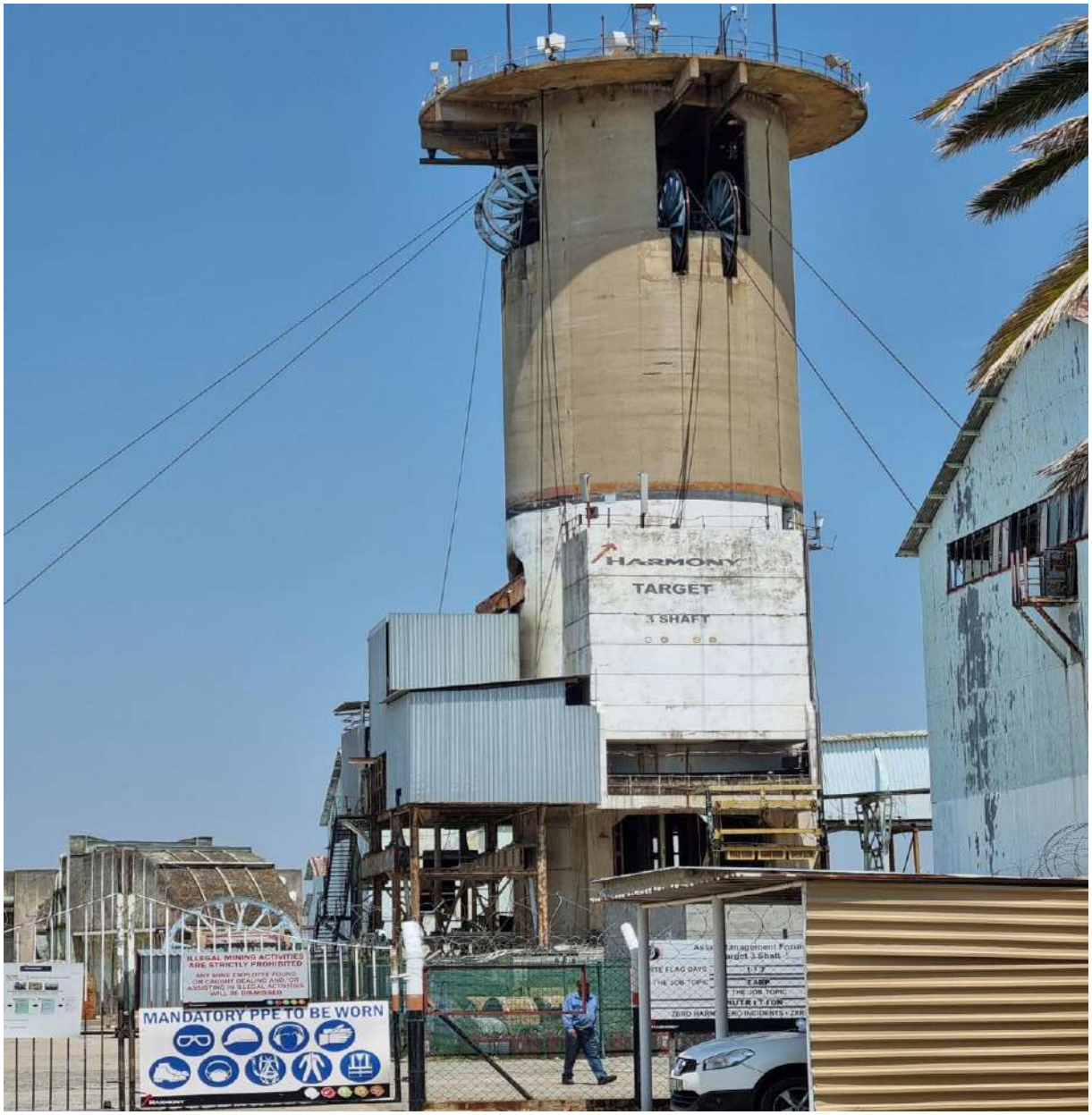


Figure 1-12: Harmony Target No 3 Shaft

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet. Mining activities in this phase are planned to occur above 48 Level and below 57 Level.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated with the Proposed Project will be relocated to this shaft.

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Figure 1-13*: *Harmony Target No 2 Shaft

A layout of the current Target No 2 Shaft surface infrastructure as well as the proposed new infrastructures which are required to be constructed are presented in Figure 1-14.

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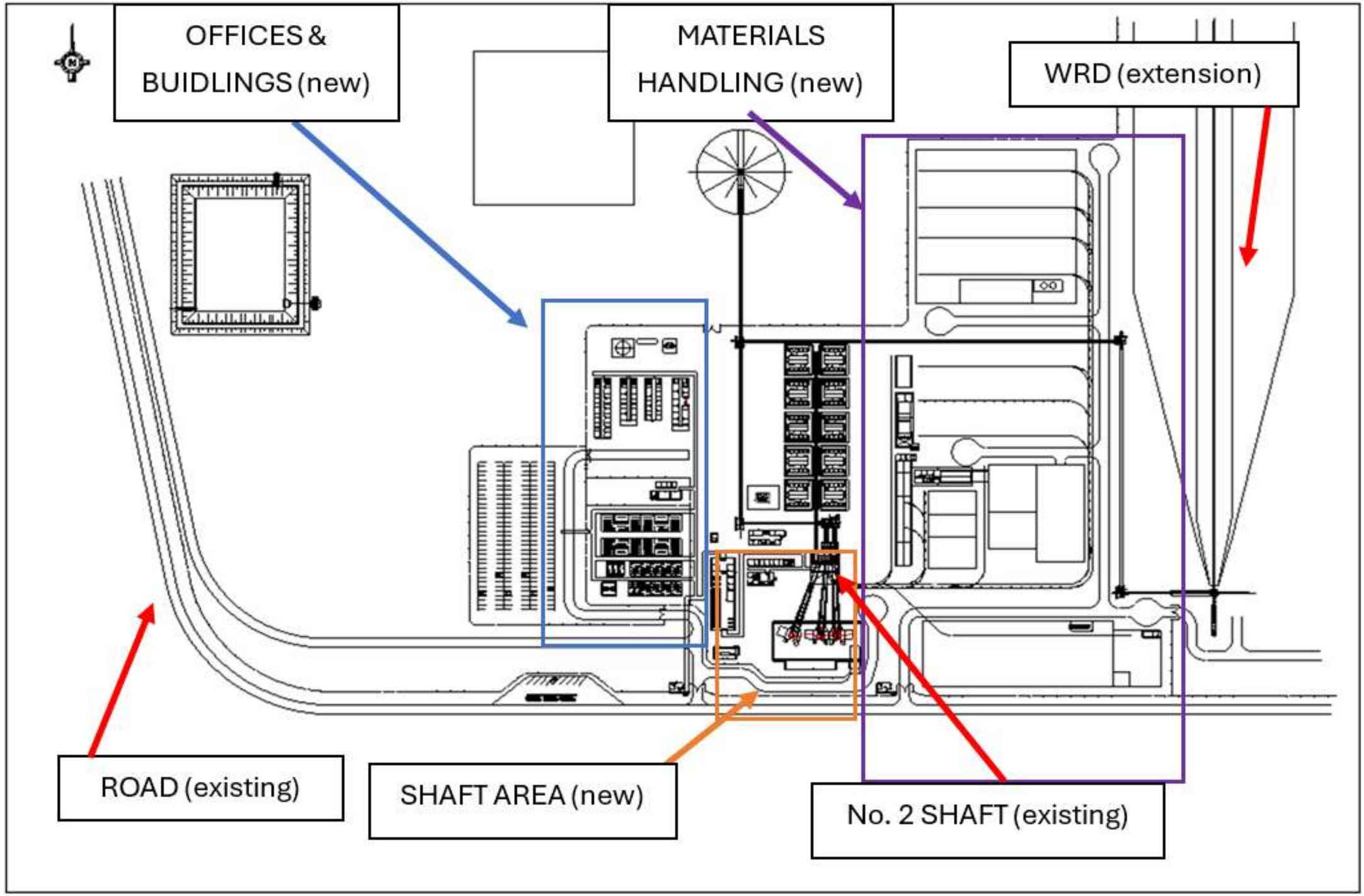


Figure 1-14: Target No 2 Shaft existing infrastructure and proposed infrastructure

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To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project (and application) being undertaken by Harmony Gold.

1.7.2 Area Extent

The total extent of the application area is 956.76 hectares (ha).

1.7.3 Depth of Mineral Below Surface

The orebodies extend between 1 500m and 2 600m below surface.

1.7.4 Proposed Beneficiation Process

All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

1.7.5 Project Schedule

Prior to the initiation of mine implementation and construction phase activities, various stages of design work will be required to be undertaken. It is expected that these activities will take approximately four years before implementation can be initiated. Active mining can commence during year 7. The key timelines are listed in Table 1-6 below:

Table 1-6: Project Timelines

Period	Description
Year 1 - 3	Site data gathering and feasibility studies
Year 4	Detailed engineering design
Year 5 - 8	Implementation and construction phase activities
Year 7	Hiring of employees
Year 7	**Initiation of mining activities underground**

The production build-up is planned to occur in two phases:

In Phase 1, which is planned to last for four years starting in Year 5, with construction and refurbishment with mining starting in Year 7. The first two years are required for level access and refurbishment, after which Target No 3 shaft will be used for hoisting of men, material and rock.

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Phase 2 commences in Year 9, whereby access to the underground workings is via Target No 2 shaft, with Target No 3 shaft being reserved as a second outlet.

As mine development progresses over the first four years, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of ore per month, which is achieved in Year 10.

10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years.

1.8 Power Supply

Listed The proposed project mining area will initially be accessed from Target No. 3 shaft, and once maintenance upgrades completed, from Target No. 2 shaft.

Both No. 3 and No. 2 shafts have existing Eskom bulk supplies providing power for the care and maintenance operations. The 3 Shaft main substation has sufficient installed capacity in order supply the power requirements for the phase 1 mining operation. The 2 Shaft main substation will require a complete upgrade.

1.8.1 No 3 Shaft Bulk Supply

The No. 3 shaft substation is supplied at 6.6kV from the Eskom bulk supply 44/6.6kV substation, which includes the following 44/6.6kV transformers:

- 2 x 10MVA transformers
- 2 x 5 MVA transformers
- 4 x 3.1 MVA transformers

No. 3 shaft will supply the complete power requirements for the phase 1 mining. During this initial period the repair and upgrading of No. 2 shaft facilities will occur, following which the mining operation will be supplied from No. 2 shaft. This is with the exception of the No. 4 shaft ventilation fans, providing the required ventilation for the JV project, which will be supplied from No. 3 shaft for the life of mine.

The calculated peak demand for No. 3 shaft is as follows:

- Phase 1 (Years 3-5) – 12.5 MVA
- Phase 2 (Years 6-17) – 1 MVA (Only JV project load)

The breakdown of the peak load calculation is provided in Table 1-7.

Table 1-7: No. 3 Shaft Peak Demand

Description	Connected Power (kW)	Operating Load (kW)
Surface Infrastructure	740	540
Hoisting Systems	8970	2740
Compressors	1530	1230
4# Ventilation Fans	2440	870

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Mining	12 200	6 680
Pumping	8 580	3 130
Total Power	34 460	15 190
Diversity factor		0.7
Peak Power (kW)		10 633
Power Factor		0.8
Peak Load (MVA)		**12.5**

The existing 3# electrical infrastructure has sufficient capacity, is in good operational condition and can therefore supply the Proposed Project requirements with little upgrade work required.

The existing No 3 Shaft electrical infrastructure is in reasonable condition, with the rock winder MV switchgear and starter equipment identified as requiring replacement. Upgrade of the surface infrastructure and rock handling system will be performed on surface. New MSU's and LV reticulation have been included to supply the new equipment, including the compressor station. The existing surface MV reticulation ring will be extended to cater for the new loads.

1.8.2 No 2 Shaft Bulk Supply

The existing No. 2 shaft substation is supplied at 6.6kV from the Eskom bulk supply 44/6.6kV substation and consists of the following 44/6.6kV transformers:

- 1 x 5 MVA transformers
- 2 x 3.1 MVA transformers

Historical information provided is that the notified maximum demand (NMD) for the No. 2 shaft operation is 4.85 MVA. The supply feeds the No. 2 shaft surface infrastructure and No. 5 shaft ventilation fans which cater for the Target 1 shaft operation. The No. 2 shaft substation will require complete upgrade of both the Eskom and mine substations in order to supply the additional load of the Jelani Proposed Project.

The calculated peak demand for the JV project at No. 2 shaft is 35 MVA, detailed in Table 1-8

Table 1-8: No 2 Shaft Peak Demand

Description	Connected Power (kW)	Operating Load (kW)
Hoisting Systems	12 200	6 100
Ice Plant	6 370	6 370
Surface Infrastructure (including water treatment plant)	1 700	1 300
Compressors	2 030	1 630
No 5 Shaft Ventilation Fans (Jelani project allocation)	1 200	1 100
Underground Pumping	20 650	9 390
Mining	31 040	16 720
Underground Ventilation	4 370	2 930
Underground Conveyors and Chairlifts	3 050	2 360
Peak Power (kW)	82 610	42 225

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Diversity factor		0.7
Peak Power (kW)		29 560
Power Factor		0.85
Peak Load (MVA)		**35**

In addition to the Jelani project load the Target No. 5 shaft ventilation fans will be supplied from the No. 2 shaft main substation. The fan station supports the Target No. 1 shaft mining operation, and an additional 3 MVA has been included in the overall notified maximum demand (NMD) calculation for the substation upgrade. Taking the Target No. 2 shaft substation NMD to 38MVA.

The upgraded Eskom bulk power supply will include the construction of a new 44kV line from Grootkop substation and the loop-in loop-out of the existing Lorraine 2 to Avgold 44kV line. A Premium supply has been costed and will include four 20MVA 44/6.6kV transformers supplying the mining operation.

1.8.3 Jelani Project Power Consumption

The project power consumption has been calculated based on the production rates, equipment duty cycle design and productivity allowances. Power costs have been based on Eskom's Megaflex tariff structure for the 2025/2026 year, which averages out at R2.18/kWh. Peak annual power consumption is calculated during Year 11, with an estimated energy consumption of 217,000 MWh.

1.9 Listed and Specified Activities

Listed activities are activities identified in terms of Section 24 of NEMA which are likely to have a detrimental effect on the environment, which may not commence without an EA from the CA. An EA is required for any listed activity and is subject to the completion of an environmental process, either a Basic Assessment (BA) or a Scoping and Environmental Impact Assessment (S&EIA). Application for an EA for activities listed in Listing Notices 1 and 3 must take the form of a BA, and activities listed in Listing Notice 2 must follow the full procedure of a S&EIA.

Table 1-9 below contains the listed activities identified in terms of NEMA and the EIA Regulations of 2014 (GN R982 of December 2014, as amended by GNR 326 of April 2017 and GNR 517 of 11 June 2021) and Listing Notices 1, 2 and 3 (GN R983, GN R984 and GN R985 of December 2014, as amended by GNR 327, GNR 325 and GNR 324 of April 2017, respectively, as well as GN R517 of 11 June 2021) which may be triggered by the Proposed Project, and for which an application for EA has been submitted. Table 1-9 also includes a description of those project activities which relate to the applicable listed activities.

The Commenting Authorities for the Proposed Project are:

- National Department of Forestry, Fisheries and the Environment (DFFE).
- Department of Water and Sanitation (DWS)
- South African Civil Aviation Authority (SACAA).
- National Nuclear Regulator of South Africa (NNR).
- Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs.
- Free State Department of Health (DoH).
- Free State Province Department of Agriculture and Rural Development.

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- Free State Department of Community Safety, Roads and Transport.
- Free State Department of Cooperative Governance and Traditional Affairs.
- Free State Department of Public Works and Infrastructure
- National Department of Public Works and Infrastructure (DPWI).
- Matjhabeng Local Municipality.
- Lejweleputswa District Municipality.
- Eskom Holdings SOC Limited.
- South African Heritage Resources Agency (SAHRA).

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Table 1-9: Listed Activities Triggered by the Proposed Project

Name of Activity	Aerial Extent of the Activity (ha)[3] Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Waste Management Authorisation	Water Use License Authorisation[4]
Underground Mining Operation	956,76 Hectares	GNR 984 - Activity 17	Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right	No Waste Management License (WML) activities are triggered by the proposed underground mining operation	Section 21 (c) and (i)
Development of gravel access tracks	8 748 m²	GNR 985 – Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **(b) Free State** (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	No Waste Management License (WML) activities are triggered by the proposed development of gravel access tracks	Section 21 (c) and (i)

[3] The total area of the reclamation and associated areas is approximately 956,76 hectares.
[4] Water use licences in terms of Section 21 of that National Water Act, 1998, will be required for various of the Listed Activities.

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Name of Activity	Aerial Extent of the Activity (ha)[3] Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Waste Management Authorisation	Water Use License Authorisation[4]
Installation of the seismographic monitoring stations.	40 m² (Each station comprises a small sensor pad / housing of approximately 5–10 m²)	GNR 985 - Activity 14	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse; **(b) Free State** (i) Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the	No Waste Management License (WML) activities are triggered by the proposed underground mining operation	Section 21 (c) and (i)

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Name of Activity	Aerial Extent of the Activity (ha)[3] Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Waste Management Authorisation	Water Use License Authorisation[4]
			competent authority or in bioregional plans;		

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1.10 Conclusions from the Scoping Phase

The Scoping study for the Project Proposed, was undertaken in accordance with the EIA Regulations of 2014 (as amended), promulgated in terms of Section 24 (5) of the NEMA. The Scoping report was aimed at detailing the nature and extent of the project, detailing the possible project risks and mitigation measures as well as the plan going forward into the EIA phase.

The baseline environmental information provided in the Scoping report was compiled as a high-level desktop investigation, and the project information is sourced from existing background information, relevant to the Proposed Project. Site visits were conducted by Kongiwe on 28 and 29 January 2026.

1.10.1 Potential Impacts Identified in the Scoping Phase

Preliminary environmental impacts were determined and have been populated in Table 1-10. As part of the Plan of Study for the EIA phase, these impacts have been further refined, calculated and assessed for all the feasible alternatives identified. Mitigation and management measures have been suggested by the specialists for all impacts identified.

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Table 1-10: Potential impacts identified during the Scoping Phase.

Environmental Component	Component Type	Potential Impact (positive or negative)	Specialist Study Planned for EIA
Physical Environment (non-living)	Surface water	• Potential hydrocarbon spills during the construction of the seismographic monitoring stations and the development of the gravel access tracks.	• Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM). • Hydrological Assessment
	Groundwater	• Dewatering of deep aquifer causing groundwater level decline. • Lowering of the water table in the shallow aquifer. • Groundwater flow alteration. • Potential seepage of mine water to the groundwater system may contaminate groundwater resources.	• Hydrogeological Assessment
	Soil and geology	• Potential soil contamination from hydrocarbon spills. • Subsidence risk above mined-out areas. • Seismicity risk from deep-level blasting.	• Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential. • Hydrogeological Assessment. • Blasting and Vibrations.
	Air quality	• Dust emissions during the installation of the seismographic monitoring stations and the development of the gravel access tracks. • Dust emissions from ore handling. • Diesel exhaust emissions.	• Air Quality Impact Assessment • Climate Change Impact Assessment
Biological Environment	Fauna and Flora	• Vegetation clearance required for the installation of the seismographic monitoring stations and the development of the gravel access tracks may result in the loss of habitat for local flora and fauna, potentially disrupting ecological communities and reducing biodiversity in the affected area.	• Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.
Social and Economic Environment	Socio-Economic	• Potential employment opportunities and job security. • Potential investment in local economy.	• Social Impact Assessment.

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Environmental Component	Component Type	Potential Impact (positive or negative)	Specialist Study Planned for EIA
		• Influx of people seeking employment. • Potential community conflict and increases in certain social challenges (e.g., in-migration and potential increases in crime). • Impact on economic and social infrastructure in the local area. • Impact on local resource use (energy, water).	
	Vibration	• Vibration from shaft hoisting operations and ore handling. • Vibration from underground blasting and drilling. • Vibration impacts from blasting potentially affecting nearby structures.	• Blasting and Vibrations.

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1.10.2 Main issues arising in the Scoping Phase

During the Scoping phase of the Proposed Project, comments were raised by various Interested and Affected Parties (I&APs) and Stakeholders.

Comments raised by stakeholders during the Scoping processes are included in the Comments and Responses Report (CRR) (Appendix C10)

1.10.3 Scoping Phase Overall Conclusions

Although mining activities often generate positive social and economic benefits, they may also result in notable negative environmental impacts. Prioritising environmental stewardship, complying with relevant environmental legislation and implementing specialist recommendations and sustainable operational practices will be required to minimise its environmental footprint and reduce ecological impacts as far as possible while balancing the economic and social benefits.

At this stage, the findings of this DSR indicate that no environmental fatal flaws have been identified for the Proposed Project. While some limitations do exist, it is anticipated that the implementation of appropriate mitigation measures would assist in reducing the significance of such impacts to acceptable levels. Impacts associated with the Proposed Project need to be considered further during the EIA Phase according to the Way Forward and the Plan of Study contained in this report.

2. Policy and Legislative Context

This chapter provides an overview of the policy and legislative context relevant to the Proposed Project. It identifies all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to the planned activities and are to be considered in the assessment process which may be applicable or have relevance to the Proposed Project.

2.1 The International Finance Corporation – Performance Standards on Environmental and Social Sustainability

The International Finance Corporation's (IFC) Sustainability Framework can serve as an international point of reference for identifying and managing environmental and social risks. The Sustainability Framework consists of the IFC's Policy and Performance Standards (PS) on Environmental and Social Sustainability. The PS can be used as a guide to identify and manage environmental and social risks associated with a proposed development. The PS are designed to avoid, mitigate and manage risks and impacts in a sustainable manner.

The IFC PS comprises of eight standards listed below:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
- Performance Standard 2: Labour and Working Conditions.
- Performance Standard 3: Resource Efficiency and Pollution Prevention.
- Performance Standard 4: Community Health, Safety, and Security.

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- Performance Standard 5: Land Acquisition and Involuntary Resettlement.
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 7: Indigenous Peoples.
- Performance Standard 8: Cultural Heritage.

The proposed project will be aligned with the applicable IFC Performance Standards (PS1, PS2, PS3, PS4, PS6, and PS8), and the relevant assessments and/or statements will be conducted.

For effective management of environmental, health, and safety issues in relation to a development, the IFC has an Environmental, Health, and Safety (EHS) Guidelines. The Guidelines are organised as per Table 2-1.

Table 2-1: General EHS Guidelines (IFC,2007)

Item No.	Description	Page No.
1.	**Environmental**	**3**
1.1	Air Emissions and Ambient Air Quality	3
1.2	Energy Conservation	17
1.3	Wastewater and Ambient Water Quality	17
1.4	Water Conservation	32
1.5	Hazardous Materials Management	35
1.6	Waste Management	51
1.7	Noise	51
1.8	Contaminated Land	53
2.	**Occupational Health and Safety**	**59**
2.1	General Facility Design and Operation	60
2.2	Communication and Training	62
2.3	Physical Hazards	64
2.4	Chemical Hazards	68
2.5	Biological Hazards	70
2.6	Radiological Hazards	72
2.7	Personal Protective Equipment (PPE)	73
2.8	Special Hazard Environments	74
2.9	Monitoring	74
3.	**Community Health and Safety**	**77**
3.1	Water Quality and Availability	77
3.2	Structural Safety of Project Infrastructure	78
3.3	Life and Fire Safety (L&FS)	79
3.4	Traffic Safety	82
3.5	Transport of Hazardous Materials	85
3.6	Disease Prevention	89
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4.	**Construction and Decommissioning**	**89**
4.1	Environment	89
4.2	Occupational Health & Safety	92
4.3	Community Health & Safety	94

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-	References and Additional Sources	96

2.2 National, Provincial and Local Legislation

The foundation for environmental preservation is entrenched in the **Constitution of South Africa, 1996**. Following the birth of democracy in South Africa, legislative and environmental policies and regulations have undergone a large transformation, and various laws and policies were promulgated with a strong emphasis on environmental concerns and the need for sustainable development. The Constitution provides environmental rights (contained in the Bill of Rights, Chapter 2 (Section 24)) and includes implications for environmental management. The environmental rights are guaranteed in Section 24 of the Constitution, and state that:

Everyone has the right:

- To an environment that is not harmful to their health or well-being.
- To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- Prevent pollution and ecological degradation.
- Promote conservation and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

To ensure that the various spheres of the social and natural environmental resources are not overlooked, other legislation and regulations have been promulgated in addition to those contained within the Constitution. The additional legislature and regulations ensure that there remains a key focus on various industries or components of the environment, and to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights. Shown in Table 2-2, the Constitution sets out the fundamental environmental rights and duties that guide all subsequent environmental legislation and policy. The applicable provincial and local policies, guidelines and by-laws relevant to the Proposed Project are summarised in Table 2-3.

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Table 2-2: Applicable National Legislation and Guidelines

Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
The Constitution of South Africa, 1996 • Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being; to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation. secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development. • Section 32 of the Constitution states that every person has a right to information held by the State and to information held by other people that is required in the exercise or protection of a right. • Section 33 of the Constitution states that everyone has a right to just and procedurally fair administrative action.	• As per the requirements of NEMA and the NEMA EIA Regulations, alternative activities that are less taxing on the environment and resources were investigated where possible. • The Scoping Report was made available for public review and Draft EIA Report will be made available for public review (as per the PPP section of this report). The Appeal Process will be described to all stakeholders through the EA notification described in the PPP section of this report.
The One Environmental System • In terms of the One Environmental System established by the NEMLAA, an EA in respect of the mining operation must be issued within 300 days of the application being submitted. This system aims to streamline the licensing processes for environmental authorisations and water use.	• Jelani proposes to establish an underground mining operation and has submitted the required EA and IWULA within the prescribed timeframes.
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) • The overarching principle of the NEMA is sustainable development. It defines sustainability as meaning the integration of social, economic and environmental factors into planning, implementation and decision making to ensure the development serves present and future generations. Section 2 of NEMA provides for the NEMA principle which apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and in conjunction with other appropriate and relevant considerations. The NEMA principles serve as the general framework within which environmental management and implementation plans must be formulated and serve as a guideline by reference to which any organ of state must exercise any function when taking any decision in terms of	• It is the objective of this application to align to NEMA. • The NEMA is the overarching Act governing sustainable development and the NEMA principles apply to all mining operations and any matter or activity relating to such operation. • Listed activities as per the EIA 2014 Regulations, as amended, have been

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
the NEMA or any statutory provision concerning the protection of the environment. • NEMA authorises the Minister of the DFFE to issue Regulations relating to the administration of the Act5, which has been done with the publication of the EIA 2014 Regulations, as amended. Section 24(2) allows the Minister to identify activities which may not commence without environmental authorisation from the competent authority. This identification has been done in accordance with listing notices referred to as Listing Notice 1, Listing Notice 2 and Listing Notice 3. The NEMA also allows the Minister to determine which authority will be the competent authority to receive and evaluate applications for EAs. • Listing Notice 1 identifies activities of limited scale and effect, which need to be assessed by a fairly simple process referred to as a BA, where after a Basic Assessment Report (BAR) is submitted to the competent authority. Listing Notice 2 identifies activities of significantly greater magnitude, which require evaluation through an initial Scoping Phase followed by an EIA and an EMPr. This process is generally referred to as the S&EIR process. Listing Notice 3 relates to activities limited to specified geographical areas and matters of concern to the various provinces which require a BAR process to be dealt with by the provincial authority concerned. • Regulation 16 (1) prescribes the general application requirements and states that an application for an EA must be made on the official application form obtainable from the CA and must, amongst others, include proof of payment of the prescribed application fee. • Regulation 21 provides for the submission of the Scoping Report to the CA for consideration and states that the scoping report must contain all the information set out in Appendix 2 to the EIA 2014 Regulations, as amended. In terms of regulation 22, the CA must, after considering the Scoping Report, either accept the report, with or without conditions and advise the applicant to proceed with the plan of study for EIA or refuse the EA. Once the Scoping Report is accepted by the CA, the applicant must submit the EIA Report inclusive of specialist reports and an EMPr which have been subjected to a PPP. The timeframes for submission of the Scoping Report and the EIA Report inclusive of the timeframes within which the CA must consider the reports and approve the EA are prescribed in regulations 21 to 24 of the EIA 2014 Regulations. • Once a decision on the EA application has been reached, the CA must notify the applicant in writing of the decision and give reasons for the decision.	identified (refer to Chapter 1, subsection 1.9).

[5] Sections 24(5) and Section 44

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA) • In terms of NEM:WA, a List of Waste Management Activities that have, or are likely to have, a Detrimental Effect on the Environment has been published in GN R921 of 29 November 20136. Regulation 2 provides that a waste management activity listed in this Schedule under Category A and Category B would require a Waste Management Licence (WML).	• No Waste Management License (WML) activities are triggered by the Proposed Project (refer to Chapter 1, subsection 1.9).
National Water Act, 1998 (Act No. 36 of 1998) (NWA) In terms of the NWA, the national government, acting through the Minister of Water and Sanitation, is the public trustee of South Africa's water resources, and must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons (section 3(1)). In terms of the NWA a person may only use water without a license if such water use is permissible under Schedule 1 (generally domestic type use) if that water use constitutes a continuation of an existing lawful water use (water uses being undertaken prior to the commencement of the NWA, generally in terms of the Water Act of 1956), or if that water use is permissible in terms of a general authorisation issued under section 39 (general authorisations allow for the use of certain section 21 uses provided that the criteria and thresholds described in the general authorisation is met). Permissible water use furthermore includes water use authorised by a license issued in terms of the NWA. Section 21 of the NWA defines water uses which are governed in terms of the Act and for which a WUL is required. In terms of section 40 (1) of the NWA "a person who is required or wishes to obtain a licence to use water must apply to the relevant responsible authority for a licence." These water uses, in terms of Section 21, are as follows: (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (d) engaging in a stream flow reduction activity contemplated in Section 36; (e) engaging in a controlled activity identified as such in Section 37(1) or declared under Section 38(1);	• An IWULA is required for the Proposed Project and has been duly submitted to the Department of Water and Sanitation (DWS).

[6] As amended by GN 332 of 2 May2014, GN R633 of 4 July 2015 and GN 1757 of 11 February 2022.

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process; (i) altering the bed, banks, course or characteristic of a watercourse; (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and (k) using water for recreational purposes. The IWULA must be prepared and submitted in accordance with the Water Use Licence Application and Appeals Regulations 2017 published in GNR 267 on 24 March 2017 and must generally be supported by a Technical Report, as well as conceptual design drawings of all water related infrastructure.	
National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEM:BA) • The NEM:BA provides for the management and conservation of South Africa's biodiversity within the framework of NEMA, as well as the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources. The South African National Biodiversity Institute (SANBI) website and GIS tools were utilised to determine whether any nationally protected and threatened ecosystems occur on site. • The Proposed Project falls within the Free State Province, which has a provincial Biodiversity Plan (v1.0). This strategy has been incorporated and considered throughout the compilation of this report.	• NEM:BA was used to inform whether activities triggered Listing Notice 3. • As per Chapter 1, the location of the Proposed Project in relation to these areas has been confirmed.
National Environmental Management: Protected Areas Act (NEM:PAA), Act 57 of 2003 as amended The National Environmental Management Protected Areas Act (Act No. 57 of 2003) (NEM:PAA) concerns the protection and conservation of ecologically viable areas representative of South Africa's diversity and its natural landscapes and seascapes, and includes *inter alia*: • The establishment of a national register of all national, provincial and local protected areas; • The management of those areas in accordance with national standards; and	• The SANBI website and GIS tools were used to determine whether the project area overlaps with Critical Biodiversity Areas (CBAs). The majority of the development plan falls within a Critical Biodiversity Area. • The Regulations were utilised to determine the need for any additional listed scheduled activities under GNR 985 (refer

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
• Inter-governmental co-operation and public consultation in matters concerning protected areas. Sections 48 to 53 of the NEM:PAA lists restricted activities that may not be conducted in a protected area. Section 48 states that no person may conduct commercial prospecting or mining activities in a: • Special nature reserve or nature reserve; • Protected environment without the written permission of the Minister and the Cabinet member responsible for minerals and energy affairs; and Protected area referred to in Section 9: • (b) world heritage sites; and • (d) specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act (No. 84 of 1998);	to Chapter 1, subsection 1.9).
Mine Health and Safety Act (MHSA), Act 29 of 1996 (as amended): • Jelani operates in accordance with the MHSA and associated regulations. This includes creating a safe and healthy work environment and providing the necessary protection and training to staff to ensure their health and safety is not compromised. • Hazardous substances will be adequately stored and labelled. All regulations pertaining to safe use, handling, processing, storage, transport and disposal of hazardous substances; protection of equipment, structures and water sources and the surface of land; infrastructures associated with the mining operations; the monitoring and control of those environmental aspects which may affect the health and safety of persons will be applied on site. Regulations pertaining to provision of water, ablution facilities and staff health and safety will be applied on site.	• Although not strictly addressed in the Draft EIA report for the Proposed Project, protecting the environment contributes to a safe working environment. MHSA regulations will be worked into the mine's Code of Practice (COP) and Standard Operating Procedures (SOPs).
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) • The MPRDA contains provisions relating to the mining operations. This must be read together with the EIA 2014 Regulations, as amended, and the assessment of impacts relating to pollution control, where appropriate, must form part of the EMPr. In terms of the One Environmental System established by the NEMLAA, an EA in respect of the	• Jelani proposes to undertake the desired underground mining project activities in accordance with the provisions of the MPRDA.

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
mining operations must be issued within 300 days of the application being submitted.	
Mining and Biodiversity Guideline, 2013. This guideline is founded on six fundamental principles: • Apply the law; • Use the best available biodiversity information; • Engage relevant stakeholders thoroughly; • Use best practice in EIA to identify, assess and evaluate impacts on biodiversity; • Apply the mitigation hierarchy when planning any mining-related activities and develop robust EMPrs; and • Ensure effective implementation of EMPrs, including adaptive management. The guideline stipulates the requirements for both utilising and integrating biodiversity information and informants into the assessment of impacts (i.e. this S&EIA process) of mining on biodiversity and ecosystem services and recommends good practice throughout the projects life cycle.	• This project will, as far as possible, make use of the fundamental principles outlined in the Mining and Biodiversity Guideline, 2013.
The South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998) The National Road Traffic Regulations, 2000 places specific duties on the consignor and consignee of dangerous goods. A consignor means the person who offers dangerous goods for transport (i.e. hazardous waste) and a consignee is the person who accepts dangerous goods, which have been transported in a vehicle. Both consignor and consignee must comply with the requirements of several SANS standard specifications and codes of practice relevant to dangerous goods which have been incorporated into the regulations. The mine owner is responsible for: • Offloading of the dangerous goods; • Providing the dangerous goods offloading supervisor; and • Ensuring that the loading and offloading are carried out by qualified employees trained in the relevant procedures.	• The requirements of the Act and the Regulations were considered when assessing the project impacts and developing the associated mitigation measures during the EIA phase.

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Jelani must, in line with Section 54 of the Act and GN R225, provide evidence that the company has appointed responsible personnel to oversee the off-loading of dangerous goods at its operations. A driver of a vehicle transporting dangerous goods is required to undergo training at an approved training body.	
Hazardous Substances Act, 1973 (Act No. 15 of 1973) • The Regulations for Hazardous Chemical Substances apply to an employer or a self-employed person who carries out work at a workplace which may expose any person to the intake of hazardous chemical substances at that workplace. Regulations 14 and 15 provide for the labelling, packaging, transportation and storage and the disposal of hazardous chemical substances respectively. These regulations set out specific requirements which form part of an employer's duty to provide and maintain, as far as reasonably practicable, a working environment that is safe and without risk to the health of his or her employees.	• The requirements of the Act and the Regulations were considered when assessing the project impacts and developing the associated mitigation measures during the EIA phase. • Mitigation measures have been carried out in the EMPr Report.
Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013) (SPLUMA) • The SPLUMA was promulgated in May 2015. SPLUMA is a framework act for all spatial planning and land use management legislation in South Africa. It seeks to promote consistency and uniformity in procedures and decision-making in this field. SPLUMA will also assist municipalities to address historical spatial imbalances and the integration of the principles of sustainable development into land use and planning regulatory tools and legislative instruments.	• The project footprint is currently being used for agricultural purposes. • The proposed underground mining operation will allow agricultural and other surface land uses to continue.
National Development Plan, 2030 The NDP strives to ensure a tightening of the accountability chain, where, in relation to this EIA, environmental noncompliance in terms of Section 16(1)(b) of NEMA is addressed at all levels of government. The environmental sustainability and resilience objectives include, inter alia: • Implementing a set of indicators for natural resources, accompanied by publication of annual compliance reports; • Achieving the peak plateau and decline trajectory for greenhouse gas (GHG) emissions coupled with the entrenchment of an economy-wide carbon price; • Improving disaster preparedness for extreme climate events. Gauteng is severely affected by drought; and • Increasing investment in new agricultural technologies, research and the development of adaptation strategies for	• The project – if approved – will support South Africa's long-term sustainable development vision through the implementation of necessary mitigation measures to safeguard environmental integrity, including compliance with NEMA and environmental management requirements and applying strategies to reduce pollution, land degradation and ecological disturbance. • A Social Impact Assessment (SIA) specialist has been consulted to ensure compliance

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
the protection of rural livelihoods and expansion of commercial agriculture. The National Development Plan (NDP) offers a long-term perspective. It defines a desired destination and identifies the role different sectors of society need to play in reaching that goal. • As a long-term strategic plan, it serves four broad objectives: – Providing overarching goals for what we want to achieve by 2030. – Building consensus on the key obstacles to us achieving these goals and what needs to be done to overcome those obstacles. – Providing a shared long-term strategic framework within which more detailed planning can take place to advance the long-term goals set out in the NDP. – Creating a basis for making choices about how best to use limited resources. • The Plan aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality. The core elements of a decent standard of living identified in the Plan are: – Housing, water, electricity and sanitation. – Safe and reliable public transport. – Quality education and skills development. – Safety and security. – Quality health care. – Social protection. – Employment. – Recreation and leisure. – Clean environment. – Adequate nutrition. The Proposed Project contribute to the goals of the NDP in creating a decent standard of living.	with the requirements of this Plan. • Social considerations have been integrated when assessing project impacts and developing appropriate mitigation measures during the EIA phase. • Social Labour Plan will be implemented.
Action Plan of the Environmental Initiative of the New Partnership of Africa's Development, 2003. This Action Plan was established with the aim of encouraging sustainable development, conservation and acceptable use	• The protection of wetland ecosystem and control of alien species are contained within the EIA Report.

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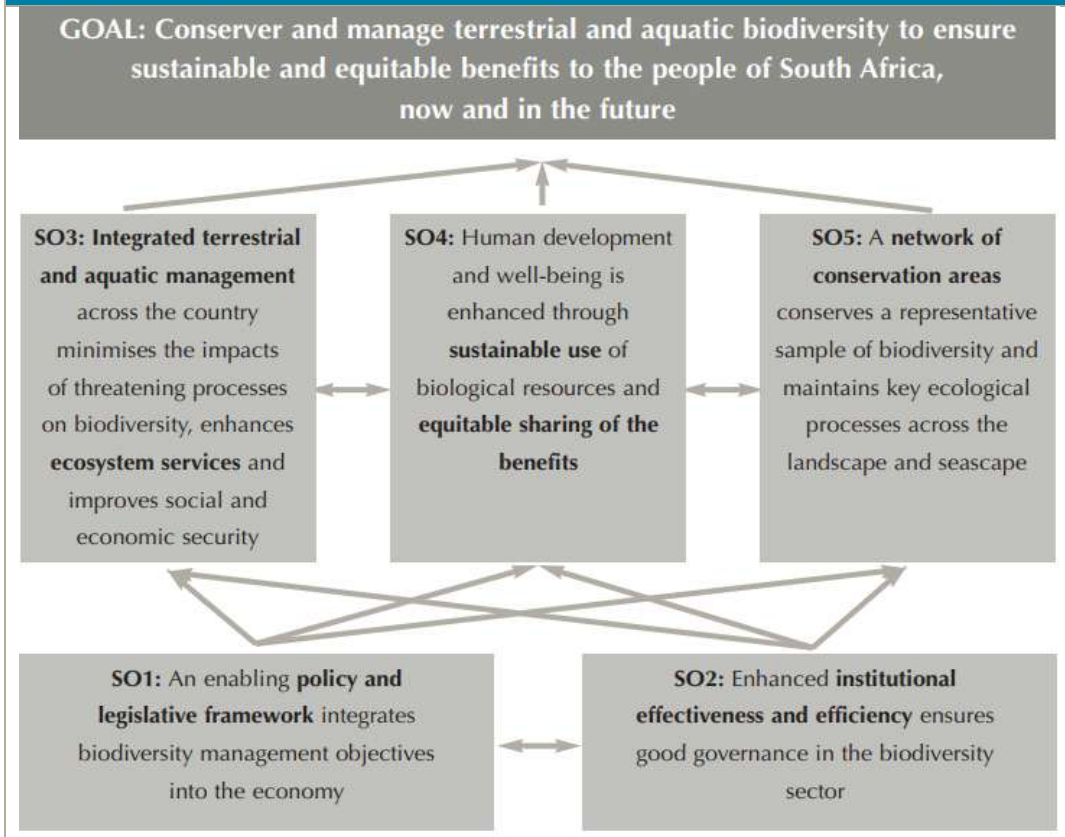
Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
of biodiversity in Africa. It has been recognised that a healthy and productive environment is a prerequisite for the success of New Partnership of Africa's Development (NEPAD), together with the need to systematically address and sustain ecosystems, biodiversity and wildlife. Six areas have been identified: • Combating land degradation, drought and desertification; • Conserving Africa's wetlands; • Preventing and controlling invasive alien species; • Conservation and sustainable use of coastal and marine resources; • Combating climate change in Africa; and • Cross-border conservation and management of natural resources.	• Various specialists' including terrestrial biodiversity, freshwater, climate change and agricultural have been consulted to systematically address and sustain ecosystems, biodiversity, and wildlife. • These considerations form an integral part of the EIA phase of the project. • All identified mitigation measures are incorporated into the EMPr Report for implementation and monitoring.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) • The NHRA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations. • The Act requires all developers to undertake cultural heritage studies for any development exceeding 0.5 ha. It also provides guidelines for impact assessment studies to be undertaken where cultural resources may be disturbed by development activities. – The South African Heritage Resources Agency (SAHRA) will need to approve the heritage assessment undertaken as part of the impact assessment process.	• A Heritage, Archaeology and Palaeontology Impact Assessment has been undertaken as part of the EIA Phase and submitted to SAHRA for their comment.
Conservation of Agricultural Resources Act (No. 43 of 1983) • The Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA) includes the use and protection of land, soil, wetlands and vegetation and the control of weeds and invader plants. This is the only legislation that is directly aimed at conservation of wetlands in agriculture. The Act contains a comprehensive list of species that are declared weeds and invader plants dividing them into three categories. These categories are as follows: – Category 1: Declared weeds that are prohibited on any land or water surface in South Africa. These species must be controlled or eradicated where possible. – Category 2: Declared invader species that are only allowed in demarcated areas under controlled conditions	• The protection of land, soil, wetlands and vegetation, including the control of weeds and invader plants are contained within the EIA Report. • Various specialists have been conducted during the EIA Phase to determine the impact on soil and vegetation i.e. Agriculture Potential and Soil Impact Assessment, Biodiversity Impact

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and prohibited within 30m of the 1:50 year flood line of any watercourse or wetland. – Category 3: Declared invader species that may remain but must be prevented from spreading. No further planting of these species is allowed. • In terms of the Act, landowners are legally responsible for the control of alien species on their properties. Failure to comply with the Act may result in various infringement consequences and in some instances imprisonment and other penalties for contravening the law.	Assessment, Aquatic and Freshwater Impact Assessment and Surface water Impact Assessment.
South Africa's National Biodiversity Strategy and Action Plan • The National Biodiversity Strategy and Action Plan (NBSAP) set out a framework and a plan of action for the conservation and sustainable use of South Africa's biological diversity and the equitable sharing of benefits derived from this use. The NBSAP was prepared by the former Department of Environmental Affairs and Tourism (DEAT), during the period May 2003 to May 2005. • The goal of the NBSAP is to conserve and manage terrestrial and aquatic biodiversity to ensure sustainable and equitable benefits to the people of South Africa, now and in the future. In support of this goal, five key strategic objectives (SOs) have been identified, each with a number of outcomes and activities. The schematic below represents the objectives and their interconnection in achieving the NBSAP "Goal", although the project is related to reclamation, the following would still apply:	• The Proposed Project is cognisant of the obligation to protect and preserve the integrity of the environment as well as its biodiversity. • Principles of this plan has been taken into consideration during the EIA Phase.

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- Through the NSBA, it is recognised that biodiversity cannot be conserved through protected area networks only. All stakeholders, from private landowners and communities to business and industry must get involved in biodiversity management.
- NBSAP further identified mining as one of the activities that causes habitat transformation and degradation and seriously threatens aquatic and terrestrial biodiversity. The strategy therefore promotes the inclusion of biodiversity considerations in mining regulations, guidelines and best practice codes to mitigate negative impacts and encourage sustainable mining practices through partnerships.

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Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) • The PAIA gives effect to the constitutional right of access to any information held by the state and any information that is held by another person and that is required for the exercise or protection of any rights. to provide for matters connected therewith.	• The requirements of the Act has been considered when assessing and involving the public and registered interested and affected parties (I&APs).
National Environmental Management Act: National Appeal Regulations, 2014 • The purpose of these regulations is to regulate the procedure contemplated in section 43(4) of the National environmental management act relating to the submission, processing and consideration of a decision on an appeal. This Act is used to help guide and understand the appeal process and the procedures may follow.	• The requirements of the Act have been considered, including provisions relating to the lodging of an appeal, should this be required for the project. • Stakeholders have been identified through WinDeed searches and the compilation of a stakeholder database, followed by consultations with landowners, occupiers, and relevant authorities such as ward councillors, conducted through virtual or in-person meetings. Key tasks included the preparation and distribution of project announcement materials (including Background Information Documents, registration sheets, advertisements, site notices, and notification letters), the undertaking of land claims enquiries, and ensuring that stakeholders are provided with detailed project information and specialist study findings
Best Practice Guideline Series The Department of Water and Sanitation has developed a number of best practice guidelines for water resource	• The guidelines define and document best practices for water and waste management associated with the project have been

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Applicable Legislation and Guidelines Used in Compiling this Report	Reference Where Applied
protection in the South African mining industry. The best practice guidelines include international principles and approaches towards sustainability. There best practice guidelines include *viz.:* • A water management hierarchy; • General water management strategies, techniques and tools; and • Guidelines for mining related activities and aspects.	considered throughout the Scoping process and reporting.

Table 2-3: Applicable Provincial and Local Policies, Guidelines and By-Laws

Policies, Guidelines and By-Laws	
Free State Climate Change Adaptation Strategy & Implementation Plan (2024–2029) • This provincial strategy outlines climate-response measures, adaptation priorities, environmental resilience guidelines, and institutional structures for environmental planning in the Free State. • The objective related to the mining sector in the Free State Province Climate Change Adaptation Strategy and Implementation Plan 2024–2029 is to Enhance resilience in the mining sector. • This goal is supported by specific response actions, including: – Implementing a programme with mining entities to incorporate climate change adaptation actions into mine operating, safety, and disaster response guidelines. – Conducting research to identify possible solutions for recycling mining tailings in Free State Province. – Developing a fire protection implementation plan for the mining sector that can be incorporated into the proposed implementation plan linked to the Wildfire Management Framework of Free State Province	• The Climate Change Adaptation Strategy and Implementation Plan have been incorporated into the EIA Report. • Climate Change Assessment Study was conducted during the EIA phase.
Free State Provincial Biodiversity Plan (2024) • The Biodiversity Plan provides: – Critical Biodiversity Areas (CBA) & Ecological Support Areas (ESA). – Land-use guidelines for biodiversity conservation. – Inputs for environmental planning and EIA decision-making.	• Aspects of the Free State Terrestrial Critical Biodiversity Areas (CBA) are applicable to the Proposed Project. • Where applicable, these have been considered throughout the S&EIA process and are included within the reporting documents.

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Policies, Guidelines and By-Laws	
	• Biodiversity Assessment Study was conducted during the EIA Phase.
Free State Spatial Development Framework (2023/2024) • This version provides: – Provincial spatial strategies. – Development guidance. – Environmental protection and land-use management direction. – Alignment with Provincial Growth and Development Strategy (PGDS), the Medium-Term Strategic Framework (MTSF), and the Spatial Planning and Land Use Management Act (SPLUMA) requirements.	• Aspects of this Framework are applicable to the Proposed Project. • Where applicable, these have been considered throughout the S&EIA process and are included within the reporting documents.
Matjhabeng Municipal Municipality: Municipal Land Use Planning By-Laws (2015) • The document specifically outlines the objectives and procedures for integrating mining rehabilitation into the municipal spatial planning process. The primary objectives in connection with mining operations are: – Integrating Mining Rehabilitation into Spatial Planning – Developing Aligned Rehabilitation Plans – Establishing a Sequence for Rehabilitation Implementation – Managing Land Transfer and Development – Defining End Land Use	• Aspects of this Plan are applicable to the Proposed Project. • Where applicable, these have been considered throughout the S&EIA process and are included within the reporting documents.
The Public Participation Guidelines in terms of the National Environmental Management Act, 1998 Environmental Impact Assessment Regulations, 2017 • This document aims to assist with the participation process of all interested and affected parties regarding any Proposed Project. This guideline provides information and guidance for proponents or applicants, interested and affected parties, competent authorities and environmental assessment practitioners on the public participation requirements of the act, as well as provides information on the characteristics of a vigorous and inclusive public participation process.	• This guideline was used to ensure that all of the required steps are followed to ensure that a complete and successful public participation process is conducted.

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Policies, Guidelines and By-Laws	
Integrated Environmental Management Guideline on Need and Desirability, 2017 • This document assists Environmental assessment practitioners on the best practice as well as how to meet the peremptory requirements prescribed by the legislation as well as sets out both the strategic and statutory context for the consideration of the need and desirability of a development involving any one of the NEMA listed activities. This document further sets out a list of questions which should be addressed when considering need and desirability of a proposed development.	• This Guideline was used to ensure that the need and desirability of the Proposed Project was thoroughly considered.
The Centre for Environmental Rights - Mining and your Community: Know your Environmental Rights • To exploit a mineral, mining companies must get permission to mine from the government. This is known as an Environmental Authorisation. To get permission, the mining company is required to assess the environment and learn about the community and consult with everyone who will be affected by the proposed mining. The Guide published in 2014 by the CER discusses what rights communities and individuals who are affected by mining have, and what laws and processes must be followed by a mining company before it can start mining.	• This Draft EIA report incorporates the recommendations and guidelines listed in the guide when undertaking Public Participation (PP). All PP is implemented according to the requirements listed in the NEMA EIA Regulations of 2014, as amended. • Refer to Chapter 6 for an overview of Public Participation to be undertaken.

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3. The Need and Desirability of the Project

Reference is made to the DFFE 2017 Guideline on Need and Desirability which states that while the "concept of need and desirability relates to the type of development being proposed. The Need and Desirability of the proposed development has been considered in terms of the regional location and the project's cumulative impact. The guidelines pose questions that should be considered in this investigation, which are addressed in Table 3-1.

Jelani intends to initiate underground mining operation within the JV area, to extract various minerals, primarily focusing on Gold ore, along with Silver, Uranium, and other associated minerals. The Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development.

The project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant, and associated surface infrastructure. All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area.

Although mining activities often generate positive social and economic benefits, they may also result in notable negative environmental impacts. Prioritising environmental stewardship, complying with relevant environmental legislation, and implementing specialist recommendations and sustainable operational practices will be required to minimise its environmental footprint and reduce ecological impacts as far as possible while balancing the economic and social benefits.

Promoting Justifiable Economic and Social Development

- A Social and Labour Plan (SLP) will be implemented for the Proposed Project. As part of the SLP, the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community.
- Community needs will be identified through a Public Participation Process, and the outcomes of this process will be documented in a Public Participation Report.
- The local economy is strongly dependent on the mining sector. The Proposed Project will continue to support economic activity in the region through job creation, stimulating investment and contributing to ongoing economic growth and development.

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Table 3-1: Considerations of Need and Desirability of the Proposed Project

No.	Description	Comment
1	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?	• The provincial and national legislative frameworks and guidelines considered for the Proposed Project are detailed in Table 2-2. • The underground mining operation is not expected to directly affect ecological integrity within the project area. All operational mining infrastructure required for the project will be situated within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Any disturbance associated with the underground mining operation will occur within the approved mining right area, which would already have been disturbed as part of the Target Mine mining process. • The installation of the seismographic monitoring stations and the development of gravel access tracks to facilitate the monitoring of potential mining-induced seismicity and boundary interactions will be the only minor surface disturbances within the JV project area. • The utilisation of existing infrastructure within the Harmony Target Mine mining right area is intended to minimise impacts on the ecological integrity of the surrounding project area. • The Biodiversity Impact Study assesses the impacts that the Proposed Project may have on the receiving environment. Section 7.6 of this Draft EIA Report provides ecological background information.
1.1	How were the following ecological integrity considerations taken into account?[7]	
1.1.1	Threatened Ecosystems[8]	
1.1.2	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure[9]	
1.1.3	Critical Biodiversity Areas (“CBAs”) and Ecological Support Areas (“ESAs”)	
1.1.4	Conservation targets.	
1.1.5	Ecological drivers of the ecosystem.	
1.16	Environmental Management Framework.	
1.1.7	Spatial Development Framework.	
1.1.8	Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).[10]	
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts,	• The project development places all required operational mining infrastructure within the existing Harmony Target Mine mining right area, thereby limiting additional disturbance within the project area ecosystem. No new operational mining

[7] Section 24 of the Constitution and Section 2(4)(a)(vi) of NEMA refer.
[8] Must consider the latest information including the notice published on 9 December 2011 (Government Notice No. 1002 in Government Gazette No. 34809 of 9 December 2011 refers) listing threatened ecosystems in terms of Section 52 of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
[9] Section 2(4)(r) of NEMA refers.
[10] Section 2(4)(n) of NEMA refers.

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No.	Description	Comment
	and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[11]	infrastructure is planned within the project area. • The installation of the seismographic monitoring stations and the development of gravel access tracks to facilitate the monitoring of potential mining-induced seismicity and boundary interactions will be the only minor surface disturbances within the JV project area. • The Biodiversity Impact Assessment present current impacts and investigate the impacts that could occur from the Proposed Project activities. • Measures to avoid and/or minimise negative impacts, as well as to enhance positive impacts, are detailed in the Biodiversity Impact Assessment report.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[12]	• The Proposed Project entails mineral extraction activities from underground, utilising existing operational mining infrastructure located within the adjacent Harmony Target Mine mining right area, thereby minimising major surface disturbance within the project footprint. The installation of the seismographic monitoring stations will be the only minor surface disturbance within the JV project area. • All underground access infrastructures and operational facilities are located within the adjacent Harmony Target Mine mining right area. Furthermore, the ore will be processed at the existing Target 1 metallurgical plant, avoiding the need for new processing infrastructure. • Mitigation measures to manage impacts on the biophysical environment are included in the EMPr.
1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable	• The proposed mining activities will be undertaken as underground operation, with all waste and ore extracted and handled within the Harmony Target Mine mining right area. • All required operational mining infrastructure will be located within the Target Mine mining right area.

[11] Section 24 of the Constitution and Sections 2(4)(a)(i) and 2(4)(b) of NEMA refer.
[12] Section 24 of the Constitution and Sections 2(4)(a)(ii) and 2(4)(b) of NEMA refer.

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No.	Description	Comment
	waste?[13]	• The project is anticipated to generate significant volumes of waste, primarily in the form of excavated waste rock and general operational waste. Rock will be transported either to the Harmony Target processing plant or to the Target waste rock dump. • Mitigation measures to manage waste are included in the EMPr.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[14]	• The Heritage Impact Assessment evaluate the potential impacts associated with the Proposed Project. • Mitigation measures were identified by the heritage specialists to minimise impacts and enhance positive impacts.
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[15]	• An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant. • The proposed mining activities will essentially deplete a non-renewable natural resource within the project area. Once the mineral is removed, it will be gone from the area forever. • Impacts of the Proposed Project were identified, and mitigation measures aimed at avoiding, reducing, and/or managing the negative impacts, as well as enhancing the positive impacts, were also developed. These management measures are included in the EMPr. • The EIA provide mitigation measures to reduce the overall impact of the mine in terms of scarce resource usage.

[13] Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer.
[14] Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.
[15] Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer.

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No.	Description	Comment
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?[16]	• An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant. • The proposed mining activities will essentially deplete a non-renewable natural resource within the project area. Once the mineral is removed, it will be gone from the area forever. • Impacts of the Proposed Project were identified, and mitigation measures aimed at avoiding, reducing, and/or managing the negative impacts, as well as enhancing the positive impacts, were also developed. These management measures are included in the EMPr. • The EIA provide mitigation measures to reduce the overall impact of the mine in terms of scarce resource usage.
1.7.1	Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth, or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).	
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e., what are the opportunity costs of using these resources this the proposed development alternative?)	
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8	How were a risk-averse and cautious approach applied in terms	

[16] Section 24 of the Constitution and Sections 2(4)(a)(vi) and 2(4)(b) of NEMA refer.

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No.	Description	Comment
	of ecological impacts?[17]:	• Specialists investigate the impacts and present the gaps and/or limitations in knowledge in their respective reports. Additionally, specialists provide an assessment of the risks associated with assumptions and the limits/gaps in current knowledge. • The list of gaps and uncertainties are listed in the EIA report (chapter 9.1). • The potential impacts of air quality have been evaluated during EIA phase. Further this, surface and groundwater monitoring will be undertaken throughout the project life. • Specialists conducted their assessment in the required seasons to meet legislative requirements.
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	
1.8.2	What is the level of risk associated with the limits of current knowledge?	
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
1.9	How will the ecological impacts result from this development impact on people's environmental right in terms following[18]	• The impacts have been investigated and quantified by each specialist and presented in the EIA report. • Air Quality, Surface Water, Groundwater and the Social Impact Assessment (SIA), among others have been conducted during the EIA phase. • Impacts of the Proposed Project have been identified, and mitigation measures aimed at avoiding, reducing, and/or managing the negative impacts, as well as enhancing the positive impacts, have been developed. These management measures are included in the EMPr. • Positive impacts include the creation of jobs providing income and, therefore, having a further positive impact on the regional socio-economy aspects of the area, along with other benefits arising from the Social and Labour Plan.
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio- economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	• The Proposed Project will potentially result in various impacts, including the continuation of impacts currently associated with ongoing mining activities in close proximity to the project area. Section 8.2 of the Draft EIA Report list potential impacts identified. • The Proposed Project will also be able to create additional employment opportunities. In an area where unemployment rates are considered high, employment creation is

[17] Section 24 of the Constitution and Section 2(4)(a)(vii) of NEMA refer.
[18] Section 24 of the Constitution and Sections 2(4)(a)(viii) and 2(4)(b) of NEMA refer.

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No.	Description	Comment
		regarded as an important benefit of the proposed underground mine. • Positive impacts include the creation of jobs providing income and, therefore, having a further positive impact on the regional socio-economy aspects of the area, along with other benefits arising from the Social and Labour Plan. • The Social Impact Assessment (SIA) identified additional mitigation measures for consideration by Jelani.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	• Section 8.2 of the Draft EIA Report list potential impacts identified.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?[19]	• Jelani intends to initiate an underground mining operation within the JV area to extract various minerals, primarily focusing on gold ore, along with silver, uranium, and other associated minerals. White Rivers Exploration (WRE), the joint venture partner, holds the Prospecting Right (PR) for various minerals within the JV area. This Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development. In addition, the project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. Consequently, the location of the project site and associated infrastructure is limited, and the identified sites are therefore considered the best practicable environmental option. • Refer to Section 5 for a discussion on Project alternatives.
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?[20]	• Section 8.2 of the Draft EIA Report list potential impacts identified. • The cumulative impacts have been assessed by the specialists and presented in the EIA.

[19] Section 2(4)(b) of NEMA refer.
[20] Regulations appendix1 3(1)(h)(vii) & 3(1)(j)(i) , appendix2 2(1)(h)(vii) and appendix3 3(1)(h)(vii) & 3(1)(j)(i) in Government Notice No. R. 982 refer.

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No.	Description	Comment
2.1	"Promoting justifiable economic and social development"[21]	• The socio-economic context of the region and the area around the Proposed Project is described in Section 7.13. • Table 2-3 in Section 2 details the applicable provincial and local policies, guidelines and by-laws considered during the EIA process. • A Social Impact Assessment has been undertaken. • A Social and Labour Plan (SLP) will be implemented for the Proposed Project. As part of the SLP, the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community. • Community needs will be identified through a Public Participation Process, and the outcomes of this process will be documented in a Public Participation Report. • The local economy is strongly dependent on the mining sector. The Proposed Project will continue to support economic activity in the region through job creation, stimulating investment and contributing to ongoing economic growth and development.
	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area.	
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.).	
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.).	
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	• Social Impact Assessment has been conducted during the EIA phase to determine the impacts of the Proposed Project. • It is anticipated that the Proposed Project will complement the local socio-economic initiatives of increasing employment, and social upliftment through the implementation of a Social and Labour Plan.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?[22]	• A Social and Labour Plan (SLP) will be implemented for the Proposed Project. As part of the SLP, the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community.

[21] Section 24 of the Constitution refers.
[22] Section 2(2) of NEMA refers.

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No.	Description	Comment
		• Community needs will be identified through a Public Participation Process, and the outcomes of this process will be documented in a Public Participation Report.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term?[23] Will the impact be socially and economically sustainable in the short- and long-term?	• A Social and Labour Plan (SLP) will be implemented for the Proposed Project. As part of the SLP, the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community. • Social Impact Assessment has been conducted during the EIA phase to determine the impacts of the Proposed Project.
2.5	In terms of location, describe how the placement of the proposed development will[24]:	• It is anticipated that the Proposed Project will complement the local socio-economic initiatives of increasing employment, and social upliftment through the implementation of a Social and Labour Plan. • Given its proximity to other mining areas, there are already people with some skills in the area that the mine could employ. • The Proposed Project will allow the mine to contribute to the local, regional and national Gross Domestic Product (GDPs), and also to the local communities through job security, as well as other influences and community upliftment programmes. • All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. • Transport aspects are not applicable to the scope of this Proposed Project application. • The Proposed Project will not impact bulk infrastructure planning or settlement planning. • The Proposed Project is unlikely to result in urban sprawl. • The Proposed Project is not expected to result in any changes to existing and planned settlements in the area. No resettlement of surrounding communities is required.
2.5.1	result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	
2.5.2	reduce the need for transport of people and goods.	
2.5.3	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport).	
2.5.4	compliment other uses in the area.	
2.5.5	be in line with the planning for the area.	
2.5.6	for urban related development, make use of underutilised land available with the urban edge.	
2.5.7	optimise the use of existing resources and infrastructure.	
2.5.8	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement).	

[23] Sections 2(2) and 2(4)(c) of NEMA refers
[24] Section 3 of the Development Facilitation Act, 1995 (Act No. 67 of 1995) ("DFA") and the National Development Plan refer.

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No.	Description	Comment
2.5.9	discourage "urban sprawl" and contribute to compaction/densification	• The Proposed Project will not include the construction of any additional residential settlements. • An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant.
2.5.10	contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs.	
2.5.11	encourage environmentally sustainable land development practices and processes.	
2.5.12	take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.).	
2.5.13	the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	
2.5.14	impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area.	
2.5.15	in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts?[25]	• A Social Impact Assessment has been undertaken, and the gaps and limitations are included in the EIA.
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?[32]	
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?[26]	

[25] Section 2(4)(a)(vii) of NEMA refers.
[26] Section 24(4) of NEMA refers.

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No.	Description	Comment
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.7	How will the socio-economic impacts result from this development impact on people's environmental right in terms following:	• The negative impacts have been identified in the Social Impact Assessment and are presented in the EIA. • Mitigation measures relating to the potential socio-economic impacts are included in the EMPr. • The potential socio-economic impacts are described in section 8.2.1.2.
2.7.1	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	• The Proposed Project will potentially result in various impacts, including the continuation of impacts currently associated with ongoing mining activities in close proximity to the project area. Section 8 of the Draft EIA Report list potential impacts identified. • The Proposed Project will also be able to create additional employment opportunities. In an area where unemployment rates are considered high, employment creation is regarded as an important benefit of the proposed underground mine. • Positive impacts include the creation of jobs providing income and, therefore, having a further positive impact on the regional socio-economy aspects of the area, along with other benefits arising from the Social and Labour Plan. • The Social Impact Assessment (SIA) identified additional mitigation measures for consideration by Jelani.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic	• The "best practicable environmental option" will be identified in the EIA Phase where specialists' findings and recommendations will be considered. • A comprehensive public participation process, guided by Chapter 6 of the EIA Regulations (GNR982 of 2014), will be undertaken throughout the Scoping and EIA

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No.	Description	Comment
	considerations?[27]	phases. The Public Participation Process followed is described in Section 6 of this EIA Report. • The EMPr provide mitigation measures for any expected impacts on all sectors of society and include grievance management measures.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?[28] Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	• An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant. • A comprehensive public participation process, guided by Chapter 6 of the EIA Regulations (GNR982 of 2014), will be undertaken throughout the Scoping and EIA phases. The Public Participation Process followed is described in Section 6 of this EIA Report. • The EMPr provide mitigation measures for any expected impacts on all sectors of society and include grievance management measures. • The proposed activities will be operated in strict accordance with the requirements of the Mine Health and Safety Act, No. 29 of 1996.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?[29]	• An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant. • A comprehensive public participation process is being undertaken as per the requirements of Section 6 of the EIA 2014 Regulations, detailed in Section 6 of this report. • A Social and Labour Plan (SLP) will be implemented for the Proposed Project. As part

[27] Section 2(4)(b) of NEMA refers.
[28] Section 2(4)(c) of NEMA refers.
[29] Section 2(4)(d) of NEMA refers.

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No.	Description	Comment
		of the SLP, the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?[30]	• An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant. • A comprehensive public participation process, guided by Chapter 6 of the EIA Regulations (GNR982 of 2014), will be undertaken throughout the Scoping and EIA phases. The Public Participation Process followed is described in Section 6 of this Scoping Report. • The EMPr provide mitigation measures for any expected impacts throughout the life cycle of the project. • The proposed activities will be operated in strict accordance with the requirements of the Mine Health and Safety Act, No. 29 of 1996.
2.13	What measures were taken to:	• A comprehensive public participation process is being undertaken as per the requirements of Chapter 6 of the EIA 2014 Regulations, detailed in Section 6 of this report.
2.13.1	ensure the participation of all interested and affected parties	
2.13.2	provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation[31]	
2.13.3	ensure participation by vulnerable and disadvantaged persons[32]	
2.13.4	promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other	

[30] Section 2(4)(e) of NEMA refers.
[31] Section 2(4)(f) of NEMA refers.
[32] Section 2(4)(f) of NEMA refers.

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No.	Description	Comment
	appropriate means[33]	
2.13.5	ensure openness and transparency, and access to information in terms of the process[34]	
2.13.6	ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge[35]	
2.13.7	ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?[36]	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?[37]	• A Social and Labour Plan (SLP) will be implemented for the Proposed Project. As part of the SLP, the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community. • The findings of the Social Impact Assessment are included in the EIA. Section 8 of the EIA Report lists potential impacts identified.
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?[38]	• Jelani will comply with the requirements of the Mine Health and Safety Act, No. 29 of 1996 and will ensure that itself and the contractor/s employed will comply with the Occupational Health and Safety Act, Act 85 of 1993. • Employees will be made aware, as part of the EIA / EMPr, of Section 4(j) of NEMA, which relates to the right of workers to refuse work that is harmful to human health or the environment and is informed of dangers. The environmental awareness programme will be included in induction material for all employees and contractors.

[33] Section 2(4)(h) of NEMA refers.
[34] Section 2(4)(k) of NEMA refers.
[35] Section 2(4)(g) of NEMA refers.
[36] Section 2(4)(q) of NEMA refers.
[37] Section 2(4)(g) of NEMA refers.
[38] Section 2(4)(j) of NEMA refers.

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No.	Description	Comment
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	• It is anticipated that the Proposed Project will complement the local socio-economic initiatives of increasing employment, and social upliftment through the implementation of a Social and Labour Plan.
2.16.1	the number of temporary versus permanent jobs that will be created.	
2.16.2	whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	
2.16.3	the distance from where labourers will have to travel.	
2.16.4	the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits).	
2.16.5	the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17	What measures were taken to ensure:	• Section 1.10 of this report details all relevant national and local legislation, policies, and guidelines that have been reviewed and incorporated. • During the Scoping phase, all relevant State Departments were provided with copies of environmental documentation for comment and will be afforded the same opportunity during the EIA Phase. The list of Stakeholders provided with environmental documentation is in PPP Report (Appendix C).
2.17.1	that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	
2.17.2	that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?[39]	• All environmental impacts, including appropriate mitigation and management measures as well as monitoring measures, were considered by the EAP and incorporated into the EIA/EMPr.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left? [40]	• The EAP will ensure that the mitigation measures which will be set out in the EMPr are realistic and practical.

[39] Section 2(4)(o) of NEMA refers.
[40] Section 24O(1)(b)(iii) of NEMA and the National Development Plan refer.

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No.	Description	Comment
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?[41]	• The Proposed Project will comply with national and local environmental regulations, such as the National Environmental Management Act (NEMA) and the National Environmental Waste Management Act. These regulations require that polluters are held accountable for any environmental damage caused. • In accordance with the requirements of Regulations 5 and 6 of the NEMA Regulations on Financial Provision (GN940 of 2014) and the DMRE Guidelines on Financial Provision, the quantum for closure-related financial provision will be determined to ensure that adequate funds are made available upfront (prior to the commencement of the project) for the rehabilitation, management, and remediation of negative residual environmental impacts. • The EMPr provide mitigation, management and monitoring measures to ensure that potential negative impacts are managed throughout the life of the Proposed Project. • An application for a Mining Right in terms of the Mineral and Petroleum Resources Development Act of 2002, which provides the regulatory framework for equitable access to and the sustainable development of mineral resources and related matters, has been submitted by the Applicant. • The Applicant will be legally bound to comply with the conditions of the EMPr.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?[42]	• The best practice environmental option are identified in the EIA Report, taking into consideration all the specialists' findings.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments	• The cumulative socio-economic impacts are identified and covered in the EIA phase.

[41] Section 2(4)(p) of NEMA refers.
[42] Section 2(4)(b) of NEMA refers.

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No.	Description	Comment
	in the area?	

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4. Period for which the Environmental Authorisation is Required

The Environmental Authorisation (EA) is required for **14 years**. Subsequent amendments can be lodged as the operational structures change.

5. Description of the Process Followed to Reach the Proposed Preferred Site

5.1 The Consideration of Alternatives

In accordance with the requirements outlined in Appendix 2 of the EIA 2014 Regulations, as amended, a consideration of reasonable and feasible alternatives, including site and technology alternatives, and as well as the "do-nothing" alternative must be undertaken. Each alternative is to be accompanied by a description and comparative assessment of the advantages and disadvantages that such development and activities will pose on the environment and socio-economy.

The EIA 2014 Regulations, as amended, define alternatives as the different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- The property on which or location where it is proposed to undertake the activity.
- The type of activity to be undertaken.
- The design or layout of the activity.
- The technology to be used in the activity.
- The operational aspects of the activity.
- The option of not implementing the activity.

Although a collection of alternatives may exist for the Proposed Project, only feasible alternatives have been considered for this report and are discussed in detail below. Kongiwe strives to seek alternatives that maximise efficient and sustainable resource utilisation and minimise environmental impacts.

5.1.1 The Property on which or Location where it is Proposed to Undertake the Activity

Jelani intends to initiate an underground mining operation within the JV area to extract various minerals, primarily Gold, along with Silver, Uranium, and associated minerals. White Rivers Exploration (WRE), the joint-venture partner, holds the Prospecting Rights for these minerals in this area. The Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development. Additionally, the project development intent to utilise available spare capacity within Harmony's existing infrastructure at the Target Mine, which is located adjacent to the JV area. As the potential mineral resources were confirmed within specific properties and the required supporting operational mining infrastructure already exists within Harmony's Target Mine mining right area, the activity is constrained to these locations. **Therefore, no alternative sites are feasible.**

5.1.2 The Type of Activity to be Undertaken

One option has been identified to be assessed as part of the Proposed Project to extract the mineral resource deposit within the project area: **Underground Mining Operation**.

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Jelani intends to initiate underground mining operation within the project area. The Proposed Project initially will target shallower mineral resource deposits at the project site. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. Selection between these methods will be based primarily on the dip of the mineralised reef.

The development plan is phased:

- Phase 1: Access to the underground mine will occur via the existing Target 3 Shaft, with mining activities undertaken between 57 Level and 48 Level.
- Phase 2: Access will occur via the existing Target 2 Shaft, with mining activities taking place above 48 Level and below 57 Level.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mine's life, be used for the movement of men, material and rock depending on which phase the mine is in. All ore produced from the underground mining operation will be transported to the existing Target 1 metallurgical plant for processing.

Due to the depth of the mineral resource deposits, which occurs at approximately 1 500 metres below surface, underground mining represents the only technically feasible method. Open-pit mining is not considered practicable at this depth due to the significant stripping requirements. No feasible alternative activity types have been identified for consideration, and underground mining is regarded as the preferred development activity alternative.

Table 5-1: The advantages and disadvantages of underground mining activities.

Option	Advantage	Disadvantage
Underground mining activities	• Minimises need for new shaft sinking. • Refurbishing and re-equipping the existing infrastructure significantly limits new construction requirements and speeds up project initiation. • Making use of the existing Target 1 metallurgical plant, remove the need for a new processing plant. • Reduces extensive surface excavation and avoids the creation of large open pits, while enabling access to deeper mineralised reef deposits. • Allows other surface land uses. • Minimises risk of relocation or	• Potential profits rely on substantial volumes of material that need to be mined and on the fluctuating price of commodities (e.g., the fluctuating price of gold). • Potential negative environmental effects during the operational phase of the project. • Potential lowering of groundwater levels due to dewatering needs. • Deep mining increases geotechnical risks (heat, rock stress, seismicity). • Potential for long-term subsidence over mined-out areas. • Labour-intensive. • Increased demand for ventilation and support systems for safe

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	displacement of local communities. • Positive economic benefits. • Lower chance of attracting illegal miners compared to open pits.	operations. • High-risk working environment for underground personnel. • Potential community concern.

5.1.3 The Design and Layout of the Activity.

The proposed layout for the Proposed Project is illustrated in Figure 1-5 above. The layout is influenced by the potential mineral resource deposits identified during the exploration phase, as well as the availability of existing infrastructure situated within the Harmony Target Mine mining right area, to support the mining project. No new operational mining infrastructure is planned within the project area. **No alternative design and layout option considered.**

5.1.4 The Technology to be Used in the Activity

Industry best practice underground mining methods will be employed. Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used. Further detail on the selected mining methods is provided in Section 1.7.

Ore will be transported to the shaft ore pass system using conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Table 5-2: The advantages and disadvantages of the technology to be used

Option	Advantage	Disadvantage
Conventional breast mining	• Highly suited for the majority of the orebody (<55° dip). • All ore produced in the stopes will be scraped into the ore passes. • Lower waste-rock generation because the method supports selective mining and improving ore waste separation. • Labour-intensive method supports local employment, skills transfer, and job creation.	• Higher direct worker exposure to blasting. • Handheld drilling and high-frequency blasting. • Larger stope voids may require additional support materials. • Delayed operations due to economic factors. • Stealing of project equipment and disruption of activities.
Shrinkage stoping	• Broken ore acts as a working platform. • Reduce worker exposure inside the stope, as personnel mainly operate from raises, travelling ways, or	• Ore must remain in the stope until final drawdown and may delay revenue generation as well as impacting early production schedules and plant feed.

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	drawpoints rather than unsupported voids. • Improves extraction of narrow or irregular steep reef zones. • Limited machinery requirements inside the stope during active stoping.	• Ground stability risk during final drawdown. • Higher blasting intensity. • Delayed operations due to economic factors. • Stealing of project equipment and disruption of activities.

5.1.5 The Operational Aspects of the Activity

The Proposed Project involves underground mining, targeting initial mineral resources. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month. Conventional breast mining and shrinkage stoping mining methods have been identified as the most practical, with the selection determined by the dip of the mineralised reef.

Ore will be transported to the shaft ore pass system using a conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump. All ore will be processed at the existing Target 1 metallurgical plant.

The project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant, and associated surface infrastructure. All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Existing shafts and level access will be refurbished and re-equipped as required, and throughout the life of mine Targets 2 and 3 Shafts will facilitate the movement of personnel, materials, and rock.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Table 5-3: The advantages and disadvantages of the operational alternative considered

Option	Advantage	Disadvantage
Underground mining operation	• Utilising the available spare capacity within Harmony's existing operational mining infrastructure at the Target Mine, including the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant, and the associated infrastructure significantly reduces the need for	• Limits flexibility in mine layout optimisation due to fixed infrastructure positions. • Potential profits rely on substantial volumes of material that need to be mined and on the fluctuating price of commodities (e.g., the fluctuating price of gold).

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	new construction and limits additional infrastructure development. • Minimises need for new shaft sinking. • Reduces extensive surface excavation and avoids the creation of large open pits, while enabling access to deeper mineralised reef deposits. • Allows other surface land uses. • Minimises risk of relocation or displacement of local communities. • Positive economic benefits. • Lower chance of attracting illegal miners compared to open pits.	• Potential negative environmental effects during the operational phase of the project. • Potential lowering of groundwater levels due to dewatering needs. • Deep mining increases geotechnical risks (heat, rock stress, seismicity). • Potential for long-term subsidence over mined-out areas. • Labour-intensive. • Increased demand for ventilation and support systems for safe operations. • High-risk working environment for underground personnel. • Potential community concern.

5.1.6 The "No-Go" Option

The option of the Proposed Project not proceeding would mean that the environmental and social status would remain the same as current. This means that both the potential negative and positive impacts associated with the Proposed Project would not occur. As a result, negative impacts on water resources and other environmental aspects would be avoided. However, positive impacts such as economic development, employment opportunities and skills development would also not materialise.

Negative impacts that would be avoided include, but are not limited to, the dewatering of the deep aquifer and various socio-economic effects, such as potential community conflict and increases in certain social challenges (e.g., in-migration and potential increases in crime).

Potential positive impacts associated with the project include future employment opportunities, which may help reduce unemployment and support improved livelihoods within local communities. In addition, the project could stimulate the local economy, potentially contributing to further development and community empowerment.

Should the Proposed Project not proceed, the aforementioned positive economic and social impacts would not be realised. Furthermore, the mineral reserves in the project area would remain unmined. The benefits associated with the proposed underground mining project will be lost, and the current socio-economic conditions, particularly those affecting surrounding communities would remain unchanged.

6. Public Participation

The Public Participation Process (PPP) offers stakeholders an opportunity to be informed about the Proposed Project, to raise issues and to make suggestions for enhanced project benefits. The PPP will be undertaken to ensure compliance with the relevant legal framework applicable to the Proposed Project.

The PPP is designed to build and maintain constructive relationships. It is an ongoing process between the applicant and the Project's stakeholders that extends throughout the life of the Project. The PPP for the Project

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ensures that adequate and timely information is provided to all potentially Project-affected people and other stakeholders, that stakeholders are given sufficient opportunity to raise comments, and that these comments are taken into consideration during Project decisions.

6.1 Applicable Legislation

The PPP as required by the environmental laws and regulations specified therein was followed as best practice. The PPP was undertaken in line with the statutory requirements for public participation. The following legislation was considered when developing and implementing the PPP:

- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) (EIA 2014 Regulations).
- Public Participation guideline in terms of NEMA.
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA).
- National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEM:WA) and the List of Waste Management Activities (GN R921 of 29 November 2013, as amended).
- Protection of Personal Information Act, 2013 (Act No. 4 of 2013) (POPIA).
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA).

NEMA mandates public participation for environmental decision-making, ensuring affected communities have a voice in development projects through the EIA Regulations, 2014. The NEMA Public Participation Guideline (in terms of the EIA Regulations) is a mandatory part of the EA process, aiming for transparent, informed decisions that promote sustainable development by integrating social, economic, and environmental factors.

The NWA is the primary law for the protection, management, and equitable use of the water resources. The NWA establishes the government's role in allocating water resources, promoting sustainable use of water resources, and preventing pollution.

The POPIA regulates the processing of personal information by both public and private bodies, aiming to protect individuals' constitutional right to privacy.

The PAIA gives effect to the constitutional right to access information held by both the state and private bodies. The Act establishes procedures for individuals to request information for the protection or exercise of their rights.

In addition to the above legislation, the PPP needs to be aligned to International good-practice guidelines for public participation, particularly in regard to the following Core Values of the International Association for Public Participation (IAP2).

- Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
- Public participation includes the promise that the public's contribution will influence the decision.
- Public participation promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers.
- Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
- Public participation seeks input from participants in designing how they participate.

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- Public participation provides participants with the information they need to participate in a meaningful way.
- Public participation communicates to participants how their input affected the decision.

6.2 Objectives of the Public Participation Process

The PPP objectives for this Project include the following:

- Ensure that stakeholders are informed about the development of for the Project in an adequate and timely manner;
- Provide stakeholders with the opportunity to participate in the environmental regulatory processes and provide comment;
- Involve stakeholders in identifying ways in which comments can be addressed;
- Work directly with stakeholders throughout the environmental regulatory processes to ensure that stakeholder comments are consistently understood and considered; and
- Verify that stakeholder comments have been recorded and addressed.

6.3 Stakeholder Engagement Activities

Summary of the stakeholder engagement process undertaken is presented in Table 6-1 below.

Table 6-1: Stakeholder Engagement Activities

Project Phase	Activities Undertaken
Pre-Scoping Phase **Completed**	• Pre-Application meeting with the Department of Mineral and Petroleum Resources (DMPR). • Consultation meeting with DMPR, regarding the Social and Labour Plan (SLP). • Stakeholder identification (WinDeed searches, compilation of stakeholder database). • Consultation with communities (within the nearby surroundings of the Proposed Project). • Consultation with the relevant Authorities (including ward councillors/ward committees) (Microsoft Teams/ One-on-one consultation meetings). • Compilation of announcement documents, such as Background Information Documents (BIDs), Registration and Comment Forum, adverts, site notices and Draft Scoping Report (DSR) notification letter. • Obtaining initial comments, suggestions from stakeholders. • Land Claims enquiry.
Scoping Phase **Completed**	• Consultations with Directly and Indirectly Affected Landowners (Consultation meetings). • Distribution and placement of Project announcement materials (site notices, and newspaper advertisements). • Updating of the stakeholder database.

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Project Phase	Activities Undertaken
	• Making available the DSR for public review and comment. • Providing stakeholders with further details of the Proposed Project and associated specialist studies. • Consultations with stakeholders (Online meetings and Open Day meetings). • Obtaining comments from stakeholders on the SLP at the Open Day. • Obtaining further comments or suggestions from stakeholders. • Development of Comments and Response Report (CRR), capturing all comments/questions and responses. • Informing specialists and the applicant about comments received from stakeholders. • Making available the Final Scoping Report.
EIA Phase	• Pre-Consultation meeting will be undertaken with the Department of Water and Sanitation (DWS), Free State Province • Site visit will be undertaken with DWS. • Provide feedback about the specialist studies conducted and mitigation measures proposed by means of consultation with stakeholders. • Provide opportunity for stakeholders to comment on specialist findings, impacts assessments and recommendations. • Make the relevant environmental reports available for public review and comment. • Consultation with stakeholders (Open Day and Online Meeting). • Verify that comments raised by stakeholder have been accurately recorded • Update CRR with new comments, questions and responses. • Inform specialists and the proponent of stakeholders' comments. • Making available the Final EIA / EMPr.
Decision Making Phase **EIA**	• Once the Competent Authority which is DMPR had come to a decision regarding the authorisation of the Proposed Project, all registered stakeholders will be notified of the decision made and the appeal process will be explained with associated timeframes.

6.4 Consultation undertaken for the Scoping Phase

Consultation during the Scoping phase aimed at providing stakeholders with an overview of the Proposed Project and to obtain comments to inform specialist studies and project planning. Stakeholders were invited to participate through online and in-person engagements depending on preference. The purpose of these meetings was to discuss the Proposed Project, contents of the DSR, provide stakeholders with an opportunity to raise their comments and to interact with the Project team members. Locality, infrastructure and land tenure maps were displayed and distributed as part of these meetings.

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The following meetings were held:

- **Authority Meetings**: Meetings were held with the relevant Authorities.
- **Landowner Meetings**: Consultation meetings were held with directly and indirectly affected landowners.
- **Online Meeting**: Online meeting was held with stakeholders who prefer online engagements.
- **Broader Public Consultation Meeting**: An Open Day was held with the broader public during the public review period.

Refer to Table 6-2 below for the schedule of stakeholder meetings.

Table 6-2: Stakeholder Meetings

Meeting Dates	Stakeholders	Time Slots
In-Person Meetings		
Saturday, 30 May 2026	Broader Stakeholder Meeting (Open Day) held with all sectors of society at S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge, 9490.	11H00 – 13H00
Online Meetings		
Monday, 15 December 2025	Microsoft Teams - Online meeting was held with Adjacent Affected Landowners within a 2km radius to ask landowner consent for the hydrocensus specialist to access properties.	10H00 – 11H00
Friday, 6 February 2026	Microsoft Teams - Online pre-application meeting was held with Competent Authority, Department of Mineral and Petroleum Resources (DMPR) officials.	08H00 – 09H00
Tuesday, 26 May 2026	Microsoft Teams - Online meeting was held with Lejweleputswa District Municipality, Free State.	14H00 – 15H00
Wednesday, 27 May 2026	Microsoft Teams – Online Meeting with indirectly affected landowners and the broader stakeholders.	10H00 – 11H00
Thursday, 28 May 2026	Microsoft Teams - Online meeting was held with Matjhabeng Local Municipality, Free State.	10H00 – 11H00

All comments raised by stakeholders during these meetings were recorded in the CRR, and responses were prepared in accordance with the scope of the Proposed Project and the available information. These are detailed in Appendix C.

Minutes of these meetings, along with the presentation materials, were compiled and distributed to all stakeholders who attended and are included in Appendix C.

6.5 Availability of the Draft Scoping Report for Public Review and Comment

As part of the Scoping Process, the applicant is required to compile a Draft Scoping Report (DSR) for mining-related activities. The DSR was available for public review and comment from Thursday, **21 May 2026** to Monday, **22 June 2026.**

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A notification of the availability of the DSR for public review and comment was distributed on Thursday, **14 May 2026** to all stakeholders on the database.

The DSR was available as follows:

- An electronic copy on Kongiwe's website: https://kongiwe.com/projects/
- A hard copy at the Allanridge Public Library. Contact details are shown in Table 6-3

Table 6-3: Place where the DSR Report was circulated

Location	Physical Address	Contact Person / Times
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063 Monday – Friday Open: 08H00 - Close: 15H30

Non-technical summaries of the DSR were available electronically to all stakeholders on the stakeholder database and distributed in hard copy at the Open Day.

Relevant Authorities received an email with a website link of the DSR as part of the announcement of the Proposed Project.

6.6 Consultation Undertaken as part of the Final Scoping Phase

The Final Scoping Report (FSR) was submitted to the DMPR on Wednesday, **1 July 2026**.

Stakeholders were notified by email of the availability of the FSR for review. Stakeholders were provided with the opportunity to verify that their comments were captured during the Draft Scoping Phase and to review responses provided by the Project team. All comments received on the FSR were incorporated into the CRR.

Table 6-4 below is a summary of the activities during the Final Scoping Phase.

Table 6-4: Summary of Activities to be Undertaken During the Final Scoping Phase

Activity	Details
Update of Stakeholder Information	• The stakeholder database was updated with new I&APs who formally registered, participated in stakeholder meetings or submitted comments.
Placement of Final Scoping Report	• The FSR is available on the Kongiwe's website.
Submission to the Authorities	• The FSR was submitted to DMPR.
Announcement of the submission of the Final Scoping Report	• A notification letter notifying stakeholders that the FSR has been submitted to DMPR was emailed to the full stakeholder database. • An SMS was sent to stakeholders who have no access to the internet.

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6.7 Consultation undertaken for the Impact Assessment Phase

Consultation with stakeholders during the Environmental Impact Assessment (EIA) Phase entails providing stakeholders with comments on specialist study findings, recommendations and mitigation measures proposed. These studies and recommendations were included as part of the Draft Environmental Impact Assessment Report (EIA) including the Environmental Management Programmes (EMPr), in support of the EA application. Stakeholders will be invited to participate in both online and in-person engagements depending on their preference. The purpose of these meetings will be held to present the findings of the specialist studies and to get comments from stakeholders.

6.7.1 Public Participation Materials: Impact Assessment Phase

Notification Letter: An email notification was sent to stakeholders on Tuesday, **22 September 2026**, informing them of the availability of the Draft EIA/EMPr Reports and the Draft IWWMP for public review and comment. The notification also provided details of the Public Meeting and invited stakeholders of the broader public to formally register as Interested and Affected Parties (I&APs).

A reminder notification will subsequently be emailed to stakeholders to remind them of the availability of the Draft EIA/EMPr Reports and the Draft IWWMP for public review and comment. The reminder notification will also serve to encourage stakeholders to attend the Public Meeting.

SMS: An SMS was sent to stakeholders with no access to the internet. Stakeholders were notified on the availability of the Draft EIA/EMPr Reports and the Draft IWWMP for public review and comment and when the Public Meeting will be held.

Newspaper Advertisements: A newspaper advert was placed in the **Vista** local newspaper within the Project area, on Thursday **24 September 2026**. The advertisement provided details about the public review period for the Draft EIA/EMPr Reports and the Draft IWWMP and how the public can access the Reports for their review and comment. The advert provided information about the online and in-person engagements sessions.

Telephonic Discussions: Stakeholders will be consulted, where required, through telephonic discussions. These discussions facilitate the process of inviting stakeholders to stakeholder meetings and provide stakeholders with an opportunity to raise comments, concerns and suggestions regarding the Project. Comments and concerns raised during telephonic discussions are recorded and addressed by the Project team.

Maps: Various maps which are part of the Draft EIA/EMPr Reports and the Draft IWWMP will be on display during online and the in-person engagements.

6.7.2 Availability of the Draft EIA/EMPr Reports and the Draft IWWMP for Public Review and Comment

The Draft EIA/EMPr Reports has been compiled and will be made available for a 30-day public review and comment period from Tuesday, **29 September 2026** until Wednesday, **28 October 2026**.

The Draft EIA Report will be made available as follows:

- Electronic copies on Kongiwe's website: https://kongiwe.com/projects/

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- The non-technical summary of the Draft EIA/EMPr Reports will be emailed to all stakeholders on the database.
- Hard copies of the non-technical summary will be distributed to the Stakeholder Meeting attendees.
- Hard copies of the Draft EIA/EMPr Reports and the Draft IWWMP will be available at the Allenridge Public Library and Nyakallong Public Library.

Table 6-5: Places where the Draft EIA/EMPr Reports and the Draft IWWMP will be circulated

Location	Physical Address	Contact Person / Times
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063 Monday – Friday Open: 08H00 - Close: 15H30
Nyakallong Public Library	Nyakallong, Allanridge, 9492	Ms Vivian Dasheka (081) 761 1620 Monday – Friday Open: 08H00 - Close: 16H00

6.7.3 Submission of the Draft EIA/EMPr Reports to DMPR

The Draft EIA/EMPr Reports and appendices was submitted to the DMPR which is the Competent Authority (CA) for the Proposed Project on Tuesday, **29 September 2026**.

6.7.4 Stakeholder Meetings

Stakeholders are invited to participate through both online and in-person engagements. Online consultations will be conducted using platforms such as Microsoft Teams, while in-person consultations will be conducted through Broader Stakeholder Meetings.

The purpose of these Stakeholder Meetings is to discuss the Draft EIA Report and the Draft IWWMP, present the findings of the specialist studies, provide stakeholders with an opportunity to raise comments and concerns regarding the Reports, and facilitate interaction with the Project team. Information regarding the Proposed Project description, specialist study findings, potential impacts, and proposed mitigation measures will be presented. The presentation will include relevant maps illustrating the affected areas.

Copies of the Non-Technical Summary will be made available to stakeholders attending the meetings. The Non-Technical Summary will be available in both English and Sesotho.

The following meetings will be held:

- **Online Meeting with Broader Stakeholders:** An online meeting will be held during the public review period, providing stakeholders with an opportunity to engage with the Project team and discuss the Draft EIA/EMPr Reports and the Draft IWWMP.
- **In-Person Meeting with Broader Stakeholders:** An in-person Public Meeting will be held during the public review period, providing stakeholders with an opportunity to engage directly with the Project team and discuss the Draft EIA/EMPr Reports and the Draft IWWMP.

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- **Landowner Meeting:** Consultation meetings will be held with directly and adjacent affected landowners, where applicable or requested.

Table 6-6 provides a summary of the Stakeholder Meetings scheduled.

Table 6-6: Stakeholder Meetings

Meeting Dates	Stakeholders	Time Slots
In-Person Meetings		
Saturday, 10 October 2026	Broader Stakeholder Meeting (Public Meeting) held at S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490	10H00 – 12:00
Online Meetings		
Tuesday, 6 October 2026	Microsoft Teams – Online Meeting was held with Broader Stakeholder including directly and indirectly affected landowner's / land occupiers /community members / authorities /NGOs and other.	10H00 – 11H00

Focused efforts will be made to engage with directly impacted stakeholders, including residents within the Proposed Project area and vulnerable groups at the local level. These stakeholders will be consulted directly and, where appropriate, through their representatives and other influential members of the community. Meetings will be conducted in a culturally appropriate manner, providing stakeholders with an opportunity to openly express their views and concerns. Stakeholders will be given the opportunity to raise issues in the language of their choice, and translation services will be provided where required.

Authorities, NGOs, landowners, land occupiers and community members will be engaged to promote participation and attendance at stakeholder meetings through telephonic consultations and the distribution of emails and SMS notifications.

A list of meetings and consultations undertaken during the process will be provided in the Final EIA Report and the Final IWWMP and presented in Appendix C.

Additionally, minutes of the meetings, together with the presentation materials, will be compiled and made available to stakeholders who attended the meetings. These will be included in Appendix C of the Final EIA/EMPr Reports and the Final IWWMP.

All comments and concerns raised by stakeholders during the meetings will be recorded in the Comment and Response Report (CRR). Responses will be prepared by the Project team in accordance with the Project scope and available information and will be included in Appendix C of the Final EIA/EMPr Reports and the Final IWWMP.

7. The Baseline Environment

This Chapter provides a description of the environment that may be affected by the Proposed Project. The information is provided to assist the reader in understanding the receiving environment within which the project is proposed, and features of the biophysical, social, and economic environment that could be directly or indirectly affected by, or alternatively could impact on, the proposed development. This information has been sourced from existing available information and the on-site specialist investigations conducted as part of the EIA and aims

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to provide the context within which this EIA is being conducted. The full impact assessments undertaken by the independent specialists, including detailed descriptions of the affected environment, are attached as Appendices D of this EIA Report.

7.1 Climate

The Proposed Project is situated in Allanridge, within the Matjhabeng Local Municipality in the Lejweleputswa District of the Free State Province. Allanridge's climate is classified as Mid-latitude desert (BWk) under the Köppen–Geiger system, based on 1 km global climate maps (Beck et al., 2018; Beck et al., 2023; Kottek et al., 2006), and is influenced by its elevation of approximately 1322m above sea level (asl).

7.1.1 Temperature

Figure 7-1 illustrates the typical weather at Allanridge, a small gold-mining town situated less than 3 km from site, based on a statistical analysis of historical hourly weather reports and model reconstructions from January 1, 1980 to December 31, 2016 (Weather Spark, 2026). This area experiences a clear seasonal temperature cycle typical of the central South African Highveld interior. Summers are long, mostly clear and warm; winters are short, clear, dry and cold. Over the course of the year the temperature typically varies from about 0 °C to 30 °C and is rarely below -3 °C or above 34 °C. The hot season lasts approximately four months (early November to early March), when average daily highs exceed 28 °C. The cool season lasts about 2.5 months (late May to early August), when average daily highs remain below 21 °C. Night-time temperatures in mid-winter frequently fall to near or below freezing, while summer nights remain mild (typically 14–17 °C). These patterns form the observed baseline against which future climate-change projections are compared.

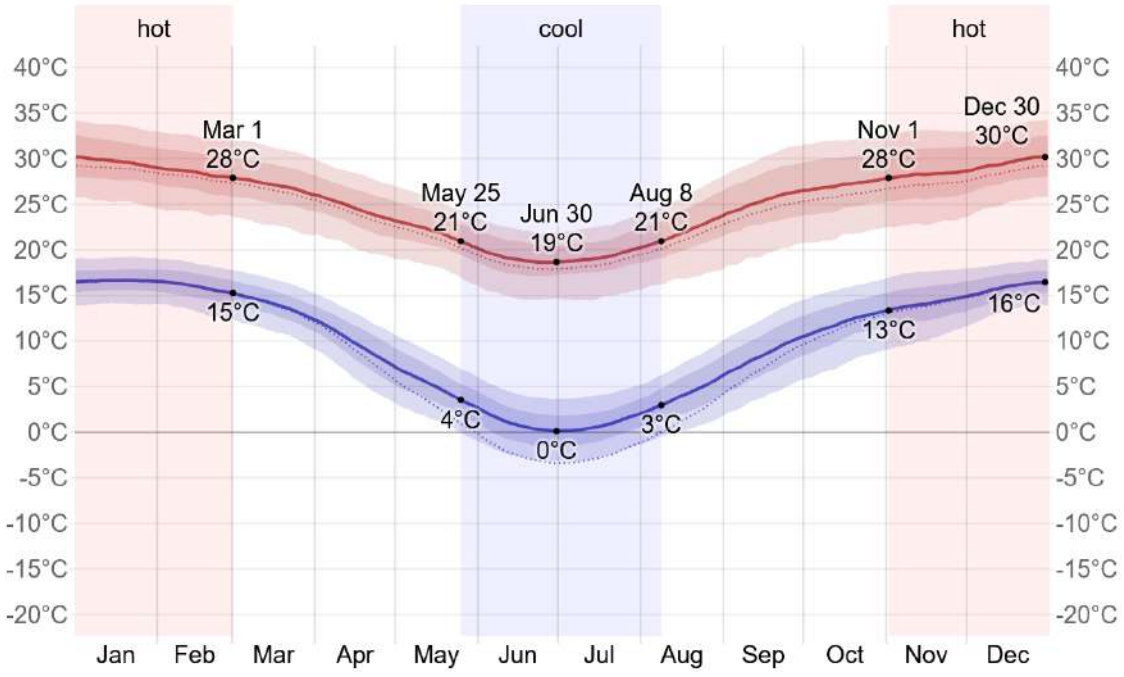


Figure 7-1: Average low (blue line) and high (red line) temperatures recorded at the Allanridge weather station (Copyright © 2026 WeatherSpark.com).

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7.1.2 Rainfall

The Free State Province lies within South Africa's summer rainfall zone and experiences a strong west-east rainfall gradient. Rainfall is delivered primarily by convective systems, including tropical-temperate troughs (TTTs), mesoscale convective systems (MCSs), and associated thunderstorms (Munday, et al., 2025).

The mean monthly rainfall for the Welkom (0364300 W) weather station between October 1920 – March 2022 is shown in Figure 7-2. Rainfall is highest over the summer months of October to April, with December and January generally being the wettest months. Very little rainfall falls over the winter months.

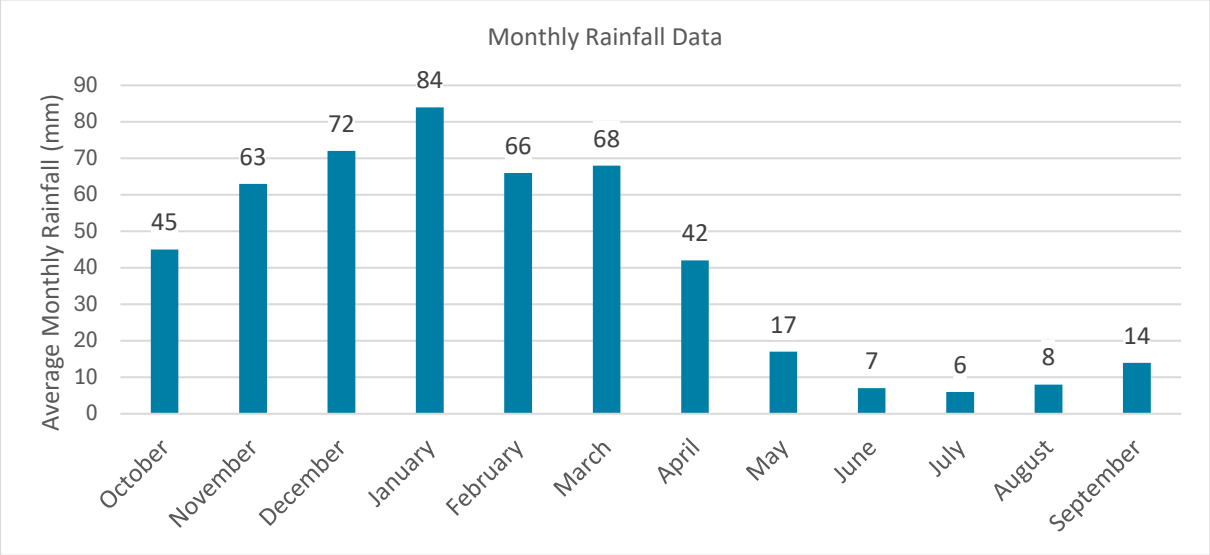


Figure 7-2: Average Monthly Rainfall over the project area (0364300 W).

7.1.3 Storm Rainfall Depths

The storm rainfall depths, which are required to calculate the peak flows, were extracted using the Design Rainfall Estimation in South Africa software programme. The programme uses the six closest rainfall stations (See Table 7-1) to the user specified coordinates, to calculate the storm rainfall depths for that site. Storm rainfall depths were extracted at the centre of the project area (27°47' S, 26°37' E). The storm rainfall depths are indicated in Table 7-2.

Table 7-1: Six Closest Rainfall Stations to the Project

Station Name	Station No.	Latitude	Longitude	MAP (mm)	Altitude (mamsl)
Odendaalsrus	0364322_W	27°52'	26°41'	497	1 330
Hanoverspan	0364093_W	27°33'	26°34'	512	1 295
Mahemispruit	0364119_W	27°59'	26°34'	514	1 299
Newlands	0364562_W	27°52'	26°49'	518	1 349
Hoopvlei	0363868_W	27°58'	26°28'	492	1 294
Richmond Noord	0364546_W	27°36'	26°49'	489	1 308

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Table 7-2: Storm Rainfall Depths for the Project Area

Storm Duration	Return Period/Storm Rainfall Depth (mm)						
min/hr/day	1:2yr	1:5yr	1:10yr	1:20yr	1:50yr	1:100yr	1:200yr
5 min	9.0	12.2	14.4	16.5	19.5	21.8	24.2
10 min	13.4	18.1	21.3	24.6	28.9	32.4	36.9
15 min	16.9	22.8	26.9	31.0	36.5	40.8	45.2
30 min	21.3	28.8	34.0	39.2	46.2	51.6	57.2
45 min	24.5	33.1	39.1	45.0	53.0	59.3	65.7
1 hr	27.0	36.5	43.1	49.6	58.5	65.4	72.4
1.5 hr	31.0	41.9	49.4	57.0	67.1	75.0	83.2
2 hr	34.2	46.2	54.5	62.8	74.0	82.7	91.7
4 hr	39.7	53.7	63.4	73.0	86.0	96.1	106.6
6 hr	43.4	58.6	69.2	79.7	93.9	104.9	116.3
8 hr	46.2	62.4	73.6	84.8	99.9	111.7	123.8
10 hr	48.5	65.5	77.3	89.0	104.9	117.2	129.9
12 hr	50.4	68.1	80.4	92.6	109.1	121.9	135.2
16 hr	53.7	72.5	85.5	98.5	116.1	129.8	143.9
20 hr	56.3	76.1	89.8	103.4	121.8	136.2	151.0
24 hr	58.6	79.1	93.4	107.6	126.7	141.7	157.1
1 day	48.7	65.8	77.7	89.4	105.4	117.8	130.6
2 days	59.9	80.9	95.4	109.9	129.5	144.8	160.5
3 days	67.5	91.2	107.6	124.0	146.1	163.3	181.0
4 days	73.3	99.0	116.9	134.6	158.6	177.3	196.6
5 days	77.6	104.8	123.7	142.5	167.9	187.7	208.1
6 days	81.9	110.7	130.6	150.4	177.2	198.1	219.6
7 days	85.1	114.9	135.6	156.2	184.1	205.8	228.1

7.1.4 Evaporation

Mean monthly S-Pan evaporation data for the study area, was obtained from the DWS weather station C4E002, located at the Erfenis Dam. S-Pan evaporation was converted into open water evaporation, by multiplying by monthly pan factors obtained from the WR90 study. This was done, as the water temperatures in an S-Pan are higher than that of open water bodies (e.g. dams), resulting in higher evaporation rates. Table 7-3 provides the monthly evaporation adopted for the study area. Evaporation is highest over the warmer months of October to March, and lowest over the cooler months of May to August.

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Table 7-3: Evaporation data for the area

Month	C4E002 S-Pan Evaporation (mm)	Pan Factor	Open Water Evaporation (mm)
October	210	0.84	176
November	233	0.88	205
December	257	0.88	226
January	246	0.88	216
February	191	0.87	166
March	173	0.85	147
April	124	0.83	103
May	98	0.81	79
June	75	0.81	61
July	86	0.81	70
August	122	0.82	100
September	173	0.83	144
Total	**1 988**	**N/A**	**1 694**

7.1.5 Wind Intensity

Baseline average wind speeds, illustrated in Figure 7-3, at Allanridge are moderate throughout the year and exhibit a clear seasonal cycle. Mean daily wind speeds are lowest in late summer and early autumn, reaching a minimum of approximately 2.9 m/s around the end of March, before gradually increasing through the winter months. Speeds rise more notably from August onwards, peaking at about 4.1 m/s in late September, and remain elevated through October and November during the windiest period of the year. Across the full annual cycle, the mean typically ranges between roughly 2.9 and 4.1 m/s, while the broader variability envelope indicates that instantaneous or higher-percentile speeds can reach 6–7 m/s during the spring windy season and drop to around 1–2 m/s under calmer conditions.

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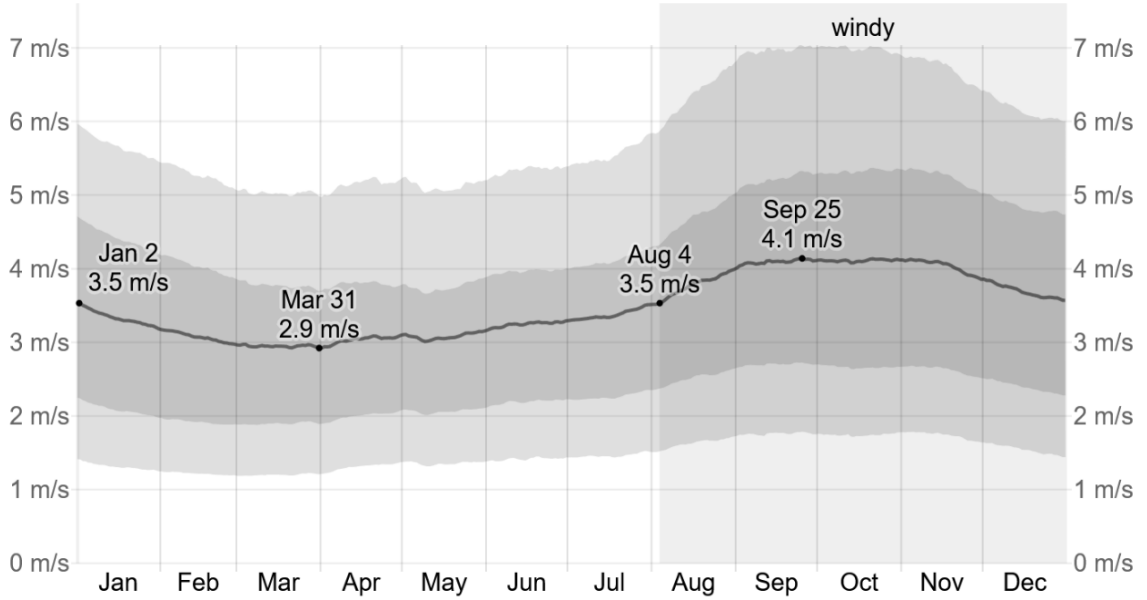


Figure 7-3: Average Annual Wind Speed in Allanridge.

7.2 Topography

The project area is situated in the Highveld area of South Africa and topography is relatively flat with low hills or 'koppies'.

The elevation of the Jelani Project varies from a high of 1 310 metres above mean sea level (mamsl) in the north-eastern corner, to a low of 1 298 mamsl at Pan A on the western boundary. The topography of the Jelani Project is flat, with an average slope of less than 3 %. The only areas where steep slopes occur, are along the sides of the TSFs and WRDs outside the Project area.

The Jelani Project drain towards the Losdoringspruit and Pan A. Several natural occurring pans characterise the landscape, resulting in much of the area of the Jelani Project being endoreic (i.e. not discharging into any of the surrounding river systems).

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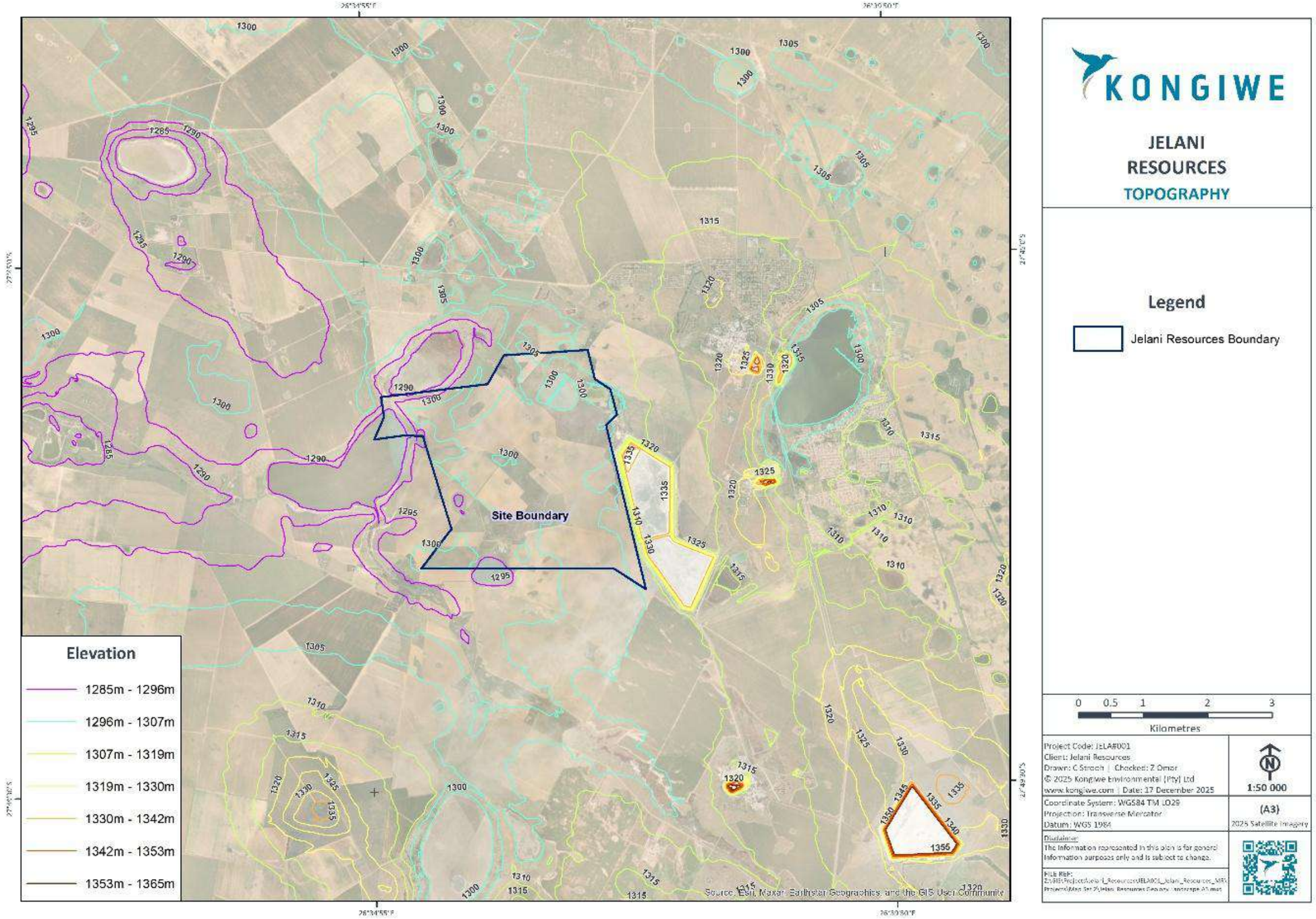


Figure 7-4: Topography of the project area.

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7.3 Geology

7.3.1 Regional Geology

The Jelani Project is located within the north-western portion of the Free State Goldfield, situated on the south-western margin of the Witwatersrand Basin. The Witwatersrand Basin comprises a thick sequence of sedimentary rocks that host the world-renowned gold-bearing conglomerate reefs and forms one of the most extensively mined geological provinces in South Africa (Bara Consulting, 2026).

The regional geological succession consists of sedimentary rocks of the Witwatersrand Supergroup, overlain by volcanic rocks of the Ventersdorp Supergroup and, in turn, by sedimentary rocks of the Karoo Supergroup (Figure 7-5). The geological sequence generally youngs upward from the Witwatersrand strata through the Ventersdorp volcanics to the Karoo sediments exposed at surface (Bara Consulting, 2026) and (AquiSim Consulting, 2025).

The Witwatersrand Supergroup comprises quartzites, conglomerates, shales and argillaceous sedimentary units deposited in a fluvial environment. Within the Free State Goldfield, the principal economic units occur within the Central Rand Group and include the Basal Reef, B Reef, A Reef, EA Reef and ED Reef horizons targeted by the proposed mining operation. The Witwatersrand succession exceeds 2 000 m in thickness within parts of the goldfield and forms the principal bedrock sequence underlying the project area (Bara Consulting, 2026).

The Witwatersrand rocks are unconformably overlain by volcanic rocks of the Ventersdorp Supergroup, predominantly consisting of andesitic lavas, pyroclastic units and associated volcanic sediments. The Ventersdorp succession is approximately 1,300 m thick in the central portions of the Free State Goldfield and is associated with significant tectonic activity that resulted in extensive faulting and block movements throughout the basin (MvB Consulting, 2026) (AquiSim Consulting, 2025).

The uppermost geological sequence, occurring below aeolian sands that cover large parts of the Study Area, comprises Karoo Supergroup sediments, which attain an average thickness of approximately 200 m (Figure 7-5 and Figure 7-7). Locally, the Allanridge Formation (part of the Ventersdorp Supergroup) is exposed at surface.

The Karoo succession includes the Beaufort Group (including the Normandien Formation), the Ecca Group (including Volksrust and Vryheid Formations) and the Dwyka Group (Dwyka Formation). The Beaufort Group contains extensive sandstone horizons capable of supporting groundwater occurrences, while the Ecca Group consists predominantly of shale and mudstone with subordinate sandstone units. The Dwyka Formation commonly consists of a low permeability tillite unit separating the shallow Karoo aquifer system from the deeper fractured aquifer systems associated with the Ventersdorp and Witwatersrand rocks. (MvB Consulting, 2026) (AquiSim Consulting, 2025).

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Depth	Supergroup	Group	Formation	Member	Abbreviation	Geology	Max. Thickness	Reef
0	Karoo	Ecca	Vryheid				183m	
100			Dwyka				Unconformity	
200	Ventersdorp	Pniel	Allanridge		A		259m	
300			Bothaville		B			
400							Unconformity	
500		Platberg	Rietgat		R		183m	
600			Kameel-doorns		N		Unconformity	
700		Klipriviersberg	Edenville		LE		245m	
800								
900			Loraine		LL		258m	
1000								
1100								
1200			Jeanette Agglomerate		LJ		88m	
1300			Orkney		LO		286m	
1400								
1500								
1600	Witwatersrand	Central Rand	Eldorado	Uitkyk	BB		146m	
					LAG		15m	
1700				Van Den Heeversrust	EA		152m	EA 15
1800								EA 1
1900				Rosedale	EB		128m	E9*
2000					EC		80m	
					ED		52m	ED* VS5*
2100			Aandenk		A Reef		50m	Earls Court A*
				Earls Court	BP R		25m	BPR*
2200				Spes Bona	B Reef		50m	Spes Bona B*
2300			Dagbreek	Doornkop Qte			67m	
				Upper Shale Marker	USM			
							113m	
2400				Leader Reef Zone	L7		14m	Leader
			Harmony	Leader Qte / Khaki Shale	LQ / ES		21m	
2500			Welkom	Basal Reef			6m	Basal*
2600				Uitsig			274m	
2700								Intermediate

Note: * Reefs that are mined

Figure 7-5: Free State Goldfields Stratigraphy (from: Harmony Geology Department)

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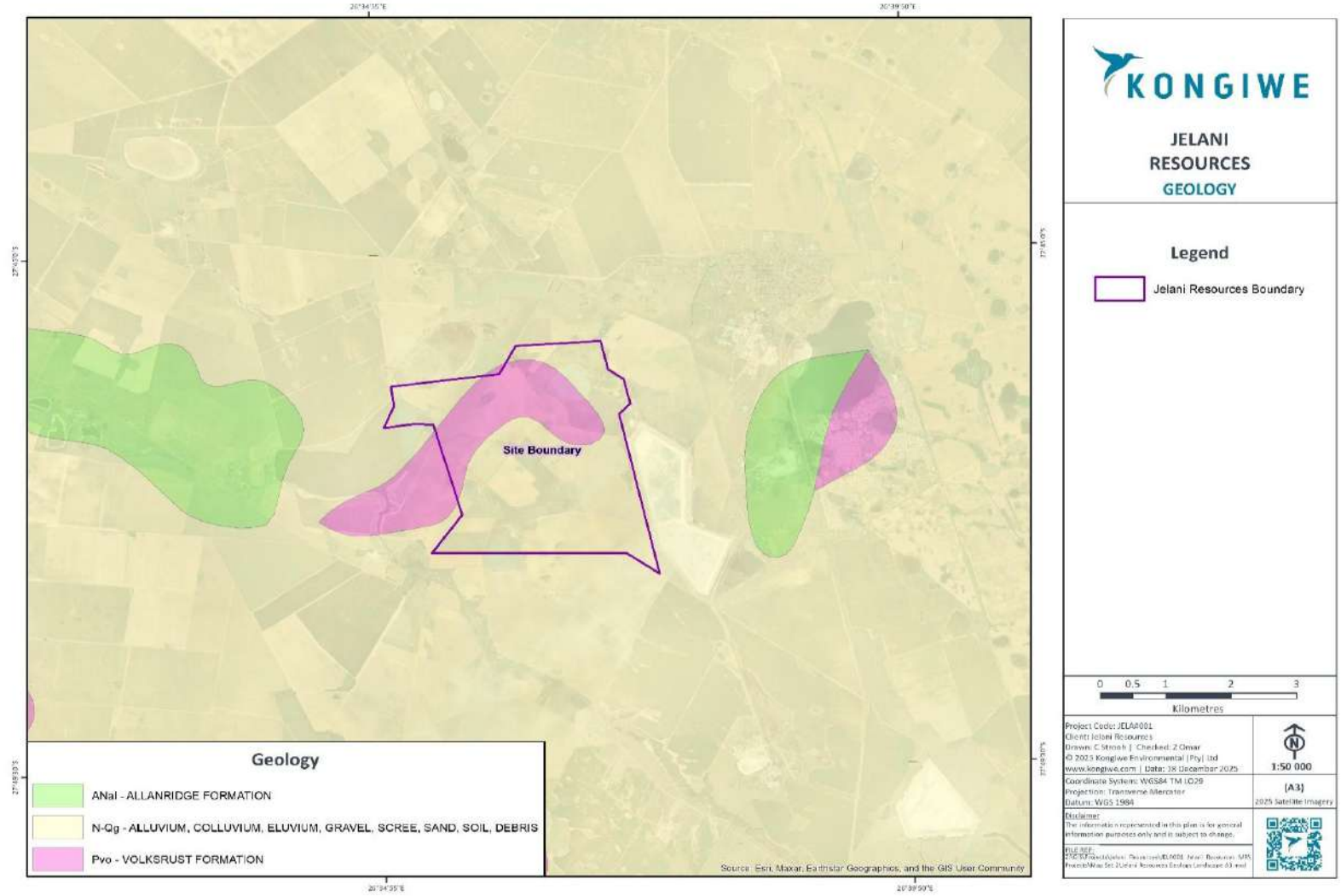


Figure 7-6: Jelani geology map

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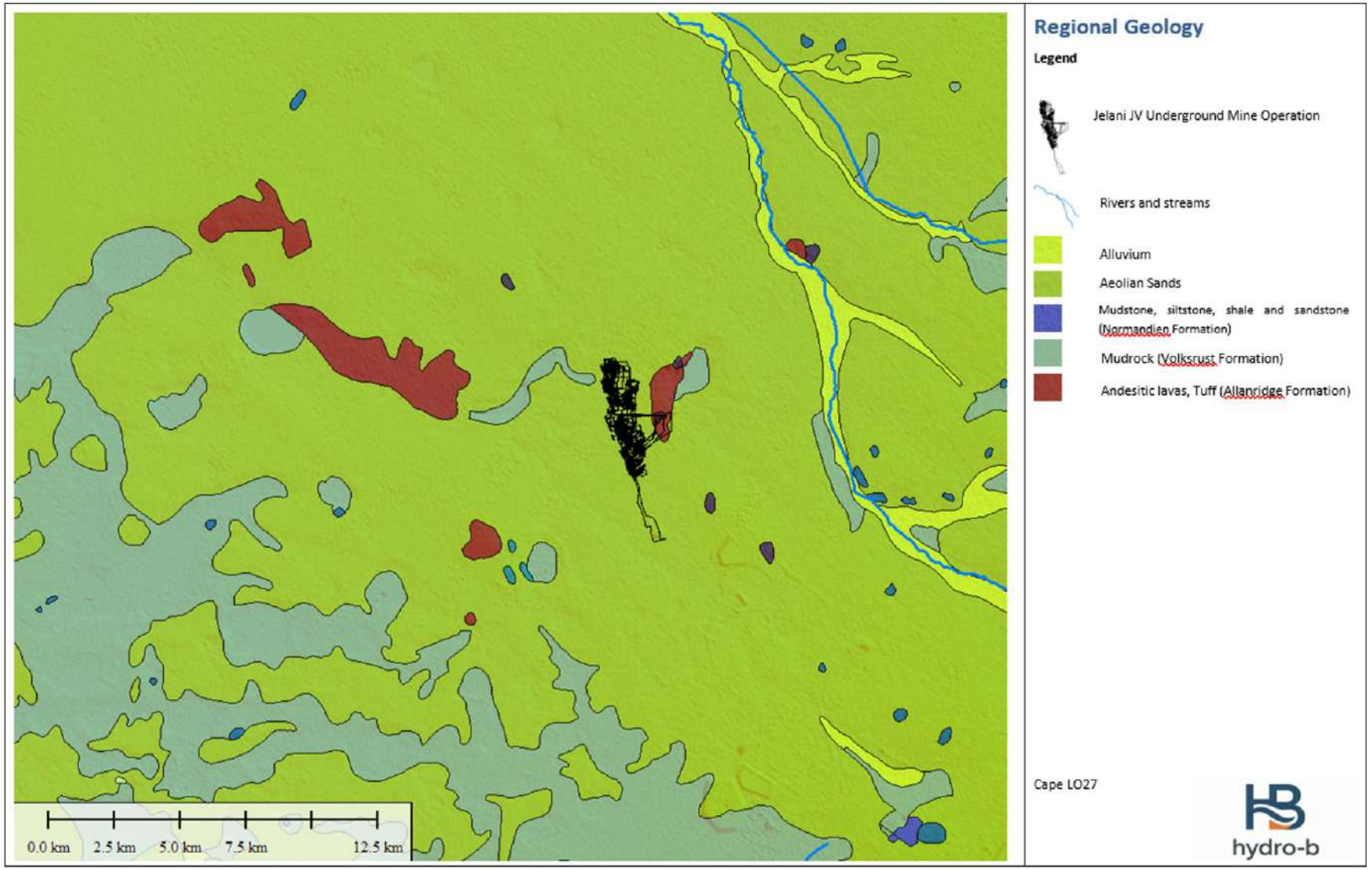


Figure 7-7: Regional Surface Geology

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7.3.2 Local Geology

The Jelani Project is situated along the western margin of the Free State Goldfield in close proximity to the historical and current Target Mine Operations. The local geology intersected by the mining operations comprises a thick sequence of Witwatersrand strata affected by faulting, folding and erosional truncation associated with subsequent tectonic events (Bara Consulting, 2026).

The near-surface geology within the project area is dominated by Karoo sediments consisting mainly of weathered shale, mudstone, sandstone and unconsolidated surficial materials. The Karoo sediments are underlain by the Ventersdorp Supergroup which, based on the exploration drilling throughout the gold field, has an average thickness of 1 300 m. The Ventersdorp Supergroup can be divided into the Pniel sequence, the Platberg Group and the basal Klipriviervberg Group consisting of alternating sediments, andesitic lavas, tuffs and agglomerates. The thickness and preservation of these units varies locally due to erosion and fault displacement (AquiSim Consulting, 2025) (MvB Consulting, 2026).

The principal lithostratigraphic units underlying the Ventersdorp Supergroup belong to the Central Rand Group and include the Luipaardsvlei, Harmony, Booysens, Kimberley, Eldorado and Mondeor Formations. These formations comprise interbedded quartzites, conglomerates and shale units. Within these lithostratigraphic units the Jelani underground operations will target the EA reef, A reef, B reef and Basal reef at mining depths ranging between 1 513 m – 2 600 m below surface.

The stratigraphic sequence contains numerous shale horizons that provide important stratigraphic controls and may act as local barriers to vertical groundwater movement where sufficiently continuous (Bara Consulting, 2026).

From a hydrogeological perspective, the geological sequence can be broadly divided into three hydrostratigraphic domains:

- A shallow weathered Karoo aquifer system associated with weathered sandstones, fractured mudstones and surficial deposits.
- An intermediate fractured-rock aquifer system associated with the Ventersdorp volcanic succession;
- A deeper fractured-rock aquifer system associated with the Witwatersrand Supergroup, including fault zones, fracture networks and mining-induced secondary permeability associated with historic and proposed underground workings.

Groundwater occurrence within the Karoo sequence is generally restricted to weathered zones, sandstone horizons, fracture zones and dyke contacts. Groundwater occurrence within the deeper Ventersdorp and Central Rand geological sequences is primarily controlled by faulting, fracturing, dyke contacts and mining-related disturbance of the rock mass (AquiSim Consulting, 2025) (MvB Consulting, 2026).

7.3.3 Structural Geology

Structurally, the Free State Goldfield is dominated by a large north-south trending synclinal basin. The region displays complex structural geology because of faulting and folding associated with this syncline (MvB Consulting, 2026) with numerous north-striking faults and significant vertical displacement. The De Bron Horst forms a major regional structural feature that divides the goldfield into eastern and western sectors (Figure 7-8). Additional

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thrust faulting associated with Ventersdorp-age tectonism has further modified the basin (Bara Consulting, 2026) (MvB Consulting, 2026). The local structural setting is characterised by a series of north-striking normal faults associated with the western margin of the goldfield. These faults subdivide the geological succession into discrete structural blocks and influence the continuity in stratigraphy (Bara Consulting, 2026).

These structures significantly control the regional, deep groundwater flow. Major faults can act either as preferential groundwater flow pathways where intensely fractured, or as hydraulic barriers where fault mineralisation reduces permeability. Numerous dykes of Ventersdorp, Bushveld, Pilanesberg and Karoo age intrude the Witwatersrand succession, commonly following pre-existing fault structures. Dyke contacts and associated fracture zones are locally important groundwater-bearing features and may influence hydraulic connectivity between geological units (AquiSim Consulting, 2025) (MvB Consulting, 2026).

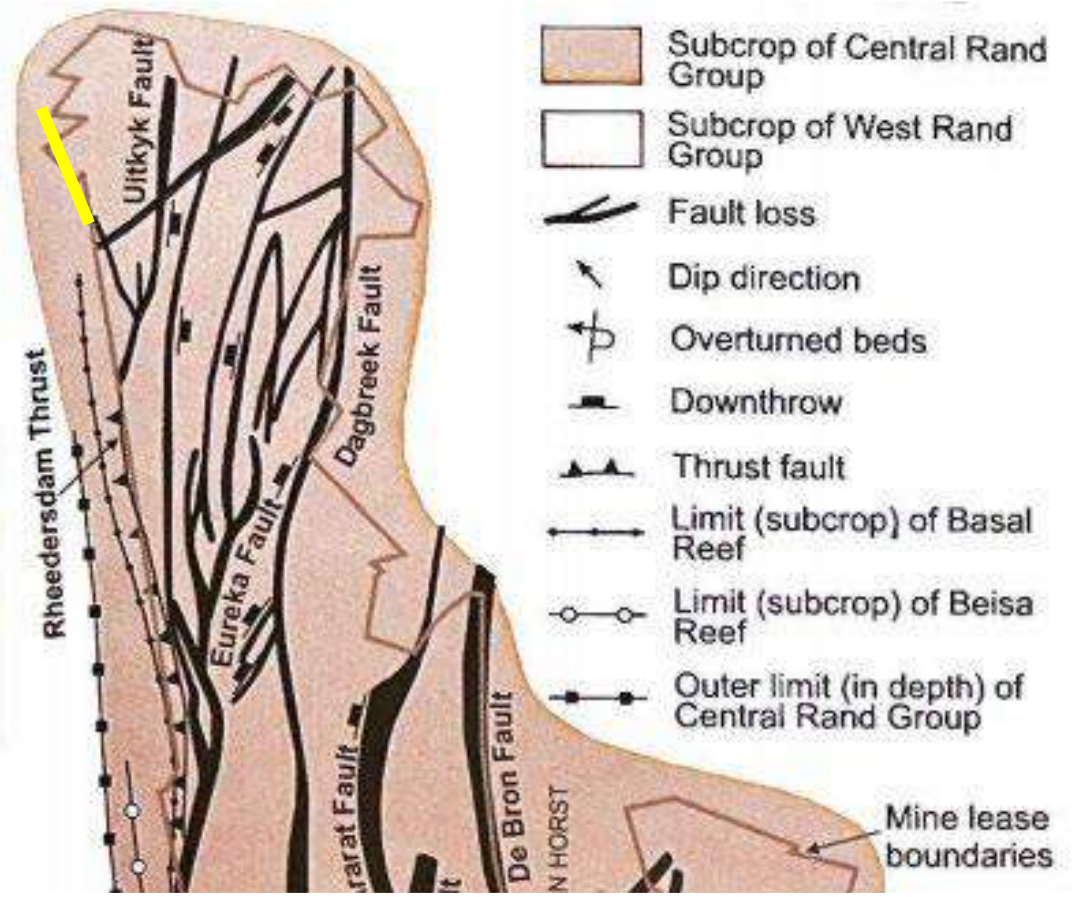


Figure 7-8: Structure of the Welkom Goldfields. Location of the Proposed Operation indicated by the Yellow Bar (Bara Consulting, 2026).

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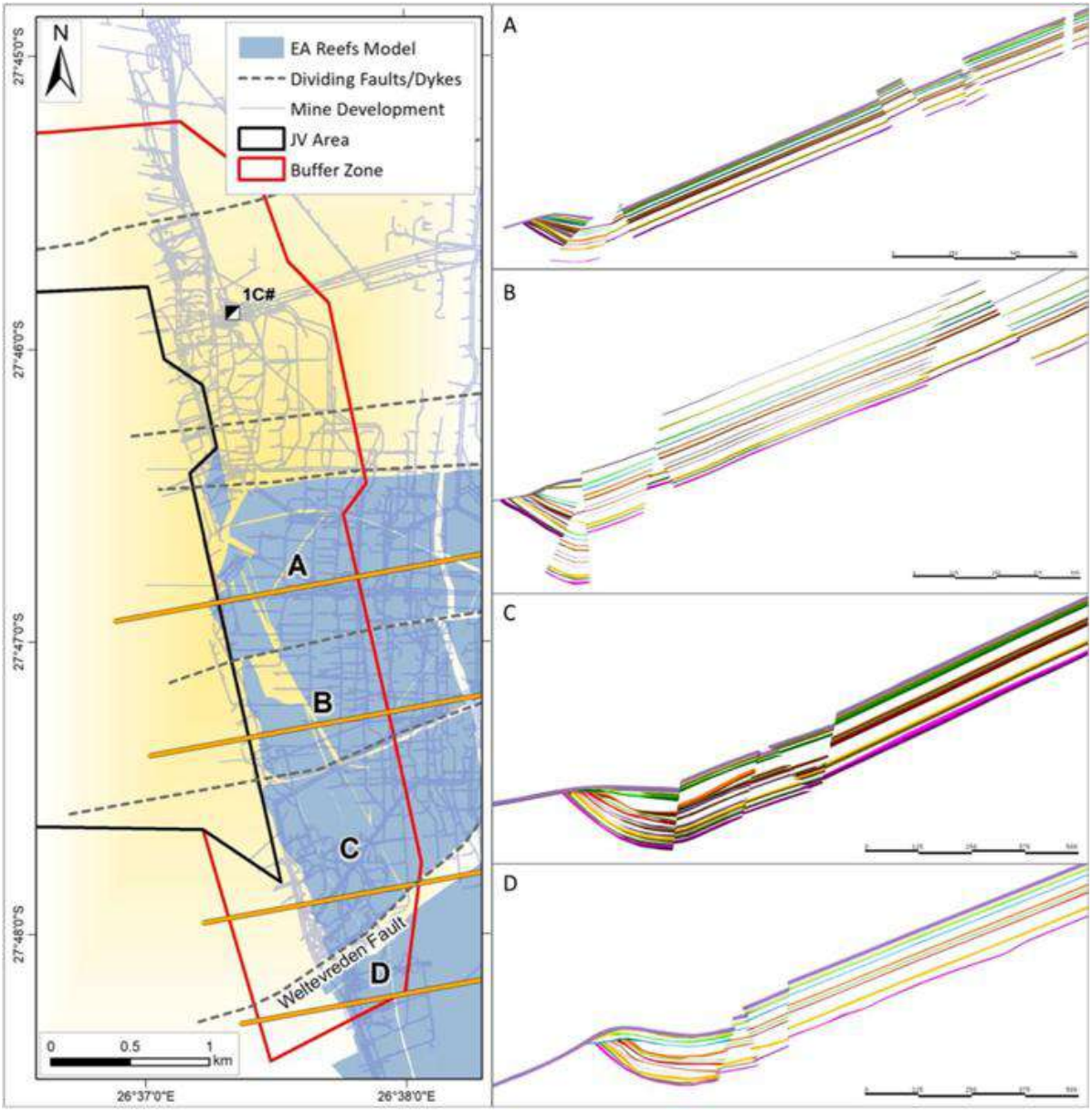


Figure 7-9: West-East Cross Sections Through the Jelani Operation showing the Targeted Reefs (Bara Consulting, 2026).

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7.4 Hydrogeological

Refer to Specialist Study: Appendix D6 – Hydrogeological Assessment

7.4.1 Aquifer Description

To understand the hydrogeological setting a description of the groundwater occurrence in the region is summarised below. It is important to note that groundwater interacting with the underground mining operations is largely derived from the deep Witwatersrand aquifer rather than from the shallow Karoo aquifer. Over the years of mining and groundwater abstraction from the underground mines the deep aquifer has been dewatered significantly (MvB Consulting, 2026).

The study area is characterised by two main aquifers (Figure 7-10):

- A shallow weathered and fractured Karoo aquifer:
  - A shallow, perched aquifer exists in the weathered zone of sedimentary rocks directly beneath the surface to an average depth of 10 meters below ground level (mbgl), with most water strikes consistently located at the interface between weathered and fractured bedrock. Groundwater mainly occurs within sandstone horizons and lenses of the younger Beaufort Group which are directly recharged by precipitation;
  - The primary porosity of the older Vryheid and Dwyka Formations is very low, and the shales, mudstones and tillite generally function as aquicludes (AquiSim Consulting, 2025). Any water bearing capacity is associated with secondary joints, bedding planes and faults and at contacts between dolerite intrusions/dykes and country rock;

- A deep, fractured Ventersdorp/Witwatersrand aquifer:
  - The deep Ventersdorp/ Witwatersrand aquifer underlies the Karoo aquifer, with the Ventersdorp aquifer overlying the Witwatersrand aquifer (Figure 7-10). Groundwater in this combined aquifer is thought to be connate (i.e. original formation water) or extremely old (fossil) water and mainly occurs in geological structures such as fault zones or igneous intrusions (e.g. dykes).

7.4.1.1 Shallow Karoo Aquifer

This aquifer consists of a shallow weathered zone overlying a fractured rock zone and is directly recharged by rainfall. Groundwater levels in this aquifer are shallow as can be observed by the presence of numerous natural springs, wetlands and pans. The aquifer is locally intruded by dolerite dykes and sills. The following statistics were derived from borehole logs for 43 exploration holes (Golder Associates, 2008):

- Average thickness of Karoo: 117 m
- Percentage of boreholes intersecting dolerite in Karoo: 33%
- Average depth of dolerite from surface: 74 m

Groundwater occurrence within the Karoo aquifer is generally restricted to sandstone horizons, fracture zones and dyke contacts, with groundwater flow in the fractured unit often associated with contact zones with dolerite

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dykes and sills (AquiSim Consulting, 2025). Shale horizons present in the Karoo formations often restrict vertical infiltration of rainwater and groundwater strikes are mainly observed at the weathered/fractured rock interface. The Dwyka Formation, situated at the base of the Karoo aquifer, is considered to act as an aquitard which forms a hydraulic barrier between the Karoo aquifer and the underlying aquifer units.

The primary permeability of the Karoo aquifer does not allow significant groundwater flow except where the permeability has been increased by secondary structures and consequently yields for boreholes drilled in this aquifer are generally low. In (AquiSim Consulting, 2025) the average yields for 39 boreholes drilled across the Free State goldfields by Pretorius in 1989 were summarised as shown below in Table 7-4. These yields correlate well with the borehole yields estimated during the hydrocensus (between 0.4 and 0.9 m3/hr) and show yields are generally low, as expected for Karoo aquifers.

Table 7-4: Average Yields for Boreholes Drilled in the Karoo Aquifer

Aquifer	Dry borehole (% of total drilled)	Average yield (m^3/hr)	Average yield of boreholes with water strikes (m3/hr)
Beaufort Group	25	2.7	3,55
Adelaide Subgroup			
Ecca Group	42	0.92	1.58
Volksrust Formation			

The groundwater quality in the fractured aquifer is generally of a poorer quality than in the weathered aquifer due to the concentration of salts and a slower recharge rate to this deeper part of the aquifer (AquiSim Consulting, 2025).

The shallow Karoo aquifer units can thus be characterised as a predominantly shallow, weathered and locally fractured aquifer system where groundwater availability is controlled by rainfall recharge, weathering, lithology and local geological structures. This is the principal groundwater system considered to be relevant to agricultural and domestic boreholes on surrounding farms.

7.4.1.2 Deeper Fractured Ventersdorp/Witwatersrand Aquifer

The Ventersdorp and Witwatersrand sequences are considered as one aquifer in which structures (as described in Section 7.3.3) significantly control the regional, deep groundwater flow. Major faults can act either as preferential groundwater flow pathways where intensely fractured, or as hydraulic barriers where fault mineralisation reduces permeability.

Numerous dykes of Ventersdorp, Bushveld, Pilanesberg and Karoo age intrude the Witwatersrand succession, commonly following pre-existing fault structures. Dyke contacts and associated fracture zones are locally important groundwater-bearing features and may influence hydraulic connectivity between geological units (AquiSim Consulting, 2025) (MvB Consulting, 2026). In addition, mine voids that have been expanded over the years have added significant groundwater conduits in the Witwatersrand aquifer and interconnect with the pre-existing fracture network.

Groundwater occurrence within the deeper Ventersdorp and Central Rand geological sequences is therefore primarily controlled by faulting, fracturing, dyke contacts and mining-related disturbances of the rock mass (AquiSim Consulting, 2025) (MvB Consulting, 2026).

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As mentioned above the impermeable nature of the Dwyka Formation at the base of the Karoo aquifer effectively seals off the deeper aquifer. Post-Karoo movement and intrusions provided some conduits for leakage between the Karoo aquifer and the deep Witwatersrand aquifer. However, the deep aquifer recharge from surface is regarded as negligible, and at best localised (MvB Consulting, 2026).

This is concluded based on the dewatering of this aquifer over the past 40 years during which the water levels in the Witwatersrand aquifer dropped significantly, with some underground dewatering boreholes having dried up in some instances. In contrast, groundwater levels in the Karoo aquifer have remained constant (MvB Consulting, 2026).

Previous studies concluded the following:

- There is no or very limited hydraulic connectivity between the Karoo aquifer and the deeper Ventersdorp/Witwatersrand aquifers;
- Recharge to the Witwatersrand aquifer is negligible (MvB Consulting, 2026);
- Once the Witwatersrand aquifer is dewatered (or the water level lowered) it will not recover. The estimated post-mining water level in the Witwatersrand aquifer will therefore be deeper than the pre-mining water level of ~200m below surface.

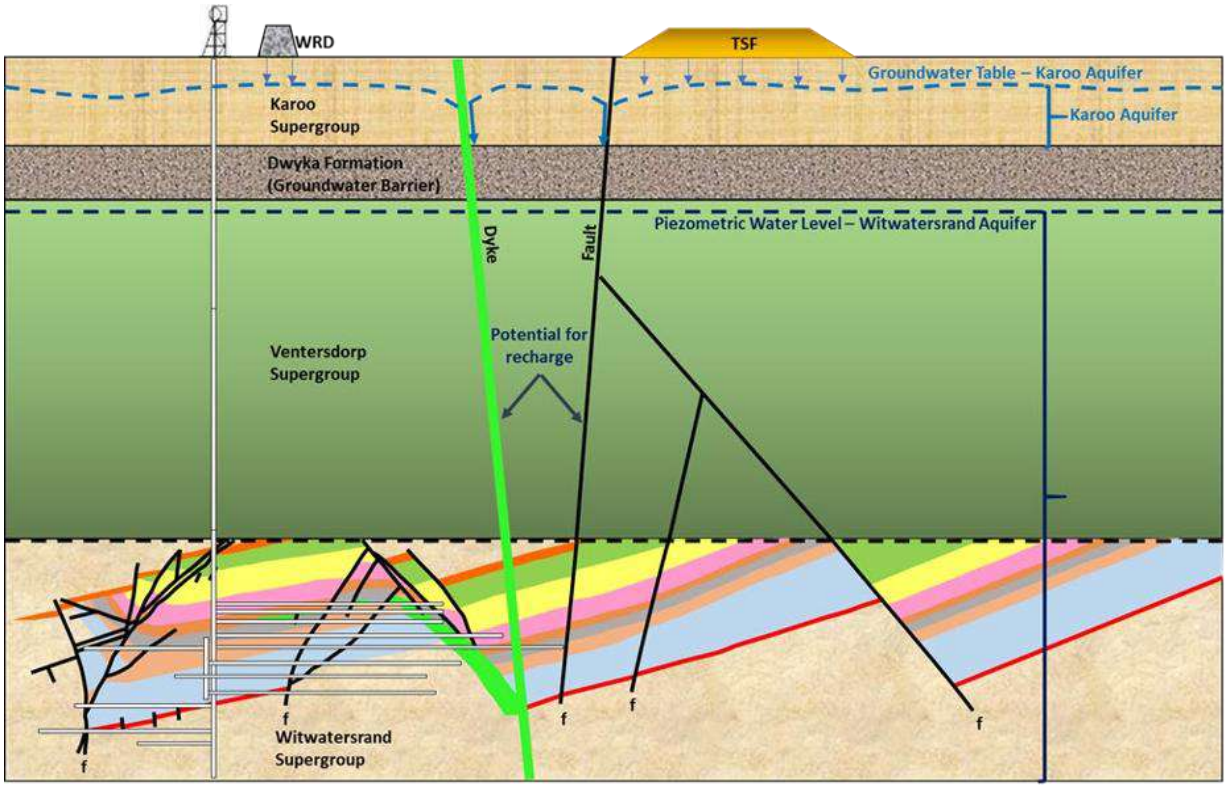


Figure 7-10: Graphical Representation of the Regional Aquifers (MvB Consulting, 2026).

7.4.2 Aquifer Parameters

Available aquifer test data was provided in (AquiSim Consulting, 2025) where AquiSim analysed data from (Golder Associates, 2008). Table 7-5 shows the transmissivity and hydraulic conductivity values obtained for the

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larger Harmony Welkom Area. Based on borehole depths (maximum depth of 100 m) these characteristics are relevant for the shallow Karoo aquifer.

AquiSim observed that the heterogeneous nature of the aquifer is evident from the variability in the calculated transmissivity/hydraulic conductivity values and typical for fractured and weathered sedimentary hard rock aquifers. The derived T- and K-values are indicative of a low permeable environment (AquiSim Consulting, 2025). The average hydraulic conductivity for the shallow aquifer is 0.29 m/d, with geometric and harmonic means of 0.1 and 0.042 m/d, respectively.

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Table 7-5: Hydraulic Parameters Derived from Available Aquifer Test Data.

BH ID	SWL	Collar	Corrected SWL	BH Depth	Corrected BH Depth	Saturated Thickness	T (Drawdown)	T (Recovery)	T (Average)	K
	mbc	magl	mbs	mbc	mbgl	m	m^2/day	m^2/day	m^2/day	m/day
BH129	2.9	0	2.90	26.24	26.24	23.34	14.30	14.60	14.45	0.619
BH135	2.88	0	2.88	35.95	35.95	33.07	2.50	3.10	2.80	0.085
BH41	6.06	0.28	5.78	26.37	26.09	20.31	27.60	-	27.60	1.359
BH144	19.49	0.71	18.78	39.19	38.48	19.70	0.70	-	0.70	0.036
BH120	0.72	0.27	0.45	20.36	20.09	19.64	1.20	-	1.20	0.061
BH190	2.24	0.14	2.10	28.24	28.10	26.00	0.60	-	0.60	0.023
BH142	8.09	0.56	7.53	35.74	35.18	27.65	0.50	-	0.50	0.018
BH17	2.32	0	2.32	35.20	35.20	32.88	1.90	-	1.90	0.058
H3-1	7.49	0.48	7.01	100.00	99.52	92.51	1.70	-	1.70	0.018
BH122	2.36	0.45	1.91	30.35	29.90	27.99	8.00	8.40	8.20	0.293
BH123	1.59	0.43	1.16	26.46	26.03	24.87	2.00	2.90	2.45	0.099
BH185	1.01	0.26	0.75	39.16	38.90	38.15	0.40	-	0.40	0.010
BH27	2.69	0	2.69	32.69	32.69	30.00	12.40	-	12.40	0.413
H3-2	5.25	0.26	4.99	35.80	35.54	30.55	2.10	3.20	2.65	0.087
N32-1	3.37	0.38	2.99	14.33	13.95	10.96	3.80	-	3.80	0.347
BH187	2.84	0.66	2.18	25.42	24.76	22.58	0.50	-	0.50	0.022
SH-1	5.78	0.21	5.57	25.40	25.19	19.62	28.00	-	28.00	1.427

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No information is provided for hydraulic conductivities for the deeper Ventersdorp/Witwatersrand aquifer. However, reported hydraulic conductivity values for these units, such as in (Witthüser, Holland, Seidel, & König, 2014) and other studies widely range between approximately 10^{-9} - 10^{-2} m/day, representing fresh to fractured rock conditions. In some cases, significantly higher values of up to several m/day have been reported in strongly weathered quartzite zones.

7.4.3 Groundwater Use

7.4.3.1 Small-scale abstractions

Based on the hydrocensus results, small-scale borehole sources in the study area are mainly used as water sources for domestic purposes for single households. Eight of the 19 boreholes surveyed during the hydrocensus were in use as third party groundwater supplies. The owners of the boreholes in the area reported that boreholes are generally low-yielding, usually ranging between an estimated 0.4 – 0.9 m3/hr. No borehole yields were reported to be strong enough to be used for crop irrigation.

7.4.3.2 Mine Water Abstractions

Active mining operations closest to the study area are the Target Mine (overlapping with the proposed Jelani Mine), Freddies Mine (to the south) and Tshepong Mine (further south), which are interconnected as shown in Figure 7-11. At current, water is actively being pumped at the Tshepong and Target Mines.

Regarding the current water situation at the Target Gold Mine reference is made to a hydrogeological investigation that served as input into the Pre-Feasibility Study for the Jelani operations (Groundwater Square, 2016). For estimation of abstraction for Target Mine operations the investigation described the following:

- Target Gold Mine is currently in full operation from No.1 Shaft;
    - The average volume of underground water pumped to surface for October and November 2015 was 181.7 Ml or 5.96 Ml/day;
    - Underground water pumped to the Plant for the period January 2013 - January 2016 ranged between 1.8 Ml/day and 4.8 Ml/day, averaging at 3.3 M/l/day;
    - Daily discharge to Vöelpan for the period starting July 2015 and ending March 2016 ranged between zero and ~11 100 m3/day, averaging at 4 823 m3/day or 4.8 Ml/day;

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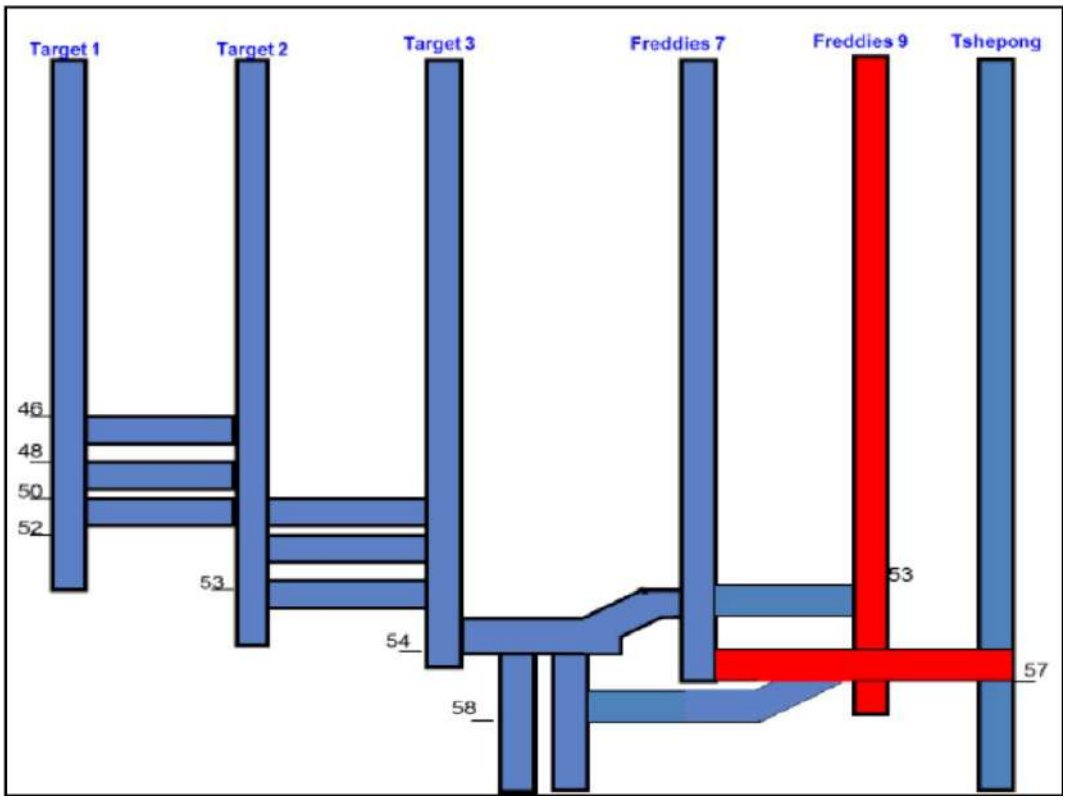


Figure 7-11: Target, Freddies and Tshepong Mine Interconnection (Digby Wells Environmental, 2015)

- The No.2 shaft is not operational but is equipped with an emergency winder and used as a second means of egress for the Target Mine;
    - The No.2 Shaft underground water pumped from No.1 Shaft for the period January 2013 - January 2016 averaged at 2 518 m3/day or 2.5 ML/day;

- The No.3 Shaft has been operating intermittently since the late 1990s and is currently closed on care and maintenance;
    - During October 2015 the refurbished pumping station at 30 Level became operational due to water from Freddies No.9 Shaft, which closed in December 2014, finding its way to No.3 Shaft on 65 Level. Before closure on average some 3.2 Ml/day was pumped at Freddies No.9 Shaft;
    - Pumping from No.3 Shaft currently roughly averages between 3.5 to 3.6 Ml/day. The average for the 5 day prior to the site visit calculates to 2.7 Ml/day;
    - The average volume pumped from Target 3 for the period June 2016 – September 2016 was 3.5 Ml/day.

7.4.4 Groundwater Level

There are 311 monitoring boreholes across the Harmony Gold mining areas, distributed around Tailings Storage Facilities (TSFs) to monitor possible impacts emanating from these TSFs. Although no geological information is available for these boreholes, it is assumed they mainly target the shallow Karoo aquifer as they are meant to monitor impacts on the shallow groundwater environment. Groundwater levels were available for 164 of these boreholes, ranging between 0 and 33 mbgl, with most groundwater levels within 15 mbgl.

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Groundwater monitoring for the Target Mine Operations included groundwater levels for five boreholes (A1, A3, A5, A6 and BH88) ranging between 0.8 and 5.9 mbgl. During the hydrocensus, groundwater levels were measured in 12 boreholes;

- Static groundwater levels ranged between 0.59 m to 5.62 mbgl;
- Dynamic groundwater levels were measured in boreholes BH01, BH03 and BH87 and ranged between 5.3 and 44.9 mbgl.
- Figure 7-12 shows the monitoring boreholes for which data was available showing most recent groundwater level reported for each point (AquiSim Consulting, 2025).

All groundwater levels were added to Figure 7-12 and show a strong relationship with surface elevation, indicating groundwater levels in the shallow Karoo aquifer typically mimic topography, showing that overall groundwater flow directions follow topographical gradients and are generally close to surface. Based on groundwater levels from the Target Mine Operations monitoring and hydrocensus boreholes, groundwater levels within in the Jelani project area are close to surface with deeper groundwater levels associated with borehole abstraction. Based on this it can be concluded that there is no impact from the underground mining activities on groundwater levels in the shallow Karoo aquifers, with only local impacts from single borehole sources.

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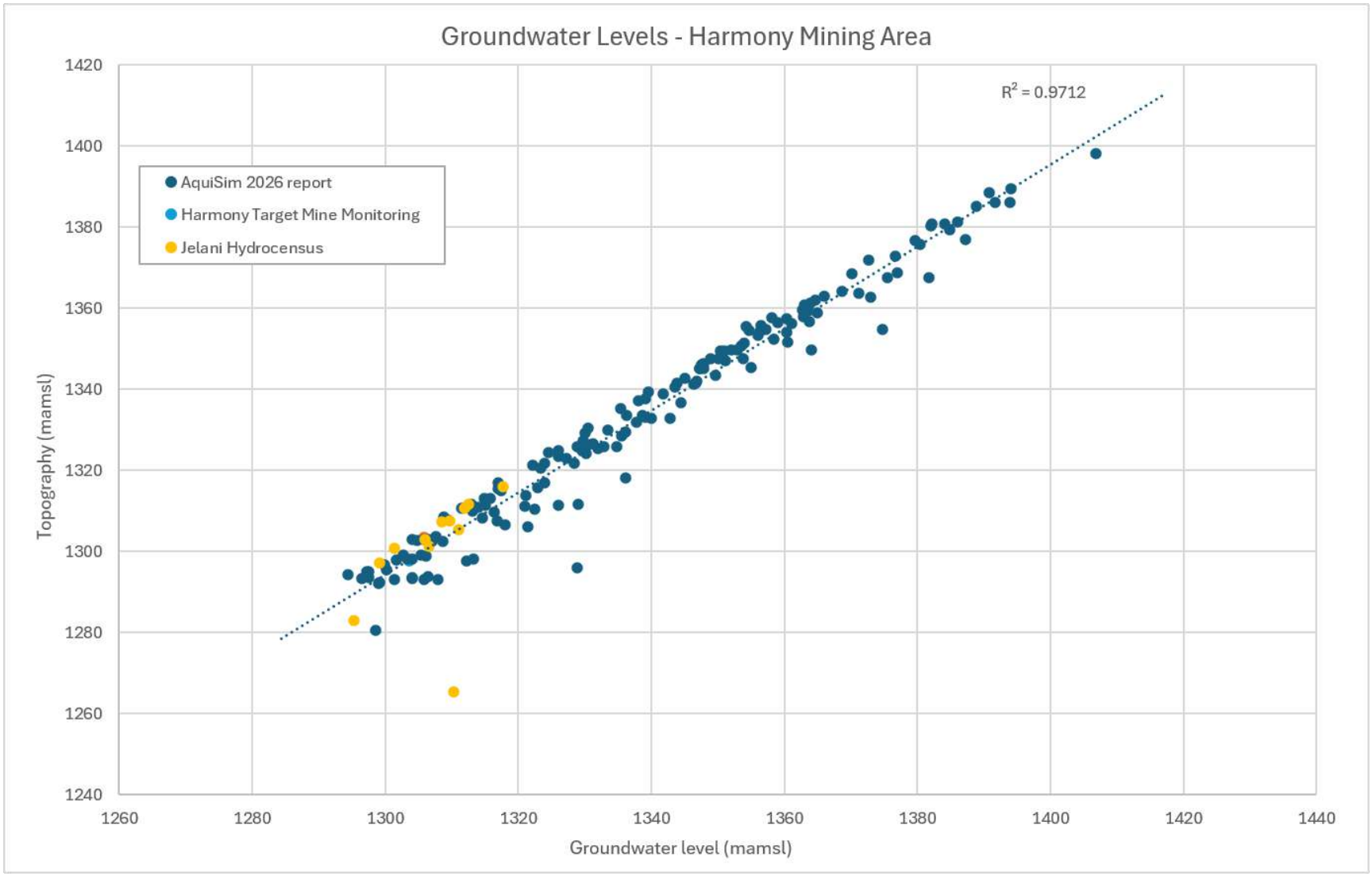


Figure 7-12: Bayesian Correlation for Available Groundwater Levels.

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Table 7-6: Hydrocensus Details

ID	Coordinates			Survey Date	Owner Information		Bore/Spring Status & Equipment							Hydrogeological Information			Sample Taken	Photo	Comments
							Primary Water Application												
							Type	Primary Use	Other Uses		Equipment	Estimated Abstraction/Flow Rate [L/hour]	Borehole inner casing diameter (mm)	Borehole Depth (mbgl)	Casing Height (m)	Static Water Level (mbch)	Static Water Level (mbgl)			
	Latitude	Longitude	Elevation (mbgl)		Owner	Farm Name			Domestic	Stock Watering									
BHN	27.79009	26.580750	N/A	15/12/2025	Eduard Steyn	Blaauwklip No. 181	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	500	152	Unknown	0.72	2.76	2.04	Yes	Yes	Bailer Sample
B11	27.787924	26.584360	N/A	15/12/2025	Eduard Steyn	Blaauwklip No. 181	Borehole	No Use	None	None	None	None	Unkown	Unknown	Unknown	Unknown	Unknown	No	No	No Access due to wet road. Farmer says the BH is surrounded with water and can not be accessed during the wet season
BH89	27.792849	26.574685	N/A	15/12/2025	Eduard Steyn	Damleegte No. 441	Borehole	No Use	None	None	None	None	Unkown	Unknown	Unknown	Unknown	Unknown	No	No	BH Destroyd according to the farmer
BH88	27.793880	26.57508	N/A	15/12/2025	Pieter Haasbroek	Goedgesnij No. 376	Borehole	No Use	None	None	None	None	Unkown	Unknown	N/A	Unknown	Unknown	No	Yes	Broken handpump. No access to measure water level or take sample
BH01	27.757485	26.587600	N/A	07/01/2026	Jaco Grobbelaar	Onrust No. 377	Borehole	Domestic	Yes (Main Household and workers houses)	Yes (Small Scale)	Submersible pump	800	152	Approx 70m	0.00	44.87	44.87	Yes	Yes	Grab sample taken from tank. Water level measured while pump was on
BH02	27.753129	26.587748	N/A	07/01/2026	Jaco Grobbelaar	Onrust No. 377	Borehole	Domestic	Yes (Single Household)	None	Submersible pump	800	Unkown	Approx 50m	Unknown	Unknown	Unknown	No	Yes	Bees. No additional info could be collected
BH03	27.784716	26.556810	N/A	07/01/2026	Christo Nel	Modderfontein No. 343	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	400	152	Approx 80	0.19	12.52	12.33	Yes	Yes	Water level measured while pump was on. Farmer uses a 1.1kw pump because a 1.5kw pump is too strong for the low yielding borehole. Grab sample taken
BH04	27.786132	26.560869	N/A	07/01/2026	Christo Nel	Modderfontein No. 343	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Windpump	Unknown	152	Unknown	Unknown	Unknown	Unknown	No	Yes	Windpump sealed, no water level access
BH87	27.802249	26.584288	N/A	07/01/2026	Pieter Haasbroek	Lacuna No. 442	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	Unknown	152	Unknown	0.80	6.13	5.33	No	Yes	Water level measured while pump was on
BH05	27.808042	26.581237	N/A	07/01/2026	Pieter Haasbroek	Lacuna No. 442	Borehole	Stock Watering	None	Yes (Small Scale)	Windpump	Unknown	152	Unknown	0.50	1.63	1.13	No	Yes	
BH86	27.805929	26.596764	N/A	07/01/2026	Pieter Haasbroek	Lacuna No. 442	Borehole	No Use	None	None	Windpump	Unknown	152	Unknown	0.51	1.10	0.59	No	Yes	
BH06	27.741958	26.595715	N/A	12/01/2026	Tertius de Jager	Zuurbron No. 444	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	500	Unkown	Approx 30	Unknown	Unknown	Unknown	No	Yes	No Access, farmer does not have key to open structure built around the BH. Grab sample taken from tank.
BH07	27.743021	26.599114	N/A	12/01/2026	Tertius de Jager	Zuurbron No. 444	Borehole	No Use	None	None	Windpump	None	Unkown	Unknown	Unknown	Unknown	Unknown	No	Yes	Bees. No additional info could be collected
BH08	27.742836	26.592158	N/A	12/01/2026	Tertius de Jager	Zuurbron No. 444	Borehole	No Use	None	None	None	None	152	18	0.21	5.83	5.62	No	Yes	
A7	27.778172	26.645384	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	None	None	None	None	152	2.92	0.12	2.32	2.20	Yes	Yes	Assumed BH may be blocked at 2,92m. Water looks dirty, may be due to an animal. Bailer sampled.
A6	27.773525	26.645368	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	None	None	None	None	50	8.73	0.36	3.30	2.94	No	Yes	
A5	27.800561	26.633653	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	None	None	None	None	152	3.62	0.04	1.75	1.71	Yes	Yes	Bailer Sampled

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ID	Coordinates			Survey Date	Owner Information		Bore/Spring Status & Equipment								Hydrogeological Information			Sample Taken	Photo	Comments
	Latitude	Longitude	Elevation (mbgl)		Owner	Farm Name	Primary Water Application				Equipment	Estimated Abstraction/Flow Rate [L/hour]	Borehole inner casing diameter (mm)	Borehole Depth (mbgl)	Casing Height (m)	Static Water Level (mbch)	Static Water Level (mbgl)			
							Type	Primary Use	Other Uses											
									Domestic	Stock Watering										
A4	27.800690	26.631467	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Could not be found / located
A3	27.783672	26.621949	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Monitoring	None	None	None	None	152	4.31	0.00	0.87	0.87	Yes	No	Bailer Sampled
A2	27.779486	26.620518	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Monitoring	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Could not be found / located
B1	27.782195	26.614362	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	None	None	None	None	None	152	Unknown	0.41	1.65	1.24	No	Yes	Assumed to be B1 as it plots close to the provided coordinates for B1
B2N1	27.780207	26.609205	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Domestic	Yes (Single Household)	None	Submersible pump	Unknown	152	Unknown	Unknown	Unknown	Unknown	No	No	Borehole Closed off. No additional data could be collected
B2N2	27.782227	26.606346	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Borehole could not be found. Not currently monitored by Aquatico
BH85	27.792017	26.593248	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Domestic	Yes (Single Household)	None	Submersible pump	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Borehole Closed.
B7	27.794087	26.616054	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	None	None	None	Windpump	None	152	Unknown	Unknown	Unknown	Unknown	No	Yes	Windpump sealed, no water level access

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7.4.4.1 Karoo Aquifer

The connectivity between the Witwatersrand and Karoo aquifers can best be investigated through an assessment of the regional groundwater levels. If the Karoo aquifer and the underlying Witwatersrand aquifers in which the mine workings are situated have a strong hydraulic connection this will lead to zones of dewatering in the shallow Karoo aquifer. Regional groundwater levels in the shallow Karoo aquifer would indicate areas where groundwater drawdown occurred. (MvB Consulting, 2026).

Harmony has an extensive groundwater monitoring network, and this information was made available. However, only the groundwater quality is measured, and the groundwater levels are not recorded. (Aquisim Consulting, 2018).

7.4.4.2 Witwatersrand Aquifer

Groundwater level records in the Witwatersrand aquifer are scarce. Some data is available for Joel mine (Van Biljon, 1995). Although this is at some distance from the study area it does provide some information that is applicable throughout the basin. Joel mine is located in the southern extremity of the Witwatersrand basin and started operating in 1986. At the time when mining started the water level was at 775 mamsl, some 600 m below surface.

The Witwatersrand aquifer is a confined aquifer, and the water level is represented by a piezometric or pressure level, which is expected to be consistent throughout the basin. This piezometric level of 775 mamsl that was measured at Joel prior to any dewatering from the mine is thought to represent the original water level in the entire Witwatersrand aquifer.

What was also noticeable at Joel was that between January 1986 and December 1992 the water level in the aquifer dropped 198 m due to dewatering from Joel mine. Many of the dewatering boreholes drilled at Joel mine dried up during this time as sections of the mine became dewatered. This shows that abstracting from the Witwatersrand aquifer dewaters the aquifer and that there is very little or no recharge to this aquifer.

7.4.5 Groundwater Quality

7.4.5.1 Hydrocensus

During the hydrocensus four samples (including one duplicate) were taken from third-party domestic sources and three samples were taken from monitoring boreholes (Figure 7-13):

- Third-party boreholes: BHN, BH01 and BH03;
- Monitoring boreholes: A3, A5 and A7;

Sample results were compared to SANS 241:2015 standards. The samples from the third-party boreholes were considered to be representative of background groundwater quality, and these boreholes show generally good groundwater quality with the exception of nitrate concentrations over the SANS limit for BHN and BH01. Magnesium 70 mg/l (at 73.1 mg/l, limit 70 mg/l) and antimony (0.03 mg/l, limit 0.02 mg/l) are slightly elevated. No other parameters exceeded SANS limits.

The elevated nitrate concentrations in BHN and BH01 suggest that this may be a result of the use of agricultural fertilisers or animal waste related to the agricultural nature of the Study Area. Boreholes BHN and BH01 are both

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used for potable water supply and nitrate concentrations should continue to be monitored frequently to establish long-term trends, as long-term exposure to elevated nitrate can be harmful to human health. If elevated nitrate concentrations persist the owners may need to investigate treatment options such as ion-exchange to meet SANS water quality standards.

Monitoring boreholes A3 and A5 are situated close to and in downgradient positions of the Target Mine No. 1 and 2 TSF (less than 50 m). Borehole A7 is downgradient of the Target 2 Shaft at a downgradient position roughly 100 m away from the associated waste rock dump. All three monitoring boreholes are therefore representative of groundwater quality in close proximity to these infrastructures.

Samples A3 and A5 show poor groundwater quality with elevated EC, TDS, chloride, sulphate, sodium, and calcium, magnesium, ammonia, antimony, cobalt and manganese to a lesser extent. The acidic pH in A3 (pH of 4.74) may be indicative of acid mine drainage related to the TSF. Sample A7 shows a similar water quality to A3 and A5 although concentrations are relatively lower compared to concentrations for A3 and A5 of the parameters mentioned above. The similarity in groundwater composition indicates that groundwater quality has been impacted at very short distances from existing mine infrastructures.

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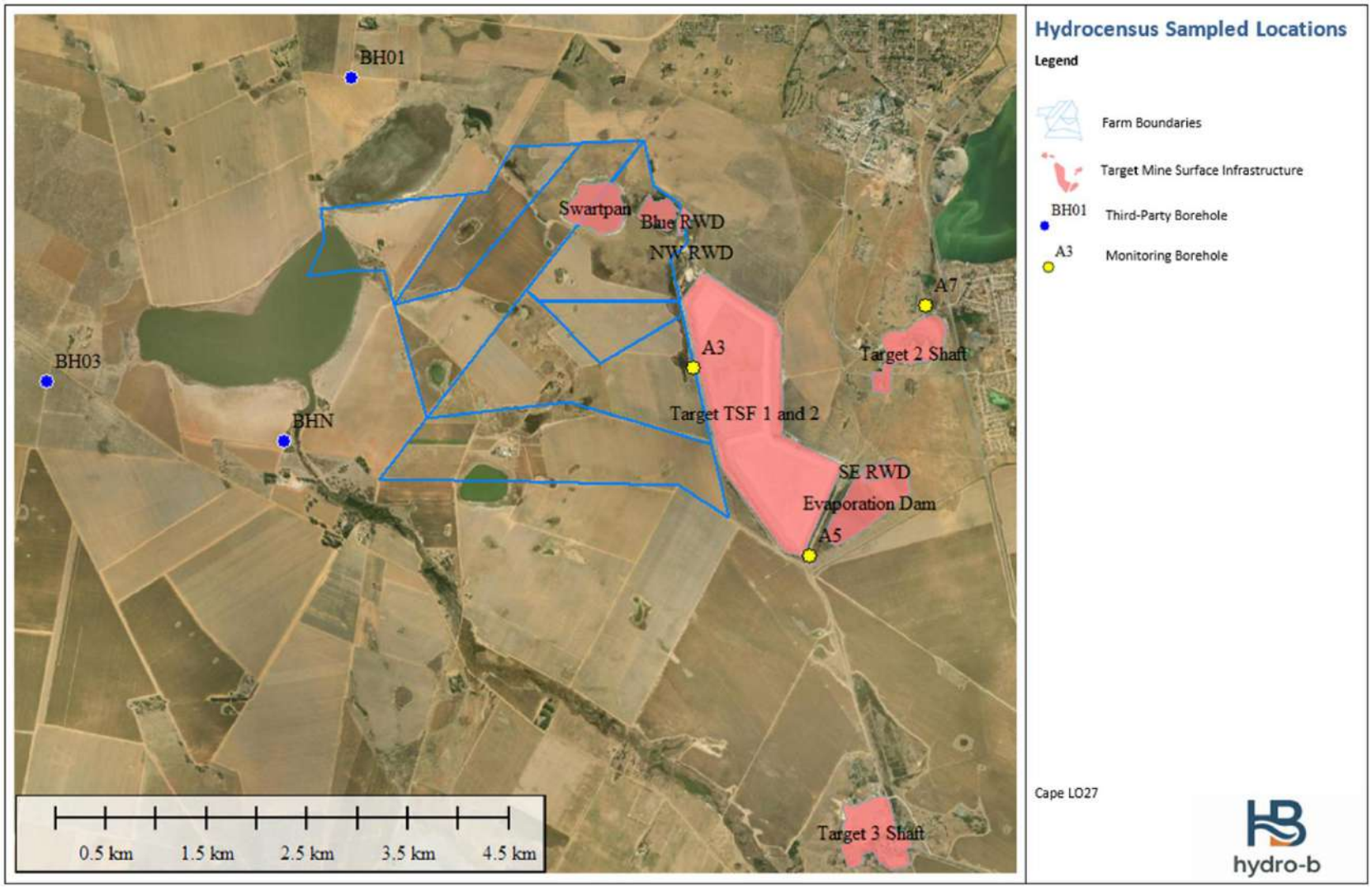


Figure 7-13: Hydrocensus – Sampled Locations.

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- A7: Mg–Ca–SO_4 type; magnesium (47 %) and calcium (42 %) dominate the cations, and sulphate (~69 %) is the main anion. The relatively lower sodium (81 mg/L) and chloride (125 mg/L) may suggest mixing of seepage from the TSF with natural groundwater.

A Piper Diagram shows the hydrochemical facies in Figure 7-14:

- BHN-A/B: These samples plot in the central region of the diamond, confirming a mixed Na–HCO_3/Cl water type.
- BH01 and BH03: Both lean toward the Na–HCO_3 corner, reflecting the bicarbonate-rich nature with moderate Na^+.
- A3, A5 and A7: These acidic, saline samples plot toward the upper right of the diamond, showing dominance of SO_4^{2-} and Cl^- with varying cation compositions; A7 is Mg–SO_4, while A3 and A5 trend toward Na/Ca–Cl–SO_4 waters.

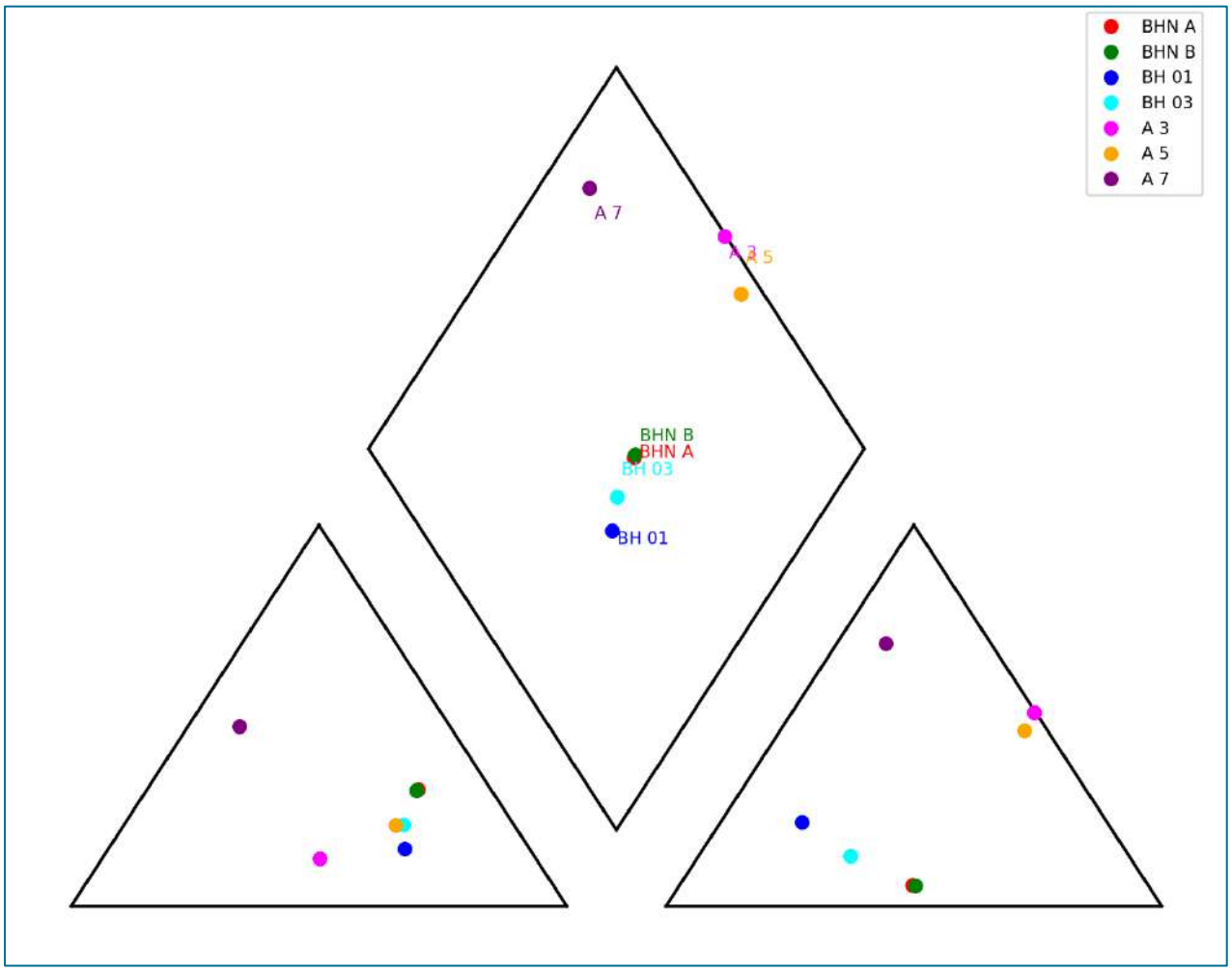


Figure 7-14: Piper Diagram for the Hydrocensus Locations

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Table 7-7: Hydrocensus Sample Analyses Results.

Sampled ID	BHN	BH 01	BH 03	A3	A5	A7
Sampled	2026/01/15	2026/01/07	2026/01/07	2026/01/12	2026/01/12	2026/01/12
Total Alkalinity (pH>4.5) mg CaCO3/L	369	318	383	11.8	302	379
Bicarbonate Alkalinity mg CaCO3/L	369	318	383	11.8	302	379
Carbonate Alkalinity mg CaCO3/L	0.00	0.00	0.00	0.00	0.00	0.00
M Alkalinity (8.3>pH>4.5) mg CaCO3/L	369	318	383	11.8	302	379
P Alkalinity (pH>8.3) mg CaCO3/L	0.00	0.00	0.00	0.00	0.00	0.00
Conductivity (Laboratory) mS/m	183	108	130	576	1065	270
pH (Laboratory)	7.46	7.57	7.54	4.74	6.63	7.11
Total Hardness mg CaCO3/L	446	254	328	1902	3112	1635
Calcium Hardness mg CaCO3/L	145	159	167	1478	1651	774
Magnesium Hardness mg CaCO3/L	301	94.7	161	424	1462	861
Total Dissolved Solids (TDS) mg/L	1092	724	802	4323	8114	2168
Temperature °C	21.0	21.0	21.0	21.0	21.0	21.0
Turbidity NTU	0.67	14.6	<0.28	45.5	8.76	32.6
Ammonia and Ammonium mg N/L	<0.45	<0.45	<0.45	21.8	<0.45	17.1
Calcium mg Ca/L	58.0	63.6	66.8	592	661	310
Chloride mg Cl/L	258	59.9	148	1188	2273	125
Magnesium mg Mg/L	73.1	23.0	39.2	103	355	209
Nitrate and Nitrite (TON) mg N/L	40.8	22.7	6.90	3.13	0.35	<0.35
Nitrite mg N/L	<0.01	<0.01	<0.01	1.13	<0.01	0.01
Otho Phosphate mg P/L	0.49	0.19	0.15	0.09	0.10	0.44
Potassium mg K/L	20.5	4.53	10.7	31.7	38.5	10.0
Sodium mg Na/L	235	171	189	666	17144	81.1
Silicon mg Si/L	10.3	12.5	14.0	6.82	10.7	10.8
Sulphate mg SO4/L	40.9	109	86.5	1670	2888	1180
Aluminium mg Al/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony mg Sb/L	0.03	0.02	0.02	0.02	0.03	0.05
Arsenic mg As/L	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Barium mg Ba/L	0.36	0.03	0.03	<0.01	<0.01	<0.01
Beryllium mg Be/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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Sampled ID	BHN	BH 01	BH 03	A3	A5	A7
Sampled	2026/01/15	2026/01/07	2026/01/07	2026/01/12	2026/01/12	2026/01/12
Boron mg Be/L	0.26	0.12	0.18	0.36	0.04	0.23
Cadmium mg Cd/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium mg Cr/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt mg Co/L	<0.01	<0.01	<0.01	0.25	0.68	<0.01
Copper mg Cu/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride mg F/L	1.38	0.13	0.42	<0.09	<0.01	0.12
Iron mg Fe/L	<0.01	<0.01	<0.01	0.29	<0.01	<0.01
Lead mg Pb/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium mg Li/L	0.03	<0.01	0.2	<0.01	<0.01	<0.01
Manganese mg Mn/L	<0.01	<0.01	<0.01	20.8	0.52	0.59
Mercury mg Hg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Molybdenum mg Mo/L	0.02	<0.01	0.01	0.03	0.06	0.04
Nickel mg Ni/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium mg Se/L	0.03	0.02	0.03	<0.01	0.02	0.04
Strontium mg Sr/L	1.92	0.76	0.51	2.81	5.01	1.99
Tin mg Sn/L	0.04	0.03	0.04	0.02	0.04	0.05
Vanadium mg V/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.10
Zinc mg Zn/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide (Free) mg CN/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide (Total) mg CN/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
WAD Cyanide mg CN/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium mg U/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

7.4.5.2 Harmony Target Monitoring Data

Monitoring data was received from Harmony for the Target Mine Operations for the period 2022 – 2025. The database included monitoring points for process, surface and groundwater points as part of the existing monitoring network. As was shown in the hydrocensus results, groundwater in close proximity of surface infrastructures related to the Target mining activities can be impacted. Impact on groundwater quality can come from direct seepage from infrastructure into the underlying aquifers, or discharge from water from infrastructures to surface water, and subsequent impact on groundwater quality through surface water-groundwater interaction. As such the monitoring points were sorted into three categories:

- Potential sources;
- Surface water monitoring points; and
- Groundwater monitoring points.

7.4.5.2.1 Sources

Sample results were available for the following potential sources:

- South-East RWD (D12);
- Blue RWD (E4);
- Freddies No. 9 Dam (ESW5);

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- Target 1 Salvage Yard Evaporation Dam (ESWT2); and
- Target 1 Million Gallon Dam (TMGD1/ESWT1).

As the Target 1 Shaft area does not fall within the catchments related to the Jelani operations these were omitted from this assessment. Sources, surface water and groundwater sampling locations are shown in Figure 7-15.

Concerning pH, the monitoring data provided shows variability in results pre-2024 but relatively stable results from 2024 onwards. Since 2024 pH for all monitored sources have been within (or slightly below/above) the SANS limit range, with exception of the Blue RWD which shows acidic conditions (average pH of around 3). This may indicate efforts from the Target Mine to stabilise the effluent pH.

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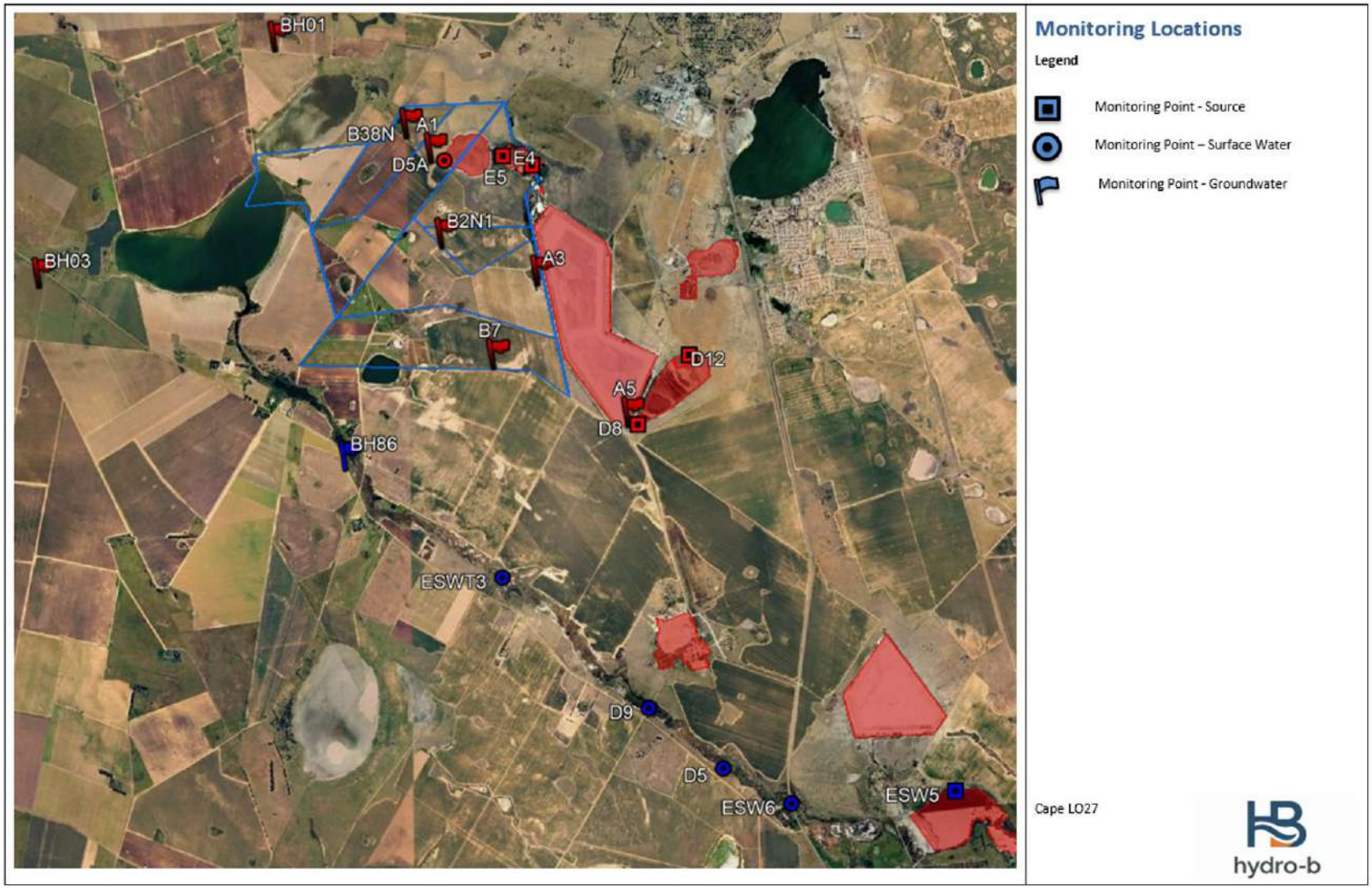


Figure 7-15: Monitoring Locations – Process Water, Surface Water and Groundwater

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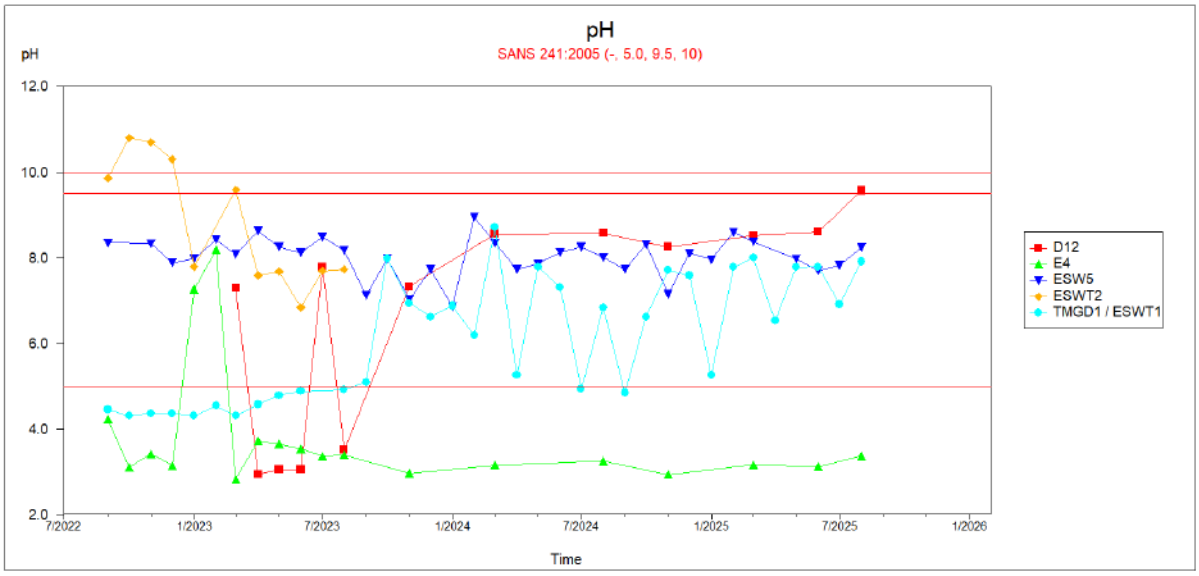


Figure 7-16: Sources – pH

When looking at the EC trends for sources, results for D12 and E4, both RWD related to the target TSF 1 and 2, look similar with average EC of around 900 mS/m. EC values for ESWT1 and ESWT5, downgradient of the Target 1 process water dam and the Freddies No. 9 dam respectively, show similar EC values of around 500 mS/m. ESWT2, downgradient of a process dam at Target 2 shaft, shows a similar average EC, but with higher variability compared to ESW5 and ESWT2. This shows that water in RWDs related to the Target 1 and 2 TSF show elevated EC values up to 1 000 mS/m, with water in process dams related to Target 1, 2 and Freddies No. 9 dam show much lower, but still elevated EC values.

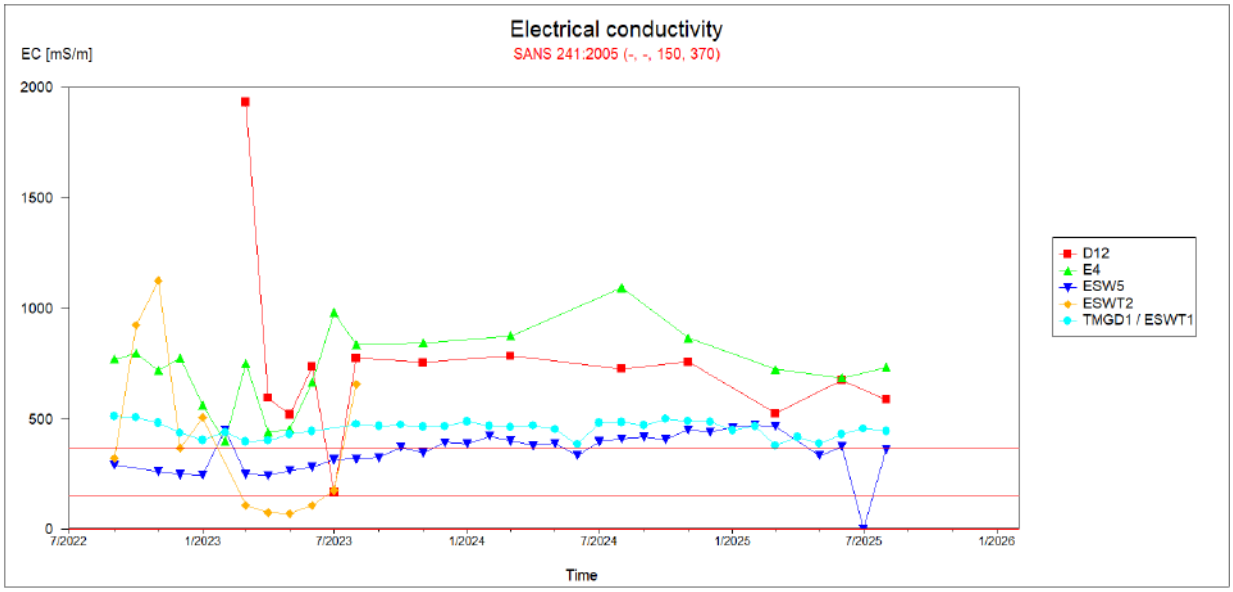


Figure 7-17: Sources – EC

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7.4.5.2.2 Target TSF and associated infrastructures

For water quality for surface and groundwater points downgradient of sources, the following sources and receptors were linked:

- E4 (Blue RWD) -> E5 (Emergency Overflow Dam) -> D5A (Swartpan) -> A1 (Swartpan outflow) -> B38N monitoring borehole;
- D12 (SE RWD) -> A5 monitoring borehole -> B7 third party borehole;
- Target TSF (no sample point) -> monitoring borehole A3 -> third party borehole B2N1

Regarding pH the following was observed:

- Blue RWD and downgradient:
  - Water in the RWD dam, emergency overflow dam and Swartpan mainly low pH values between approximately 2.5 and 4, indicating return water from the Target TSF exhibits a low pH;
  - In contrast, pH measured at the Swartpan outflow and in monitoring borehole B38N are relatively stable between approximately 7 and 9.

- SE RWD and downgradient:
  - The pH in the RWD and downgradient borehole D5 have mainly been within the SANS range, between 7 and 9, with pH at the RWD higher than at D5;
  - In 2023 low pH values were observed for both monitoring locations but these have since increased.

- Target TSF and downgradient:
  - Although no water quality was provided for the Target TSF itself, downgradient monitoring borehole A3 shows that pH is mostly within the SANS range, with only one value in 2025 slightly below the pH 5 limit;
  - Downgradient third-party borehole B2N1 shows a relatively pH around pH 8.

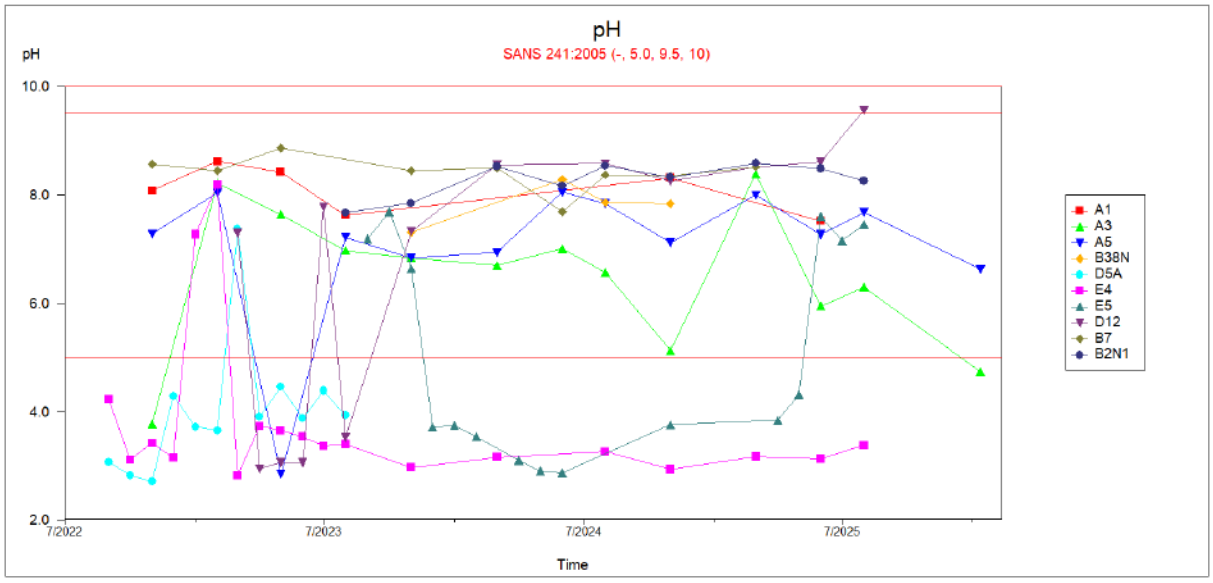


Figure 7-18: Target TSF and Associated Dams and Downgradient – pH

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Regarding the EC the following was observed:

- Blue RWD and downgradient:
  - EC values in the RWD dam and Swartpan are elevated between 1 000 and 1 700 mg/l;
  - EC values in the emergency overflow dam fluctuate between about 300 and 9 000 mS/m and may be related to the periodic usage of this dam. EC values at monitoring borehole A1 are significantly lower, up to about 2 000 mS/m;
  - EC values in the downgradient monitoring borehole B38N are significantly lower and just above the SANS limit of 370 mS/m.

- SE RWD and downgradient:
  - EC in the SE RWD (D12) is elevated but stable at around 750 mS/m with exception of one spike in 2023, with borehole D5 (immediately downgradient of the evaporation dam) showing lower EC values of between 1 00 and 500 mS/m with exception of one spike in 2022;
  - EC values in third-party borehole B2N1 are below the SANS limit.

- Target TSF and downgradient:
  - Although no water quality was provided for the Target TSF itself, downgradient monitoring borehole A3 shows the EC is around 600 mS/m, above the SANS limit of 370 mS/m;
  - Downgradient third-party borehole B7 shows EC values below the SANS limit.

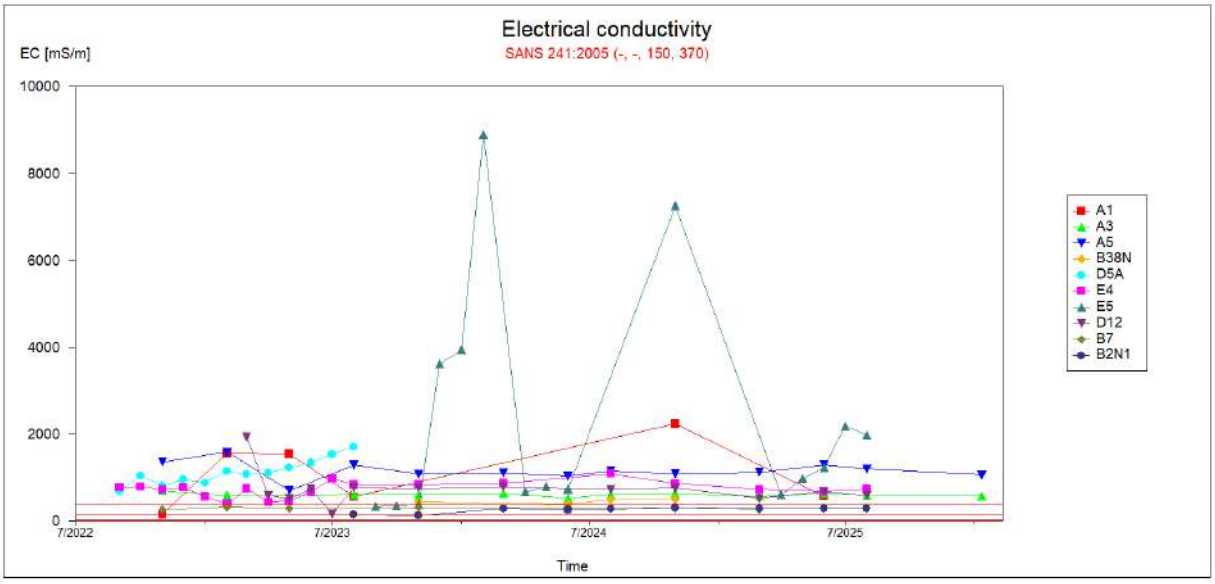


Figure 7-19: Target TSF and Associated Dams and Downgradient – EC

Regarding sulphate the following was observed:

- Blue RWD and downgradient:
  - Sulphate concentrations in the RWD dam and Swartpan are elevated at concentrations around 3 000 mg/l;
  - Concentrations in the emergency overflow dam strongly fluctuate between about 500 and 7 000 mg/l and may be related to the periodic usage of this dam;

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- Sulphate measured at monitoring borehole A1 just downgradient of the Swartpan shows a similar range for water in the Swartpan;
- Sulphate in downgradient monitoring borehole B38N is significantly lower and below the SANS limit of 400 mg/l.

- SE RWD and downgradient:
  - Sulphate in the SE RWD (D12) is elevated between approximately 1 000 and 2 000 mg/l, with borehole D5 (immediately downgradient of the evaporation dam) showing higher concentrations of between 2 000 and 3 500 mg/l. This higher concentration can likely be attributed to the evaporation dam;
  - Sulphate concentrations in third-party borehole B2N1 are below SANS limits.

- Target TSF and downgradient:
  - Although no water quality was provided for the Target TSF itself, downgradient monitoring borehole A3 shows elevated sulphate concentrations in line with these observed at the SE RWD;
  - Downgradient third-party borehole B7 shows sulphate concentrations below SANS limits.

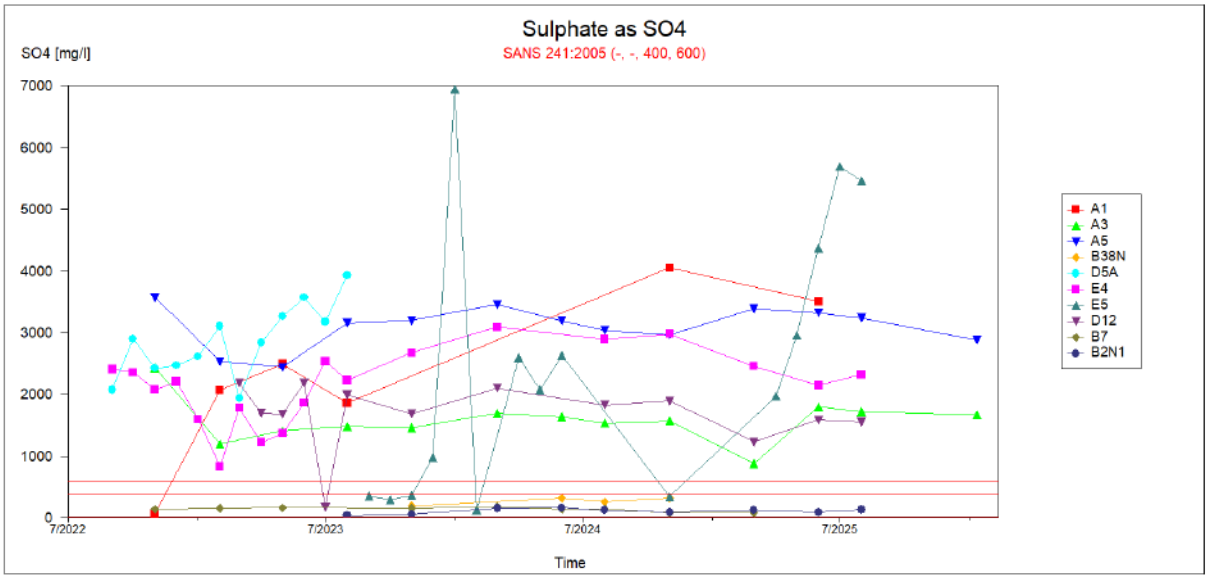


Figure 7-20: Target TSF and Associated Dams and Downgradient – SO_4

From the above, the main sources are the Target TSF and related process dams. This is shown by elevated EC and sulphate concentrations, which seem more elevated for the process water facilities north of the Target TSF when compared to the process water facilities to the south of the Target TSF. In addition, acidic conditions are mainly related to the northern process water dams – this may indicate that return water from Target TSF1 may be more acidic than from Target TSF2.

7.4.5.2.3 Freddies No.9 dam, Target Shaft 3 and the Doringspruit

For the Doringspruit and related sources, the following the following sources and receptors were linked:

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- ESW5 (Freddies No. 9 dam) -> ESW6 (Losdoringspruit) -> D5 (Losdoringspruit) -> D9 (Losdoringspruit) -> ESWT3 (Losdoringspruit, downgradient of Target Shaft 3) -> Monitoring borehole BH86.

Regarding pH the following was observed:

- The pH for all monitoring points is within SANS range and relatively stable between approximately 7 and 9.

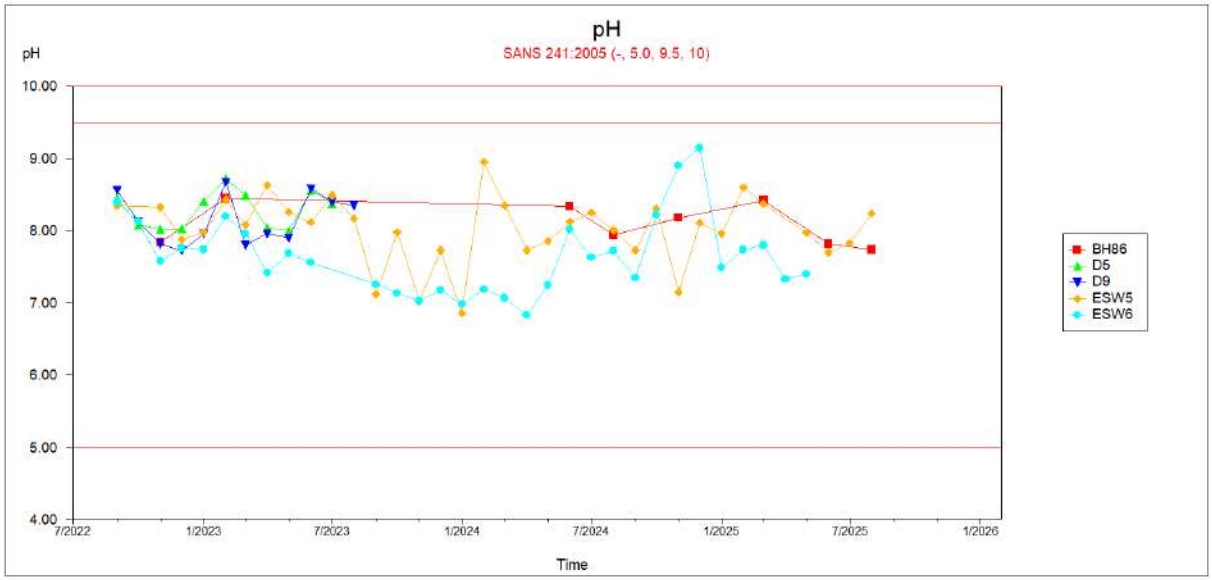


Figure 7-21: Source Freddies Dam and Downgradient Losdoringspruit – pH

Regarding EC the following was observed:

- The EC for Freddies No. 9 dam shows a gradually increasing trend over the period 2022 – 2025, with EC values just exceeding the SANS limit of 350 mS/m. However, values later in 2025 show values just at or below the limit;
- ESWT3, the most downgradient monitoring point on the Doringspruit, shows clear variability in concentrations, with three-to-six-month intervals between peaks. A similarity in fluctuations, although less pronounced, can be seen for ESW6 further upstream and ESW5 (Freddies No. 9 dam); this could possibly indicate dilution effects immediately downgradient of Freddies No. 9 dam, and possible discharge of waters from the Target Shaft 3 area;
- For all other monitoring points EC values are mainly below the SANS limit with some notable spikes, mainly for D5 and ESW6. In 2023 the EC also spiked and exceeded the SANS limit for borehole BH86, but this has not occurred since.

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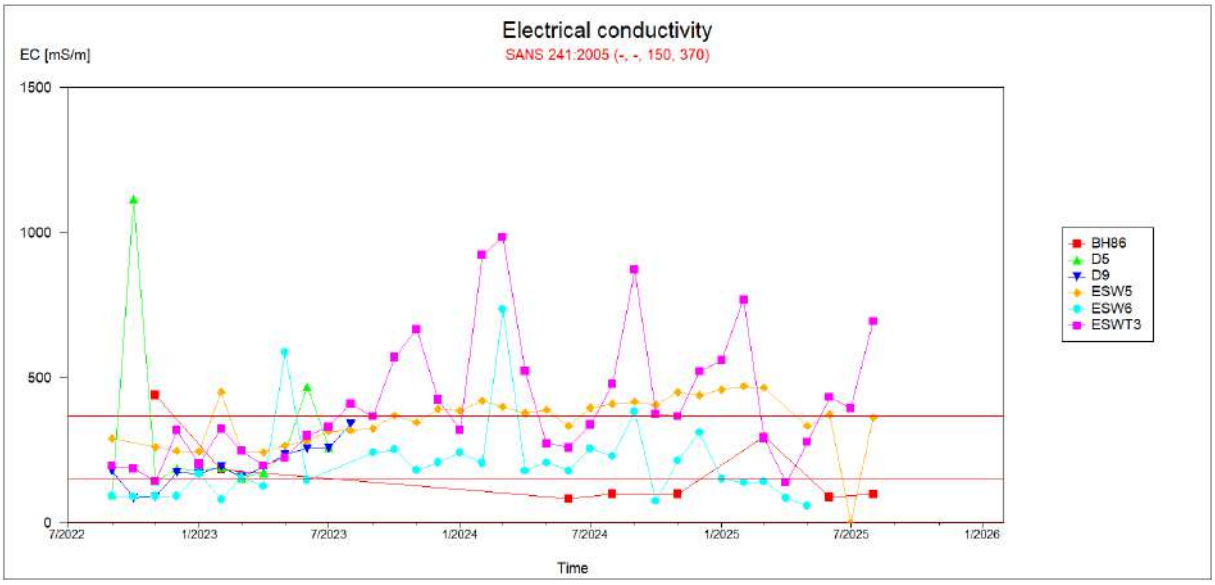


Figure 7-22: Source Freddies Dam and Downgradient Losdoringspruit – EC

Regarding SO4 the following was observed:

- The sulphate concentrations for water in the Freddies No. 9 dam shows a gradually increasing trend over the period 2022 – 2025, with sulphate below or slightly above the SANS limit of 600 mg/l.
- ESWT3 shows peaks in sulphate concentrations with three-to-six-month intervals between peaks, similar as for EC. A similarity in fluctuations can be seen for ESW6 and ESW5; this could possibly indicate dilution effects immediately downgradient of Freddies No. 9 dam, and possible discharge of waters from the Target Shaft 3 area;
- For all other monitoring points sulphate concentrations are mainly below the SANS limit with some notable spikes, mainly for D5 and ESW6. Sulphate concentrations for borehole BH86 have remained below the SANS limit.

Concerning the water quality in the Doringspruit and downgradient groundwater, the following can be concluded:

- Water in Freddies No. 9 Dam shows a slightly increasing trend but generally remains below the SANS limit;
- Water in the Doringspruit downgradient of the Target 3 Shaft area indicates there may be discharges of water from this site, which could explain the peaks in sulphate concentrations;
- Groundwater in close proximity to the spruit does not indicate any impacts- this is shown in BH86 as well as BHN, sampled as part of the hydrocensus.

7.4.5.3 Overall Conclusions Current Groundwater Quality

Pertaining the groundwater quality in the study area, the following can be concluded:

- The main source of contamination is the Target TSF 1 and 2 and associated process water dams. Other secondary sources are the Target 3 Shaft area and the Freddies No. 9 TSF and dam;

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- Sulphate is the main parameter of concern and can be used as an indicator parameter for contamination (Figure 7-23);
- Highest sulphate concentrations and acidity were observed for the process dams to the north of the TSF; sulphate concentrations for process dams south of the Target TSF were elevated, but lower when compared to the infrastructure north of the TSF;
- Surface waters, such as the Doringspruit and the Swartpan, are impacted by existing mine infrastructure;
- Groundwater immediately downgradient of infrastructure is impacted by seepage from TSFs and unlined process water dams. However, third-party and monitoring boreholes further downgradient of infrastructures do not show elevated sulphate concentrations, and as such there is no evidence of widespread groundwater contamination;
- Uranium was included in this assessment due to elevated concentrations reported in mine process water and some downstream surface water features, indicating that uranium is present within the site water management system. Although uranium is not currently included in the Target Mine monitoring programme uranium was analysed in hydrocensus boreholes. Uranium was not detected in any of the hydrocensus samples and there is therefore no evidence at present to indicate an impact on groundwater quality;
- However, to confirm this, uranium should be included as a routine parameter in the groundwater monitoring programme of the Target Mine monitoring boreholes.

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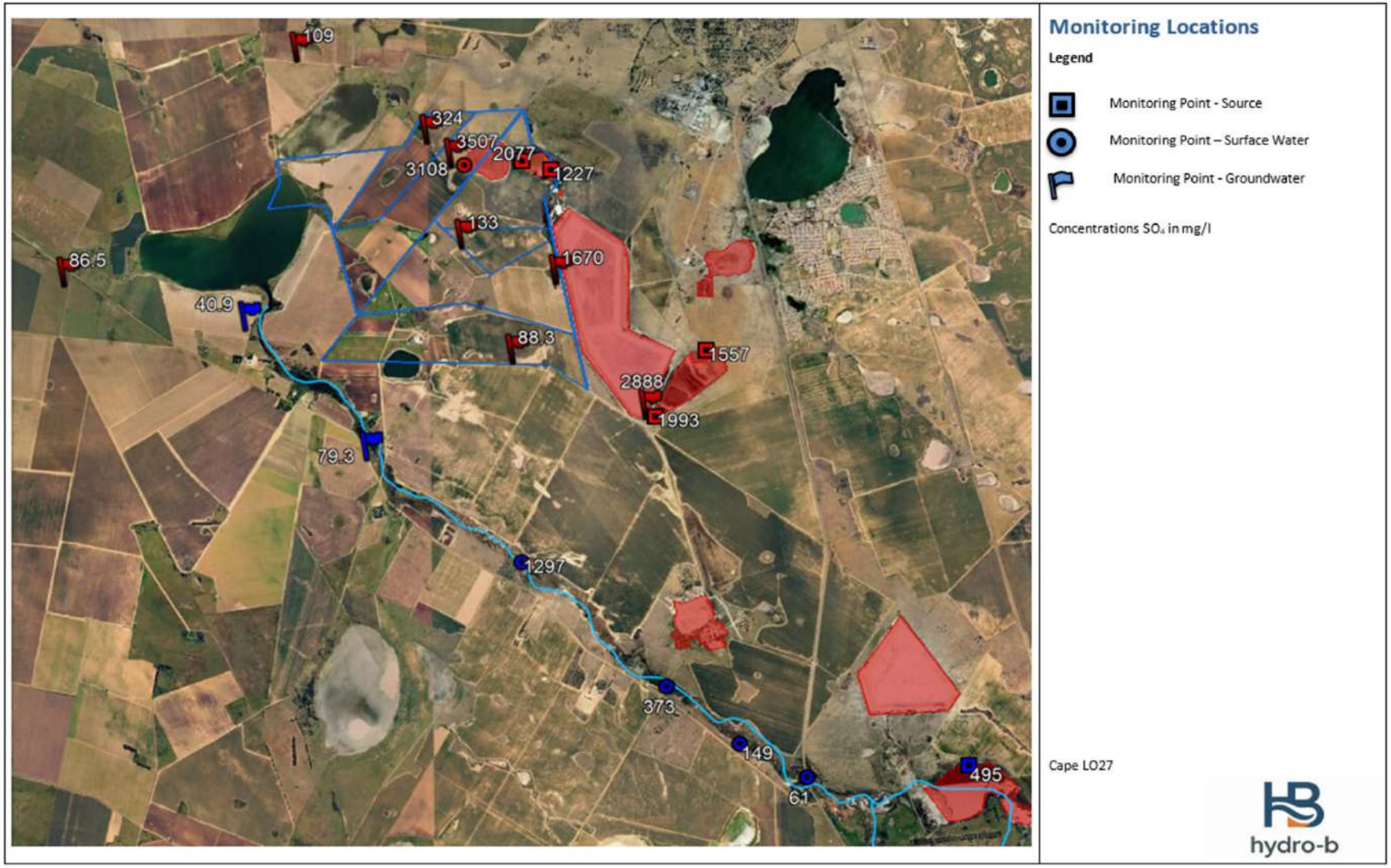


Figure 7-23: Target TSF and Dams and Doringspruit- SO_4 Concentration

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7.4.6 Conceptual Model

The conceptual hydrogeological model has been developed from the available geological, hydrogeological and operational information, including existing, regional groundwater models, existing Target mine groundwater and mine water records, historical Target pumping and inflow data and the existing understanding of groundwater behaviour associated with the deep Free State gold mines. The conceptual model considers groundwater quantity and quality during the operational and post-closure phases and provides the basis for assessing the groundwater impacts associated with the Jelani Project taking into account baseline conditions.

7.4.6.1 Hydrostratigraphic Units

Two principal hydrogeological environments are considered relevant to the Jelani Project:

(1) A shallow Karoo aquifer system; and
(2) A deep, fractured Ventersdorp/Witwatersrand aquifer.

7.4.6.1.1 Shallow Karoo Aquifer

The surface geology is dominated by Ecca Group shales, mudstones and sandstones, part of the Karoo Supergroup. This aquifer can be subdivided in a weathered unit (to an approximate depth of 10 m) and a fractured unit (to an approximate depth of 80 m). Most of the Karoo sediments are saturated and significant groundwater occurrence is mainly associated with sandstone horizons, weathered zones, fractures and dyke contacts. This aquifer is directly recharged by rainfall. The Dwyka Formation at the bottom of the Karoo aquifer is considered an aquitard, separating this aquifer from the deeper aquifer.

From previous experience the hydraulic conductivity of this aquifer is in the range of 10^{-1}-10^{-2} m/d, with previous aquifer testing in this aquifer yielding similar results, with an average hydraulic conductivity of 0.29 m/d and a harmonic mean of 0.042 m/d). Information on porosity of this aquifer were not available for this study, however, based on previous experience an acceptable range for the weathered aquifer is 3-7% and for the fractured aquifer 1-3%.

7.4.6.1.2 Ventersdrop/Witwatersrand Aquifer

The Ventersdorp/Witwatersrand aquifer is strongly controlled by fractures, faults, intrusive contacts and, in the Witwatersrand unit, existing mine voids. Hydraulic conductivities for this aquifer widely range between 10^{-9} - 10^{-2} m/day representing fresh to fractured rock.

The available investigations indicate that groundwater-bearing structures may occur within the Ventersdorp sequence and that, locally, these could provide hydraulic connections between shallow groundwater and deeper water-bearing zones. However, such connections are limited and localised, as the groundwater samples from the shallow aquifer do not indicate groundwater that has interacted with deep mine water or shallow groundwater levels to be impacted by mine abstractions in the deeper aquifer. This aligns with descriptions in historical studies which described the linkages between the shallow Karoo and deep Witwatersrand systems as negligible.

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7.4.6.1.3 Groundwater Recharge

Recharge to the shallow Karoo groundwater system occurs predominantly through infiltration of rainfall. The most recent hydrology report (Kongiwe Environmental, 2026) indicates an average annual rainfall of approximately 492 mm/a for the Welkom area. Based on previous experience in similar Karoo settings the recharge is expected to be between 1-3% of MAP. Hydraulic connection between the shallow Karoo aquifer and the underlying deeper aquifer is limited and recharge to the deeper aquifer is considered to be negligible or localised.

7.4.6.2 Groundwater Flow

7.4.6.2.1 Shallow Groundwater

Groundwater flow in the shallow Karoo aquifer generally follows topographic gradients and local drainage patterns, with groundwater discharge occurring towards surface drainage features, pans and other local discharge zones. The regional drainage is generally from southeast towards northwest, with the Sand River being the principal regional drainage feature. The shallow groundwater system is therefore conceptualised as a relatively shallow, rainfall-recharged system. General groundwater flow directions are as depicted in Figure 7-24.

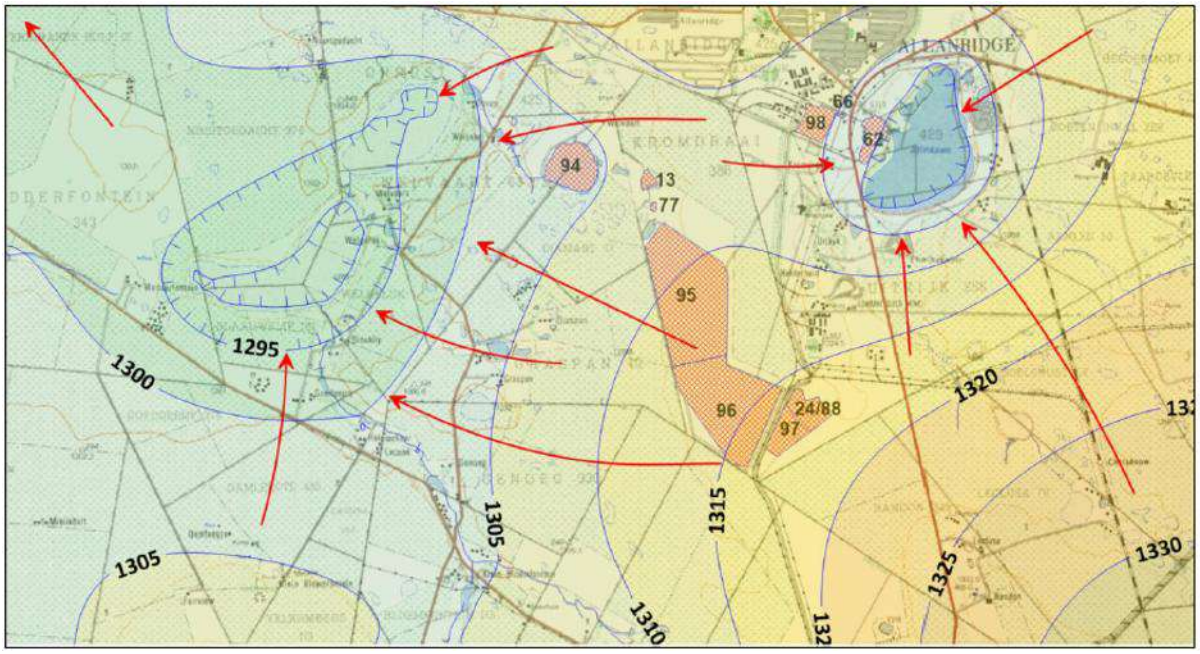


Figure 7-24: Simulated Groundwater Contours (Karoo Aquifer) Indicating Main groundwater Flow Directions (AquiSim Consulting, 2025).

7.4.6.2.2 Deep Groundwater

Groundwater flow in the deep aquifer is very different, as mine voids in the Witwatersrand unit have intersected water-bearing fractures, faults and other permeable structures, and groundwater is captured in the mine workings and pumped to surface. The existing underground mine workings form artificial flow paths and connections between different mine areas that allow for significant groundwater volumes to move from mine to mine, and groundwater levels in the deep aquifer are significantly subdued resulting from long-term pumping.

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7.4.6.3 Existing and Proposed Mine Dewatering

Historical Target operation records indicating average pumping from Target 3 shaft of approximately 3.5 ML/day in 2016 while Target 2 shaft handled approximately 2.5 ML/day. As the Jelani Operation will use the same infrastructure and mining will occur in the same area, this provides some insight in the anticipated groundwater inflows for the Jelani project. The principal groundwater source for the deeper Jelani workings is expected to be predominantly from the water stored within the interconnected network of mining-related voids within the deep fractured Witwatersrand aquifer.

The Jelani workings will overlap with and extend approximately 140 m below the maximum depth of the existing Target 2 workings. The appropriate conceptualisation is therefore that the proposed Jelani Operation will be an incremental expansion of an existing deep groundwater sink rather than the creation of a new groundwater depression.

The shallow Karoo aquifer is an important groundwater resource for surrounding farms and local fractures and geological contacts could act as preferential groundwater pathways. However, the available regional evidence indicates that the shallow and deep groundwater systems are not hydraulically connected on a regional scale. The historical investigations concluded that extensive dewatering of the deep Witwatersrand system did not show noticeable dewatering of the upper Karoo aquifer to date. The conceptual model therefore assumes that the deep mining and associated dewatering primarily affect the deep Witwatersrand groundwater system and interconnected mine workings, while the shallow Karoo aquifer remains mainly controlled by local rainfall recharge and shallow geological conditions.

7.4.6.4 Source–Pathway–Receptor Model

The principal groundwater source–pathway–receptor model is conceptualised as follows.

7.4.6.4.1 Sources

The principal potential groundwater contamination sources associated with the existing Target operation including:

- The existing Target TSF;
- Associated process water dams, to the northeast and southwest of the TSF;
- The Swartpan, currently receiving overflow from the above-mentioned process dams; and
- An evaporation dam to the southeast of the TSF.

For this impact assessment the focus will be on predicting the spatial extent of the cumulative contaminant migration (historical and future) from pollution sources for the operational and the post-closure phase. The cumulative impact from historical and proposed mining activities is relevant to consider for the Jelani project because the project will utilise some of the existing Target process water infrastructures rather than creating new contamination sources (with exception of a new TSF, which will fall outside of the scope of this assessment).

The conceptual model will therefore focus on the cumulative impact of groundwater contamination associated with the Jelani project, subject to confirmation of the final mine infrastructure and water-management arrangements.

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7.4.6.4.2 Pathways

Potential contaminant migration pathways include:

- Infiltration;
- Shallow groundwater flow;
- Geological fractures and preferential pathways;
- Deeper groundwater flow;
- Mine workings.

The conceptual model will focus on the impact on groundwater quality in the shallow Karoo aquifer and will assume that contamination from surface facilities will not migrate vertically to the deep mine workings, or that mine water will automatically migrate into shallow farm aquifers. Instead, hydraulic connectivity must be controlled by the presence and permeability of geological structures and the prevailing hydraulic gradients.

7.4.6.4.3 Receptors

The main receptors are:

- Farm boreholes;
- Downstream shallow groundwater; and
- Surface drainage.

The principal potential impact pathway is: surface mine water infrastructures → groundwater quality in the shallow Karoo aquifer → downgradient aquifers, farm boreholes and drainage features.

7.4.6.5 Conceptual Model Uncertainties

The conceptual model is considered sufficiently established to assess the incremental groundwater impacts of Jelani; however, several uncertainties remain.

These include:

- The construction details and depth of monitoring boreholes. For this assessment it has been assumed these were drilled into the fractured Karoo stratigraphy.
- The post-closure plans for the mine surface infrastructure for the Target Mine and the Jelani Mine;
- Source-terms for each source and geochemical modelling of long-term seepage quality emanating from the Target TSF;
- Specific seepage rates from each surface infrastructure.

7.4.6.6 Conceptual Model of Potential Impact from Jelani

The conceptual model predicts the following sequence during mining:

1. New mine workings intersect fractures and other water-bearing structures;
2. Groundwater enters the workings and is collected within the underground water-management system;

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3. Hydraulic connections with existing Target workings allow water to move through the established underground network;
4. Pumping at Target 2 removes the additional mine water from the underground system;
5. The additional groundwater abstraction is expected to be concentrated within the deep Witwatersrand groundwater system;
6. The shallow Karoo aquifer remains predominantly controlled by rainfall recharge and local hydrogeological conditions;
7. Because the shallow and deep systems have limited regional hydraulic connectivity, significant additional drawdown of the shallow Karoo aquifer is not expected;
8. Existing surface contamination sources remain the principal potential source of groundwater quality impacts;
9. Jelani will utilise existing infrastructure, the incremental contaminant source associated with the project is expected to be limited.

7.4.7 Numerical Model

7.4.7.1 Aim of the Model

The aim of the numerical groundwater model is to:

- Construct a groundwater model based on the existing numerical groundwater model as detailed in (AquiSim Consulting, 2025);
- To construct a model focussing on the study area;
- To simulate potential cumulative impacts of seepages from mine waste facilities (WRDs, TSFs and associated process water facilities) on the local groundwater environment. This includes the proposed Jelani Operation and nearby existing mining operations;
- Provide inputs to the groundwater impact assessment for operational and post-closure phases.

7.4.7.2 Model Inputs

Model inputs were used and were predominantly based on a previous iteration of a groundwater model as carried out by (AquiSim Consulting, 2025), with the addition of information obtained from Harmony monitoring reports and the hydrocensus as carried out as part of this assessment. The following input data was used to construct the numerical groundwater model update:

- A report on a previous groundwater model, including descriptions of lithological units, hydraulic conductivities, storage parameters and recharge estimates;
- Groundwater levels collated and analysed in previous hydrogeological investigations with relevant groundwater levels for the period between 1999 and 2013;
- Harmony monitoring reports for the period March 2022 – August 2025;
- The hydrocensus survey carried out in 2025/2026;

7.4.7.3 Model Construction

7.4.7.3.1 Model Domain

The model domain is irregularly shaped with approximate dimensions of 38 km by 29 km in the horizontal directions. Compilation of the finite difference grid using the GMS GUI facilitated the construction of a conventional horizontal grid, as well as vertical geometry provided for the two layers.

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The modelling area was discretised by a 394 x 330 grid in the x and y directions, resulting in 173 894 active cells for the model grid. A grid refinement of 25 m x25 m cells covering the Jelani mining right area was applied with gradually coarser grid cell sizes to a maximum size of 200 m x 200 m away from the mining area to reduce model run time (Figure 7-25).

Along the vertical direction the numerical model was structured in two layers with layer thicknesses of 10 m and 70 m (Table 7-8). The layer positions were based on lithology and mining depths for the Jelani operations mine and allow for accurate horizontal and vertical groundwater flow in the model. The total model thickness was set at 80 m in order to model the upper Karoo aquifer.

Table 7-8: Summary Table Showing Layer Number, Type and Thickness

Layer	Aquifer Units	Thickness (m)	Depth (m)	Layer Type
1	Karoo weathered aquifer	10	70	Unconfined
2	Karoo fractured aquifer	70	80	Confined

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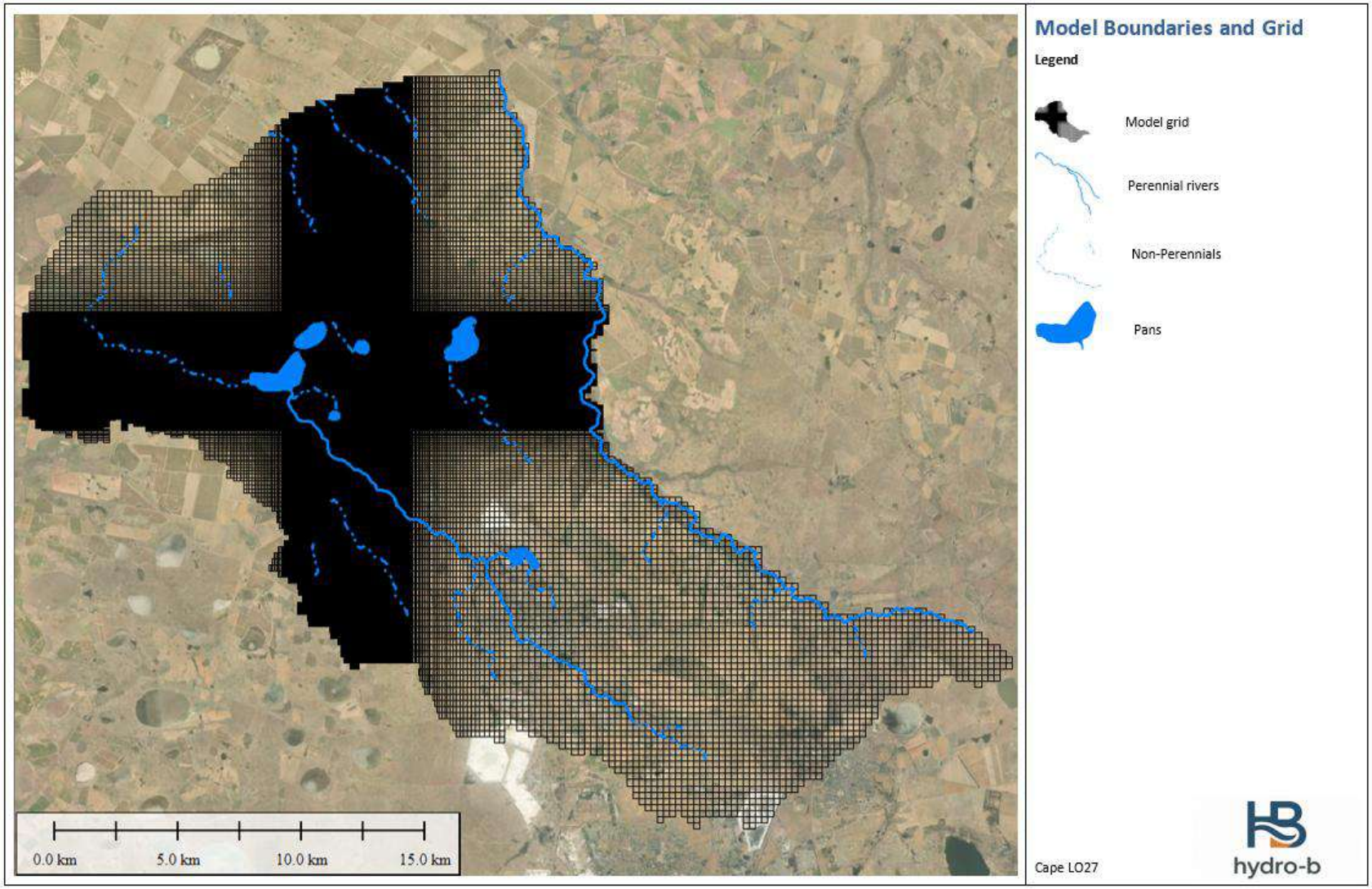


Figure 7-25: Model Boundaries and Grid

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7.4.7.3.2 Simulated Water Levels and Flow Directions

The simulated groundwater levels for the pre-mining situation are shown in Figure 7-26. Pre-mining simulated heads indicate a general groundwater flow direction in a west-northwesterly direction. The simulated groundwater levels correlated to the hydrocensus data which indicated a similar regional flow direction, as well as flow directions previously simulated in (AquiSim Consulting, 2025).

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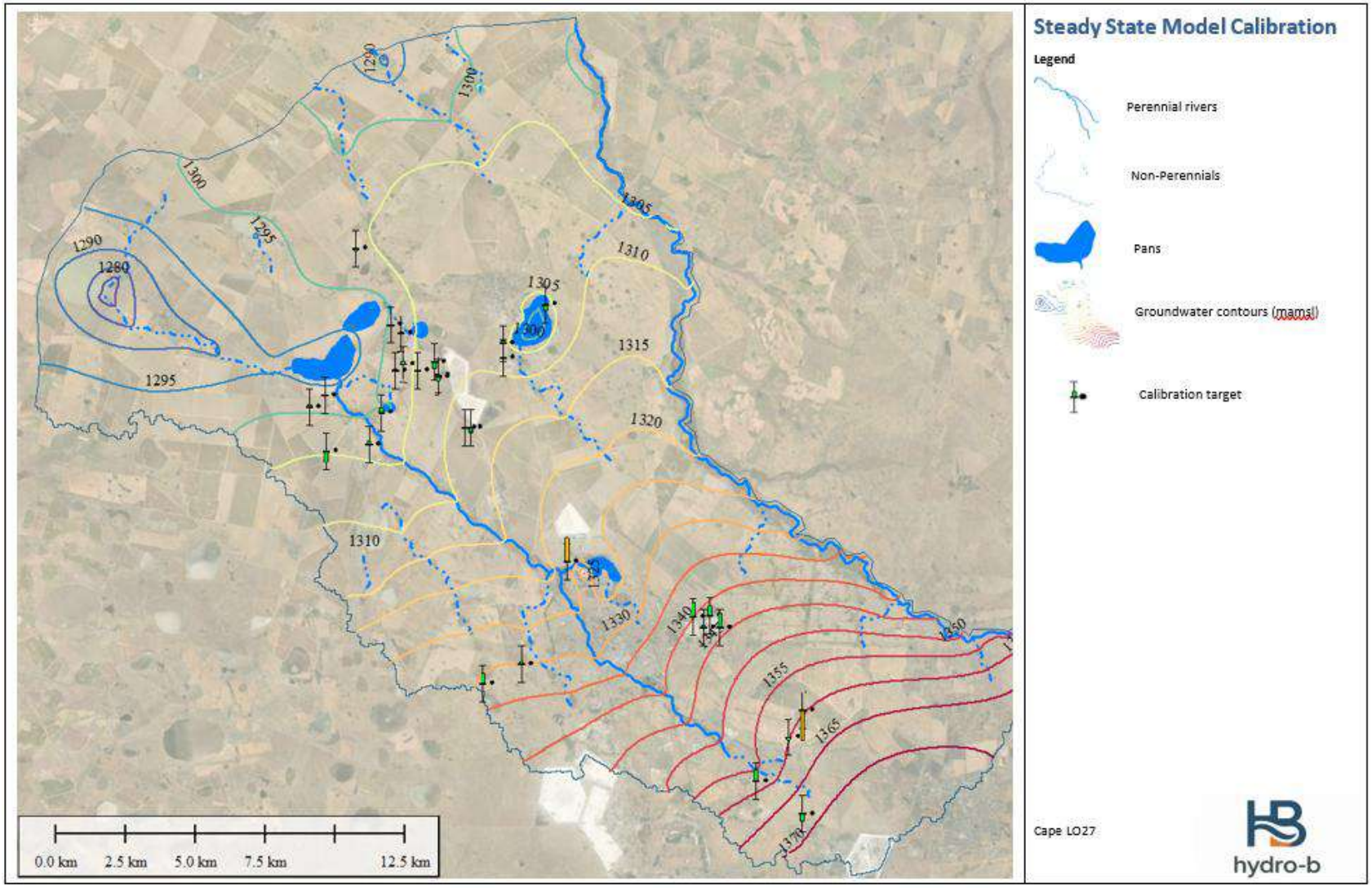


Figure 7-26: Steady State Model Calibration and Groundwater Contours

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7.4.7.4 Scenario Modelling

As previously mentioned the scenario modelling focussed on contaminant movement in the shallow aquifer. The current understanding is that the impact of the dewatering of the deeper aquifer will not result in a significant impact on groundwater levels in the shallow aquifer and as such the quantification of this impact was not undertaken as part of these model simulations.

The contaminant migration is based on using sulphate as a conservative tracer and indicator parameter for illustration of the release and dispersion of contaminants in groundwater, assuming the various mine-related surface infrastructures can all contribute to elevated sulphate concentrations in the underlying shallow Karoo aquifer.

The proposed Jelani project will utilise the existing surface infrastructure with no additional or new mining infrastructure proposed, and therefore no changes in sources are expected. For each source concentrations were assigned using average sulphate concentrations from available information as detailed in Section 7.4.5.2. Where this was not available, such as for the Target TSF, values were based on input concentrations as used in (AquiSim Consulting, 2025). Based on background groundwater quality data the average background concentration for sulphate is 140 mg/l, and this value was taken as the lower limit for contaminant plume migration. Model input concentrations are summarised in Table 7-9.

Table 7-9: Model Input Concentrations.

Infrastructure	Input concentration (SO4, mg/l)
Target TSF (No. 1 and 2)	2 000
North-West RWD	2 160
Blue RWD	2 160
Emergency Overflow Dam	2 480
Swartpan	2 860
South-East RWD	2 000
Evaporation Dam	3 500

1967 was used as the start year for the activities based on previous modelling as a conservative approach representing the maximum period over which contamination could have occurred (AquiSim Consulting, 2025). 2041 was taken as end year for the process water and evaporation dams, as this is included to be the projected as end date for the mining activities related to the Jelani project (Bara Consulting, 2026). It is assumed that these dams will be rehabilitated with natural recharge allowed in these areas by infiltration of accumulated rainwater.

At current no source-term or geochemical modelling results are available to assess the long-term quality of seepage water from the Target TSF. As a conservative approach, input concentrations for the Target TSF were kept constant into the post-closure phase and simulated together with seepages from the process water and evaporation dams and the Swartpan.

To simulate infiltration of water from the mine waste and water infrastructures a recharge rate of 0.00013 m/d (10% of MAP) was used. This percentage is in line with values used in other studies in similar hydrogeological settings, including (AquiSim Consulting, 2025), as well as values reported in well-known research publications such as (Hodgson & Kranz, 1998).

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A longitudinal dispersivity of 25 m was adopted for the transport simulations, which is considered appropriate for the regional scale of the model domain (~30 km) and long transport distances. The selected value is consistent with published guidance and previous regional-scale groundwater transport studies, which indicate that longitudinal dispersivity may range from tens to several hundreds of meters for kilometer-scale transport problems in heterogeneous aquifer systems (Gelhar, Welty, & Rehfeldt, 1992) and (Xu & Eckstein, 1995). Transversal dispersivity was set as 0.1 times the longitudinal dispersivity.

As a base case scenario, the effective or kinematic porosity for the Karoo aquifer was assigned to be 4% for the weathered zone and 2% for the fractured zone. These values provided a best fit for the 2025 groundwater quality data.

Scenario modelling for 2025 (reference year for model results in (AquiSim Consulting, 2025) as well as availability of monitoring data in Figure 7-27 shows that:

- Contaminant plume migration mainly follows the regional groundwater flow direction, which for the Study Area is in a general westerly flow direction;
- The current extent of the sulphate plume is congruent with the previous model results and aligns with available groundwater quality data;
- The existing contaminant plume indicating only limited migration from current the TSFs (maximum distance of approximately 420 m).

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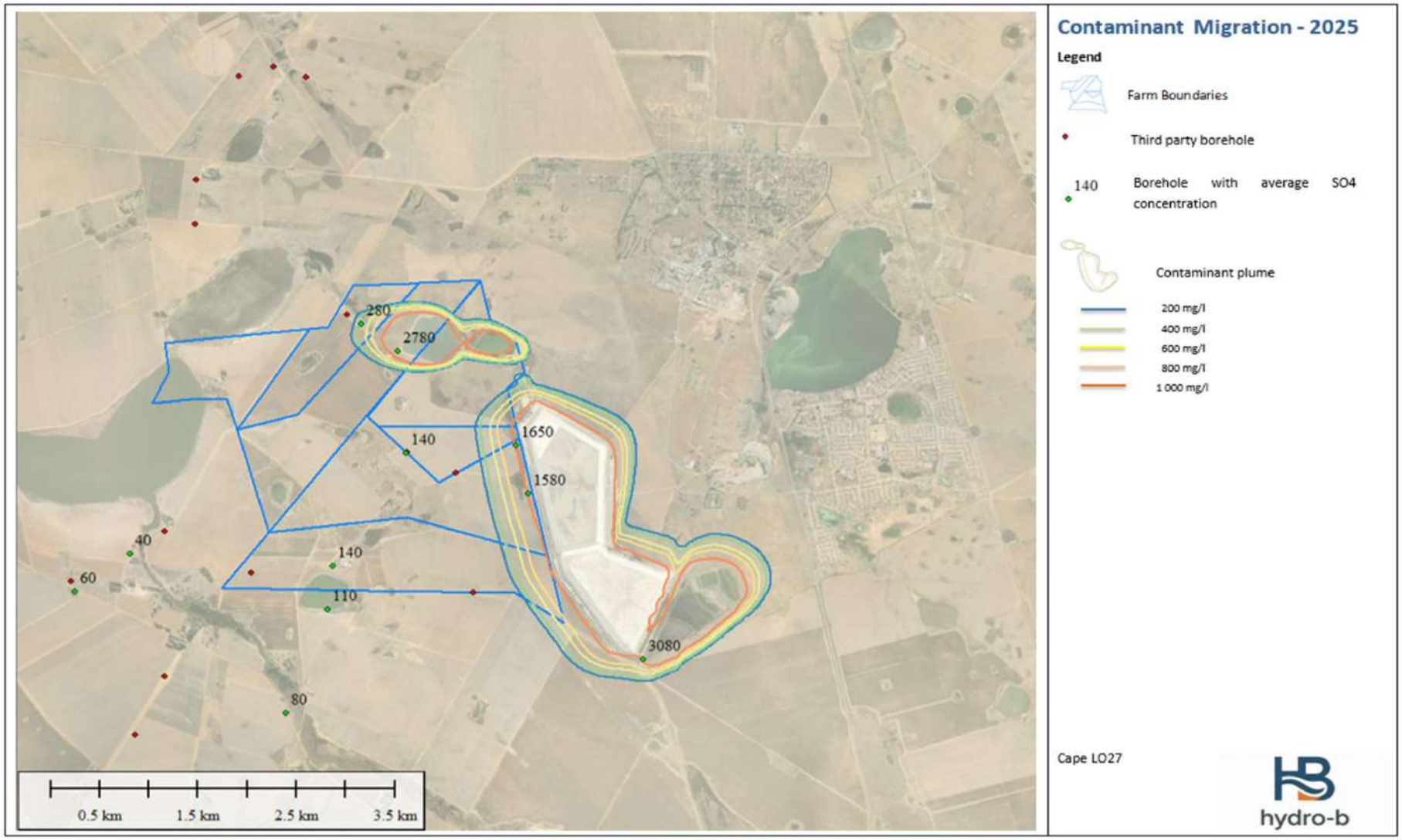


Figure 7-27: Contaminant Plume – 2025 Situation

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7.4.8 Groundwater Sensitivity, Avoidance and Acceptable Change

The groundwater environment within the Project Area comprises shallow groundwater associated mainly with the Karoo sequence and deeper groundwater associated with fractured Ventersdorp and Witwatersrand formations. The shallow groundwater system is considered the principal groundwater receptor potentially affected by seepage from surface infrastructure, while the deeper groundwater system is primarily associated with mine dewatering and inter-mine flows.

Groundwater receptors identified during the assessment include existing third-party groundwater users, shallow groundwater and surface drainage that interact with groundwater.

No additional major surface infrastructure is proposed for the Jelani Project as part of this assessment. The proposed operation will make use of existing Target Mine surface infrastructure. Therefore, the need for groundwater-specific avoidance areas associated with new surface infrastructure is limited.

The principal groundwater protection requirement is prevention, early detection and management of contaminant migration from existing mine infrastructure. Areas with existing groundwater users downgradient of this infrastructure should be regarded as receptors and should be incorporated into the groundwater monitoring programme. Protection of these groundwater receptors will rely on source control, monitoring, early detection and adaptive management.

For this assessment acceptable change is considered to comprise changes in groundwater levels or quality that remain within natural and established baseline range and do not result in an unacceptable impact on identified groundwater users or other groundwater receptors. Where monitoring identifies a significant, long-term deviation from baseline conditions that can be attributed to the project the cause should be investigated and management measures, where required, implemented.

7.5 Hydrological

Refer to Specialist Study: Appendix D5 – Hydrological Assessment

7.5.1 Regional Catchment and Drainage

As per The DWS has divided South Africa into primary, secondary, tertiary and quaternary catchments. This hierarchy is outlined as follows:

- Primary catchments are the largest defined catchments for South Africa, of which there are 22, and are assigned a letter ranging from A – X (excluding O).
- Secondary catchments are subdivisions of the primary catchments and are the second largest catchments in South Africa and are assigned the primary catchment letter within which they are located and a number e.g. C2 (secondary catchment 2 located within primary catchment C).
- Tertiary catchments are subdivisions of secondary catchments and are represented for example by C25 (tertiary catchment 5 located within secondary catchment C2).

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- Quaternary catchments are the smallest defined catchments and are assigned the tertiary catchment number, along with a quaternary catchment letter e.g. C21B (quaternary catchment B located within tertiary catchment C25).

Further to the above, the DWS has divided South Africa into 6 Water Management Areas (WMAs), that is, the Breede-Olifants, Inkomati-Usuthu, Limpopo-Olifants, Mzimvubu-Tsitsikamma, Pongola-Mtamvuna and Vaal-Orange WMAs.

The Project area is predominantly located within the Vaal-Orange WMA and within quaternary catchment C25B.

Several natural occurring pans characterise the landscape. The Losdoringspruit is located to the west of the project area within the C25B quaternary catchment.

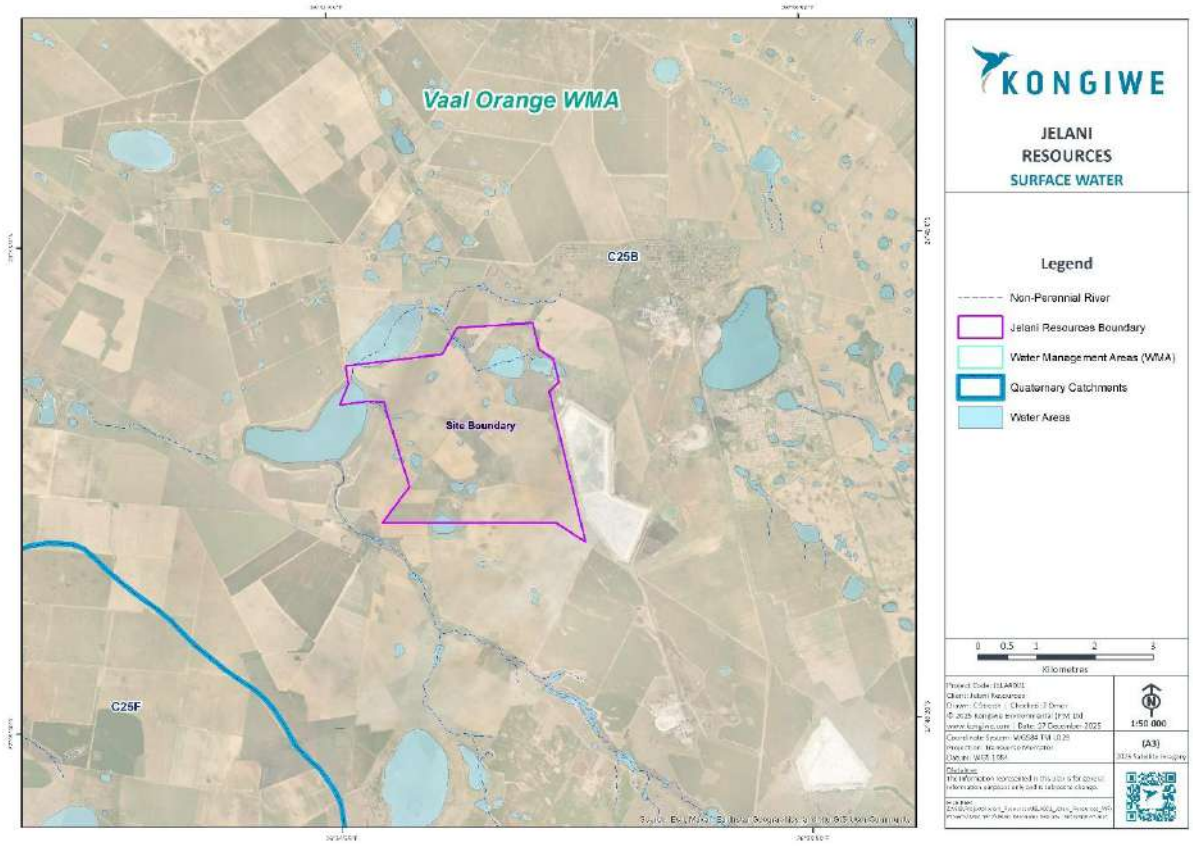


Figure 7-28: Jelani Project Surface Water Map

7.5.2 Water Quality

Harmony Gold Mine currently undertake water quality reporting for the Target Operations. Water-quality sampling is undertaken twice a year, with samples collected from the relevant monitoring points and analysed by an accredited laboratory.

7.5.2.1 Surface Water Monitoring Points

The surface water monitoring points are indicated on Figure 7-29 below:

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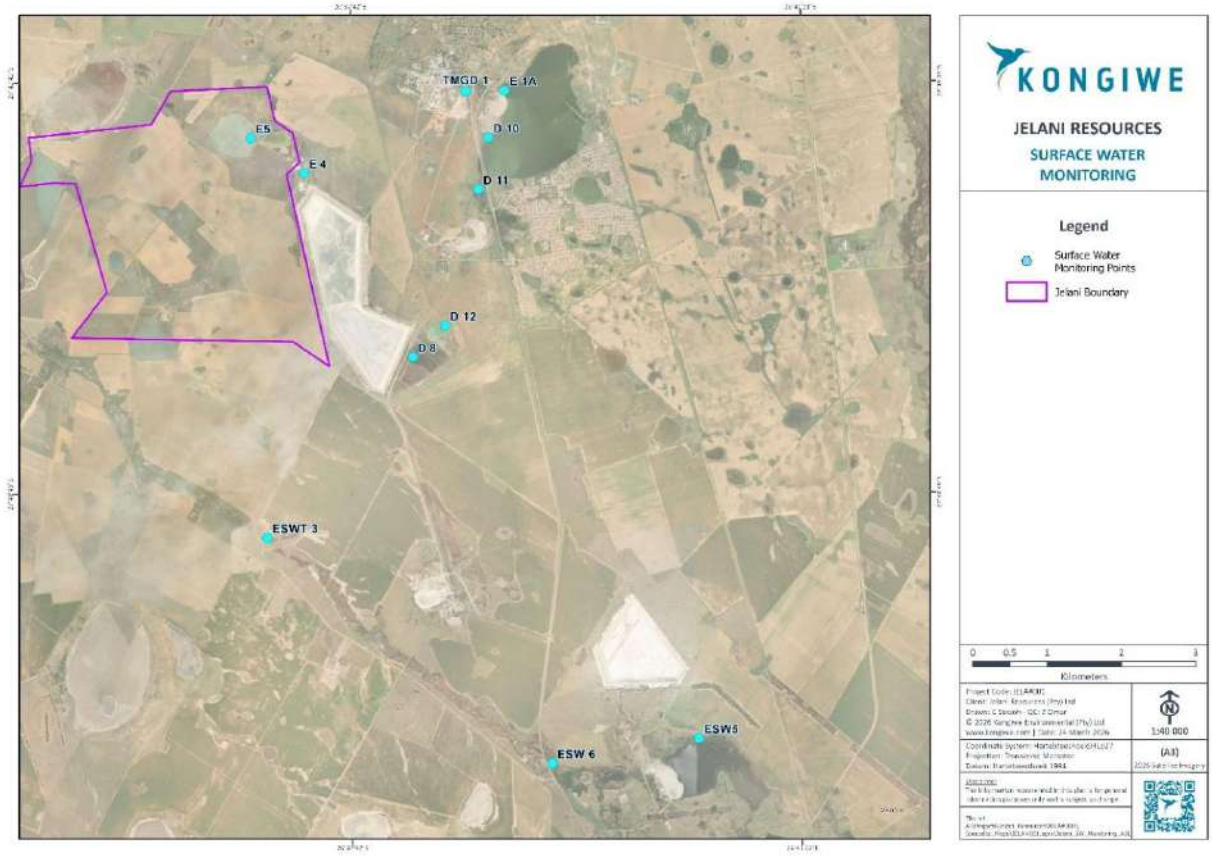


Figure 7-29: Surface Water Monitoring Points - Target Operations

7.5.2.2 Surface Water Parameter Limits

The surface water quality results were compared to the South African Water Quality Guidelines and Resource Quality Objectives. These surface water parameter limits are shown in Table 7-10 below:

Table 7-10: Surface Water Parameter Limits

Parameter	Limit	Unit	Source
pH	6.5-8.5	*pH*	RQO 2016
EC	65	*mS/m*	RQO 2016
TDS	1 000	*Mg/L*	SAWQG 1996 – V5 Livestock
NH_3	1.5	*Mg/L*	SANA 241 : 2015
Cl	1 500	*Mg/L*	SAWQG 1996 – V5 Livestock
NO_2	100	*Mg/L*	SAWQG 1996 – V5 Livestock
PO_4	0.058	*Mg/L*	RQO 2016
SO_4	1 000	*Mg/L*	SAWQG 1996 – V5 Livestock
U	0.01	*Mg/L*	SAWQG 1996 – V4 Irrigation
TON		*Mg/L*	
*SAWQG – South African Water Quality Guidelines *RQO – Resource Quality Objectives			

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The surface water parameter limits are specified as follows:

Good	Over/Under	Under detection limit	No limit

7.5.2.3 Surface Water Quality Results

The surface water quality results from Harmony are shown in Table 7-11 below:

Table 7-11: Surface Water Quality Results

	D8		D12		E4		E5		ESW T3	
	Mar-24	Nov-24	Mar-24	Nov-24	Mar-24	Nov-24	Apr-24	Nov-24	Mar-24	Nov-24
pH	4.46	4.40	8.56	8.26	3.16	2.94	3.10	3.76	7.76	7.98
EC	1 130	881	786	759	876	867	673	7 255	985	367
TDS	8 858	6 872	5 114	5 688	6 642	6 744	5 382	61 196	6 630	2 374
NH_3	35.60	19.60	12.60	1.19	55.50	49.60	31.70	0.27	21.60	1.06
Cl	2 542	1 814	1 720	1 495	1 624	1 583	1 075	29 200	2 519	807
NO_2	0.232	4.380	14.000	5.650	0.415	2.730	0.390	5.620	0.194	1.320
PO_4	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.472	8.510	0.647
SO_4	3 450	2 441	2 103	1 896	3 094	2 982	2 599	343	1 235	333
TON	0.23	4.38	14.00	5.65	0.42	2.73	0.39	5.62	0.19	1.32

7.5.2.4 Results and Discussion

- pH levels at D8, E4 and E5 show acidic conditions (pH<6), with E4 and E5 dropping to a pH as low as 2.94 and 3.10, respectively. These sample points show the effect of the TSF and the underground water pumped out and stored in the Emergency Overflow Dam.
- Electrical Conductivity (EC) measures water's ability to conduct electrical current, indicating the concentration of dissolved salts and ions. High EC can indicate pollution, high nutrient levels in irrigation, or excessive salts, which can cause toxicity in plants. All readings are high.
- Total dissolved solids (TDS) are the amount of organic and inorganic materials, such as metals, minerals, salts, and ions, dissolved in a particular volume of water. TDS are essentially a measure of anything dissolved in water that is not an H2O molecule. When water encounters soluble material, particles of the material are absorbed into the water, creating total dissolved solids. Water containing TDS concentrations below 1 000 mg/litre is usually acceptable to consumers, although acceptability may vary according to circumstances. All readings exceed 1 000 mg/litre therefore are unsuitable for human consumption.
- Surface waters which are not contaminated with organic wastes, generally have a low ammonia nitrogen concentration, typically less than 0.2 mg/L. Ammonia (NH_3) and nitrite (NO_2) are discussed as separate parameters. Surface-water ammonia concentrations ranged from 0.27 mg/L to 55.50 mg/L. Against the stated limit of 1.5 mg/L NH_3, concentrations exceeded the limit at D8 during March 2024 and November 2024; D12, E4, E5 and ESW T3 during March 2024. The highest concentration was recorded at E4 in March 2024 at 55.50 mg/L. Results recorded at D12, E5 and ESW T3 during November 2024 were below the stated limit.

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- Surface-water nitrite concentrations ranged from 0.194 mg/L to 14.000 mg/L. All reported concentrations were below the stated limit of 100 mg/L NO_2. The highest surface-water nitrite concentration was recorded at D12 in March 2024 at 14.000 mg/L.
- Groundwater nitrite concentrations ranged from 0.215 mg/L to 5.180 mg/L, which were below the stated groundwater limit of 9.1 mg/L NO_2. Monitoring point BH A1 was recorded as dry in March 2024, and no result was available for that sampling event. The results indicate elevated ammonia at several surface-water monitoring points, while the reported nitrite concentrations remained below the applicable limits. Further interpretation should consider the sampling locations, potential contaminant sources and temporal variation in the results.
- Chloride increases the electrical conductivity of water and thus increases its corrosivity. In metal pipes, chloride reacts with metal ions to form soluble salts (8), thus increasing levels of metals in drinkingwater. The majority of the Chloride levels are high.
- Nitrite (NO2) measures the concentration of nitrite ions (NO2-) in water, providing valuable insights into nitrogen pollution levels and water quality. Nitrite can originate from various sources such as agricultural runoff, industrial discharges, and wastewater effluents. Elevated nitrite levels in water can pose health risks, particularly to infants, and may indicate pollution from fertilizers, septic systems, or industrial activities. Nitrite levels are acceptable.
- In appropriate quantities, phosphorus (PO4) can be used by vegetation and soil microbes for normal growth. However, in excess quantities, phosphorus can lead to water quality problems such as eutrophication and harmful algal growth. Some aquatic resources, such as wetlands, naturally serve as sinks for phosphorus found in sediments or dissolved in water. However, since phosphorus generally occurs in small quantities in the natural environment, even small increases can negatively affect water quality and biological condition. The phosphorus levels tend to be acceptable, except for ESW T3 (Losdoringspruit - Downstream of Target 3 Shaft).
- Sulphate is a common constituent of water and arises from the dissolution of mineral sulphates in soil and rock, particularly calcium sulphate (gypsum) and other partially soluble sulphate minerals. Since most sulphates are soluble in water, and calcium sulphate relatively soluble, sulphates when added to water tend to accumulate to progressively increasing concentrations. Sulphates are discharged from acid mine wastes and many other industrial processes such as tanneries, textile mills and processes using sulphuric acid or sulphates. The Sulphate values are high.
- Total Oxidised Nitrogen (TON) represents the combined concentration of nitrate and nitrite nitrogen in the water sample.
- It should be noted that it is expected that there will be several exceedances of the parameter limits due to some sampling points being in areas where dirty water is stored or generated. However, where applicable, interventions are needed to mitigate risks to the environment.

7.5.3 Surface Water Runoff

7.5.3.1 Jelani Project Area

The Jelani Project Area has 3 catchment areas impacting on the surface water hydrology (See Figure 7-30):

- The Swartpan Catchment Area – the biggest catchment area of size approximately 8.3 km^2 including the area to the east of the Target 1 TSF. There is overland flow to the Swartpan, and a natural watercourse below Swartpan to Pan A.
- Pan B Catchment Area – area of size approximately 1.5 km^2. There is no defined watercourse, just overland flow into the Pan.

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- Pan C Catchment Area – area of size approximately 2.5 km^2. There is no defined watercourse, just overland flow into the Pan.
- Balance of Jelani Project Area – flows in a westerly direction into Pan A or the Losdoringspruit.

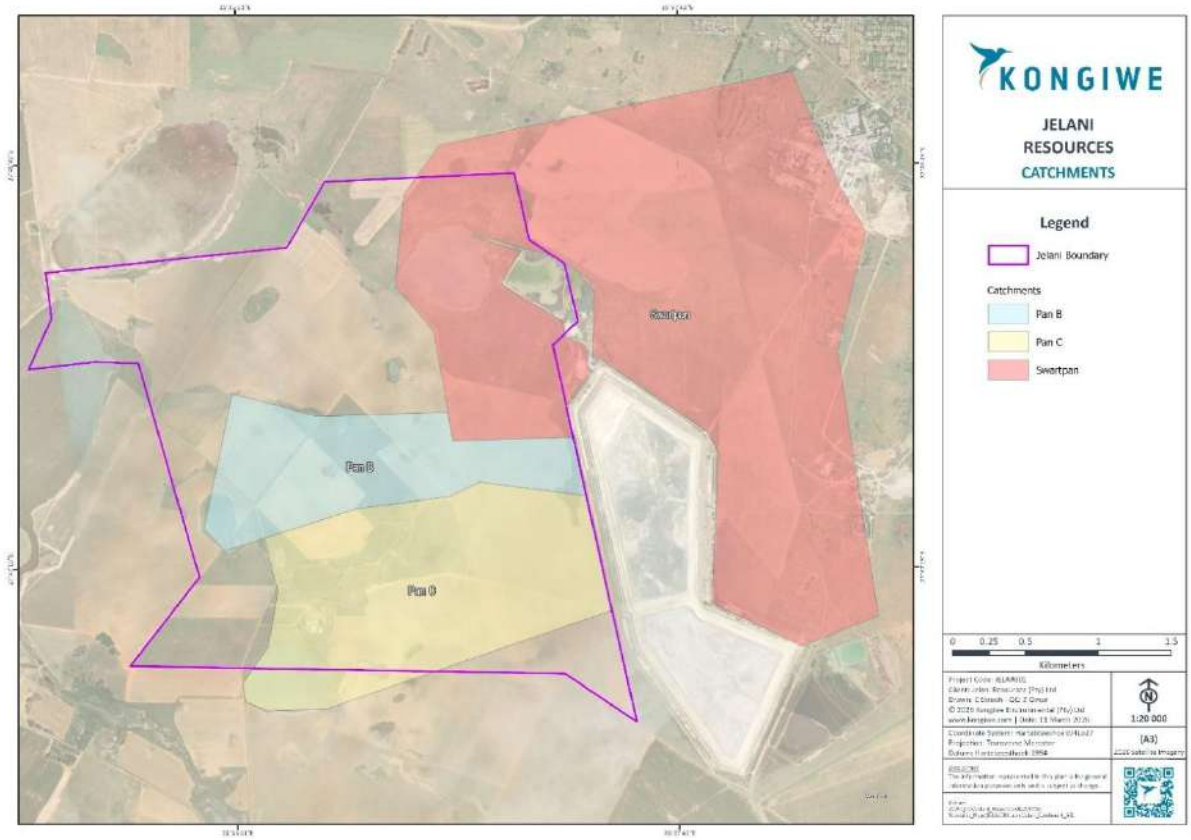


Figure 7-30: Catchment areas affecting the Jelani Project

The area drains in a westerly direction where the Target 1 and 2 TSFs act as a barrier and deflects the runoff in a northerly direction, concentrating the flow in the North-west Return Water Dam area.

7.5.3.2 Catchment Areas

7.5.3.2.1 Swartpan Catchment Area

An open bypass channel has been constructed around the North-west (Old) Return Water Dam (RWD), the Blue RWD and the Emergency Overflow Ponds, ultimately discharging into Swartpan (See Figure 7-31). The purpose of the channel is assumed to be to bypass the “clean” stormwater runoff around the “dirty” mine infrastructure. This open channel is currently completely overgrown (See Figure 7-32).

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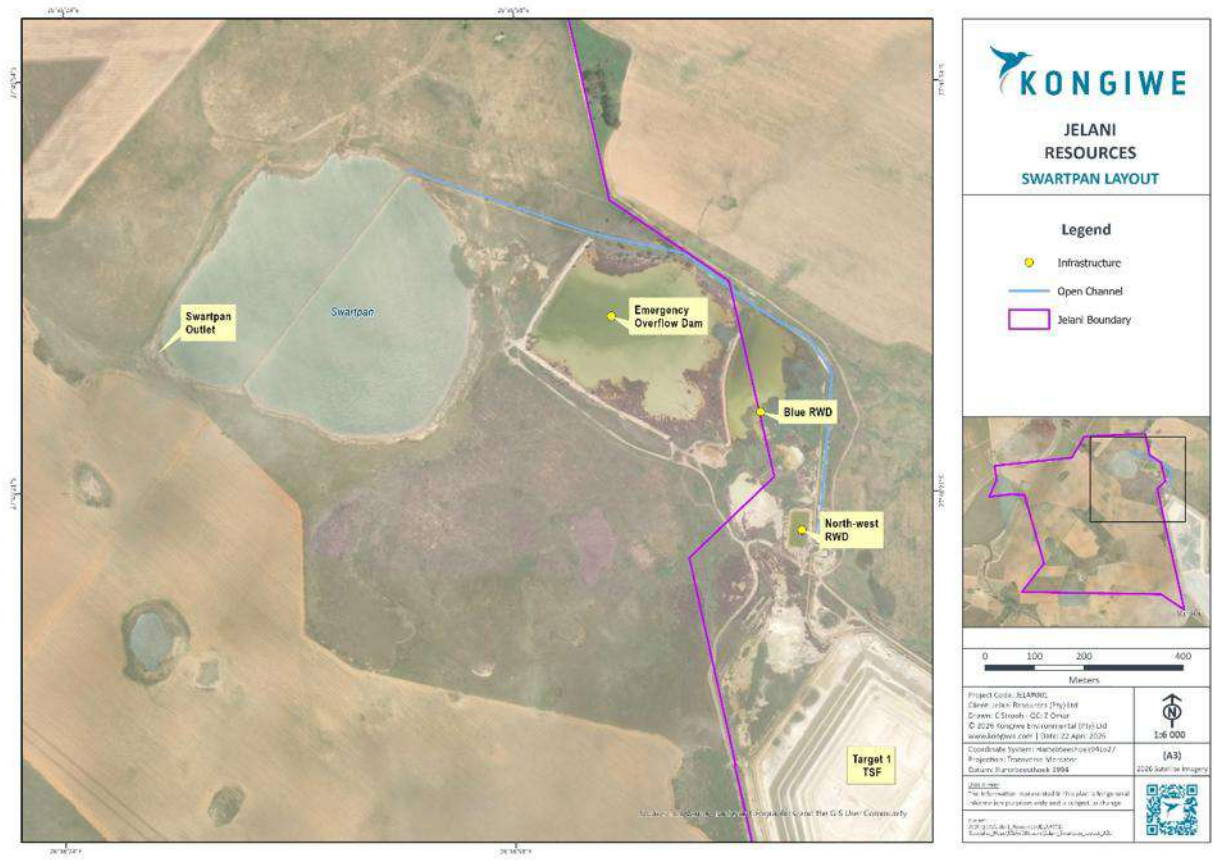


Figure 7-31: Swartpan area layout

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Figure 7-32: Open Trench to Swartpan, completely overgrown

There is an area between the start of the open bypass channel and the end of the earth berm around Target 1 TSF where the stormwater runoff collects in the solution trenches and ends up in the North-west RWD, Blue RWD and the Emergency Overflow Dam (See Figure 7-33).

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Figure 7-33: Area where stormwater is collected in the solution trenches

Swartpan appears to have a wall constructed across it to separate clean and dirty water, however at the site inspection in January 2026 this wall was not visible as the pan was full. Swartpan has no formal outlet structure and drains from its south-west corner down a natural channel which ends up in Pan A. The natural channel is crossed by a farm road however there are no formal stormwater structures under this road to allow any flow to pass. The Losdoringspruit also flows into Pan A, which in turn overflows into the Gelukspan (See Figure 1-6).

7.5.3.2.2 Pan B Catchment Area

There is no formal outlet structure from Pan B (See Figure 1-6). When full, the Pan will overflow into the surrounding lands, and ultimately into the Losdoringspruit.

7.5.3.2.3 Pan C Catchment Area

There is a formal open trench outlet channel from Pan C, fed by a 600 mm dia pipe from Pan C under the Farm Road (See Figure 1-6). The outlet channel takes the overflow down to the Losdoringspruit.

7.5.3.2.4 Discussion of Existing Scenario

The biggest problem for the Swartpan Catchment Area is that the clean and dirty water are not adequately separated, due to the open bypass channel around the dirty water facilities not extending far enough and clean water ending up in the “dirty” solution trenches.

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At the site visit on 28/29 January 2026, it was noted that the North-west RWD, the Blue RWD and the Emergency Overflow Dam were all full, and there was evidence that the area had been subjected to flooding. At a site visit on 2-4 December 2025 with DWS officials for the Harmony Integrated IWULA Project, the area could not be accessed as it was under water.

The wall across Swartpan seems to indicate that at some stage the eastern section of Swartpan was used to contain “dirty” water. The open bypass channel around the infrastructure terminates in the “clean” water area of Swartpan, indicating that at some stage there may have been an attempt to separate the clean and dirty water.

The Emergency Overflow Dam was full, and this indicates that it is not operating as an emergency dam but as part of the normal operating infrastructure of the area.

The open bypass channel around the mine infrastructure has sufficient capacity to handle the 1 in 50 year storm if adequately maintained. However, under its current unmaintained state (completely overgrown), the channel is likely to overflow under the 1 in 50 year event.

7.5.3.3 Proposed Swartpan Solution

The following is proposed:

- Extend the open bypass channel /earth berm at the North-west RWD problem area to collect all clean water and bypass the mine infrastructure area to deposit the clean water directly into Swartpan.
- This results in the North-west RWD, Blue RWD and Emergency Overflow Dam handling “dirty” water only.
- Operate the North-west RWD, Blue RWD and Emergency Overflow Dam complex such that there is sufficient capacity to handle the 1 in 50 year “dirty” water flow without overflowing.
- Construct containment berms around potential pollution-generating areas to prevent contamination of nearby water resources throughout the construction and operational phases of the Life of Mine.

7.5.3.4 Operational Capacity, Responsibility and Implementation

To finalise the proposed solution and demonstrate compliance with GN R704, the following information must be provided:

The North-west Return Water Dam, Blue Return Water Dam and Emergency Overflow Dam are operated by Target Operations. Target Operations should therefore be identified as the current operator responsible for routine inspection, maintenance, water-level management, storm-event preparedness, drawdown procedures, pollution prevention and emergency response, subject to confirmation of legal ownership and the applicable authorisations.

The North-west Return Water Dam and Emergency Overflow Dam are understood to have been constructed before 1998, while the Blue Return Water Dam is understood to be a lined dam constructed after 1998. The respective construction and commissioning dates, design capacities, as-built information and authorisation status must be confirmed from Target Operations’s records, historical aerial imagery, dam-safety records and applicable water-use authorisations.

The historical status of the North-west Return Water Dam and Emergency Overflow Dam does not exempt current operation, maintenance, rehabilitation or modification from applicable legal requirements. Similarly, the

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post-1998 Blue Return Water Dam should be assessed against the environmental, water-use and dam-safety requirements applicable at the time of its construction, as well as current requirements governing its operation and any proposed modification.

The report must further confirm whether the existing dams and proposed works are authorised under Target Operations's existing authorisations, the WU43378 application, the Harmony Integrated IWULA, the Jelani Project or a separate authorisation. It must also identify the party responsible for implementing and funding the proposed works.

7.5.4 Conceptual Stormwater Management Plan

The following design philosophy was adopted to guide the development of the Stormwater Management Plan (SWMP), and is based on GN R704 regulations and the DWS BPG G1: Storm Water Management:

- Confine or divert any unpolluted water to a clean water system, away from a dirty area.
- Runoff from dirty areas must be captured and contained and should as far as possible be recycled and reused.
- Clean and dirty water systems must be designed and constructed to prevent cross contamination.
- Clean and dirty water systems must convey or contain runoff from the 1:50 year storm event.
- Appropriate maintenance and management of stormwater related infrastructure should always be ensured.

The typical proposed design for clean and dirty water channels is shown in Figure 7-34:

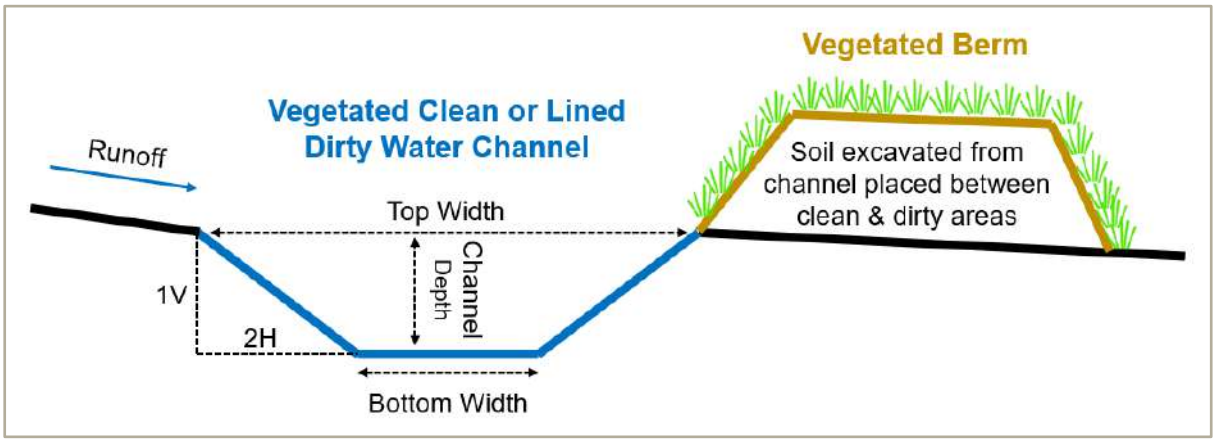


Figure 7-34: Typical proposed design for clean and dirty water channels

7.5.5 Floodlines

The floodlines for the natural watercourse downstream of Swartpan are shown in Figure 7-35. Contours were generated from Google Earth, and the 1:50-year and 1:100-year events were taken to be the attenuated outflows from Swartpan. Manning's formula was used to calculate flow widths. The floodlines presented are indicative only and should not be regarded as formal or final floodline delineations. They are intended to provide a preliminary indication of potential inundation areas and should be verified through a detailed topographical survey and hydraulic assessment.

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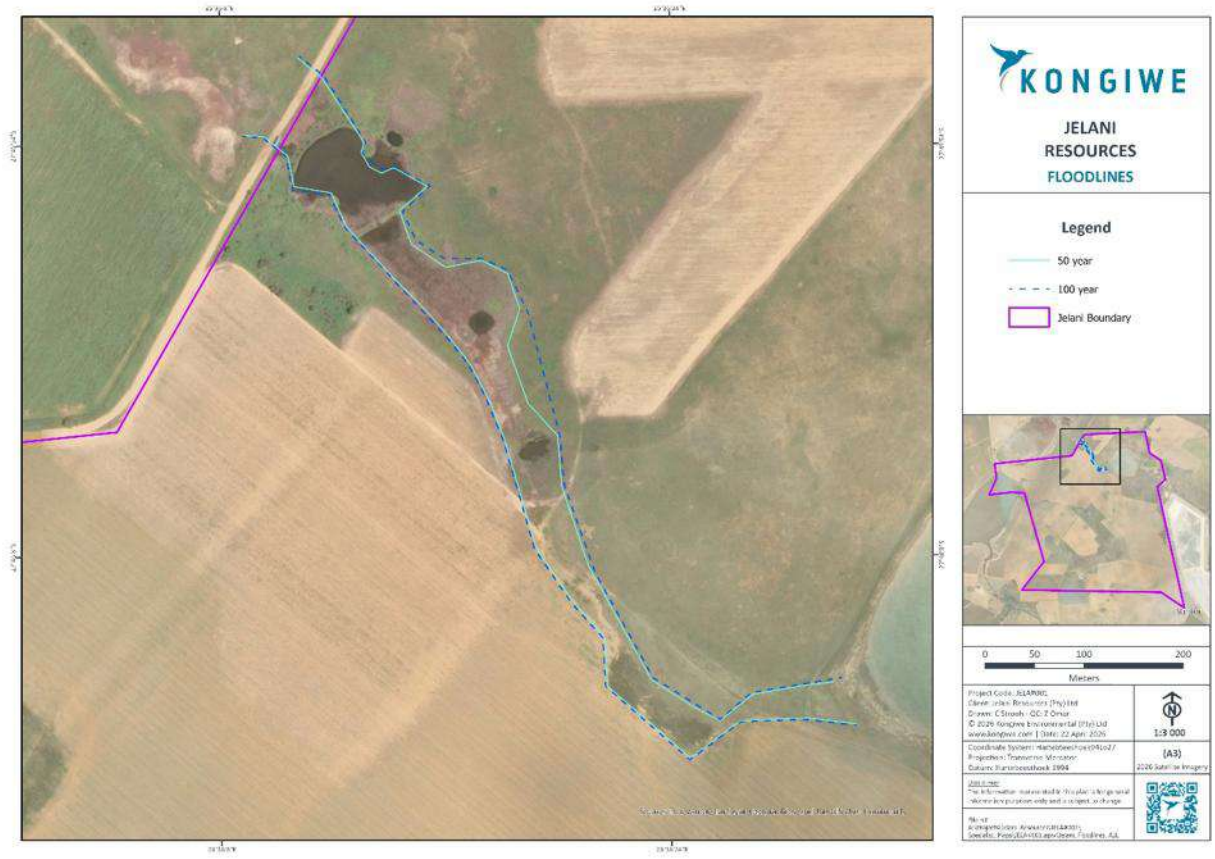


Figure 7-35: 1:50 year (solid line) and 1:100 year (dashed line) floodlines downstream of Swartpan

7.5.6 Discussion of Proposed Scenario

The proposed solution separates the “clean” and “dirty” water impacting the Jelani Project Area. The “clean” water from the catchment area is collected by means of earth berms and the open bypass channel and transferred to Swartpan, which is now a “clean” water pan. Swartpan has an attenuation effect even if it is full, and the resultant outflow hydrographs are routed down the natural watercourse downstream of Swartpan to Pan A. Floodlines are given for this natural watercourse.

The open bypass channel to Swartpan will have to be cleaned out and protected by unreinforced concrete lining to prevent scouring and erosion.

The “dirty” water in now confined to the North-west RWD, Blue RWD and Emergency Overflow Dam, which must be operated at a level to allow sufficient spare capacity to accommodate the 1:50-year event runoff. Containment berms must also be constructed around potential pollution-generating areas to prevent contamination of nearby water resources throughout the construction and operational phases of the Life of Mine.

Under the proposed stormwater-management system, clean runoff will be diverted through the proposed bypass channel towards Swartpan, while dirty or potentially contaminated runoff will be retained within the return-water-dam complex. This will alter the existing runoff routes and may change the volume, timing and quality of water reaching the relevant wetlands and pans. The final drainage layout should therefore clearly show the existing and proposed flow paths, catchment boundaries, diversion structures, discharge points and receiving wetlands or pans.

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The proposed diversion is expected to reduce or delay runoff reaching wetlands or pans that currently receive flow from the dirty-water areas. Conversely, Swartpan may receive a greater proportion of clean runoff through the proposed bypass channel. The change in inflow volume and timing may affect the frequency, duration and extent of inundation, particularly during larger rainfall events. Reduced inflows could shorten the hydroperiod or reduce the frequency of wetting in downstream wetland areas, while concentrated discharges could increase flow velocities, erosion or localised sediment deposition at the discharge point.

The likely effects on the relevant wetland and pan systems should be assessed as shown in Table 13:

Table 7-12: Likely Effects on relevant wetland and pan systems

Wetland or pan	Existing runoff route	Proposed runoff route	Potential hydrological effect
Swartpan	Receives runoff from its natural contributing catchment, together with any existing drainage that reaches the pan.	Receives clean runoff through the proposed bypass channel.	Potential increase in inflow volume during storm events, with possible changes to inundation frequency, peak water levels, erosion and sediment deposition at the discharge point.
Pan A	Receives runoff from its existing upstream catchment and natural overland flow paths.	Runoff route to be confirmed based on the final diversion and channel layout.	Potential reduction, delay or concentration of inflows, which may alter the pan's hydroperiod and seasonal water levels.
Pan B	Receives runoff from its existing upstream catchment and natural drainage features.	Runoff route to be confirmed based on the final diversion and channel layout.	Potential changes in the timing and volume of inflow, with possible effects on the duration and extent of inundation.
Pan C	Receives runoff from its existing upstream catchment and natural drainage features.	Runoff route to be confirmed based on the final diversion and channel layout.	Potential reduction or redistribution of inflows, together with possible localised erosion or sedimentation if flows are concentrated.
Other identified wetland units	Receive runoff from local catchments through natural drainage lines or diffuse overland flow.	Existing and proposed connections must be shown on the final drainage plan.	Effects may include altered wetting frequency, hydroperiod, flow concentration, sediment deposition or reduced diffuse runoff.

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The proposed system should be designed to maintain appropriate clean-water inputs to wetlands and pans wherever these inputs are required to sustain their hydrological functioning. The discharge from the bypass channel should be located and designed to prevent erosion, excessive flow concentration and sediment deposition. Energy dissipation, erosion protection and sediment-control measures should be incorporated at the discharge point where required.

A final assessment should quantify the existing and proposed runoff volumes and peak flows reaching each relevant wetland or pan for representative rainfall events, including the 1:2-year, 1:5-year, 1:10-year, 1:50-year and 1:100-year events where relevant. The assessment should also compare the timing of inflows, the duration of inundation and the expected change in peak water levels. The wetland-hydrology assessment must be based on the final surveyed drainage layout and confirmed catchment delineation. Where this information is not available, the potential effects should be identified as [TO CONFIRM] rather than presented as confirmed impacts.

7.5.7 Management Plans

The following monitoring plans are recommended:

- It is recommended that stormwater infrastructure be inspected once a month during the dry season and wet season. They should also be observed right away following any extreme rainfall events. Any identified damage, or maintenance issues should be addressed promptly to ensure the continued functionality of the stormwater infrastructure. The maintenance manager or onsite Environmental Officer should oversee monitoring. The following should be included in inspections that are documented:
    - The date of the examination.
    - Rainfall quantity received before inspection.
    - Photos of any identified damage or maintenance issue observed.
    - The steps taken to resolve problems.
    - Time required to do so.
    - Photos taken after action was performed.
- A surface water quality monitoring programme plays a critical role in managing potential impacts by identifying water quality deterioration early and guiding the implementation of appropriate mitigation measures. Sampling must be conducted in line with the DWS Best Practice Guideline G3: Water Monitoring Systems. All samples should be stored at approximately 4°C, shielded from direct sunlight, and delivered to an accredited laboratory within 24 hours for analysis. Monitoring results must be evaluated against previous sampling data to identify any significant deviations or emerging trends. Should trend analysis reveal a decline in water quality from the established baseline, an immediate investigation is required to determine whether the operation is the source. If found responsible, corrective actions must be promptly implemented to prevent further contamination. Monitoring reports should be compiled monthly, or as otherwise directed by the DWS, and should include trend analyses. It is also recommended that upstream and downstream monitoring points be compared to assess the potential influence of site activities on surface water quality.

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7.6 Biodiversity

Refer to Specialist Study: Appendix D3 – Terrestrial Biodiversity Assessment

7.6.1 Vegetation Type and Fine-Scale Habitats

As per South African National Biodiversity Institute (SANBI) (2024) database, the study area is characterised by two (2) vegetation type, namely the Vaal Vet Sandy Grassland and Western Free State Clay Grassland. According to the 2022 Red List of Ecosystems (RLE) database (SANBI, 2022a; 2022b), most of the study area is modified by cultivation with only small portions Vaal Vet Sandy Grassland (mostly eastern section) and Western Free State Clay Grassland (mostly western section) considered to be likely present within the study area.

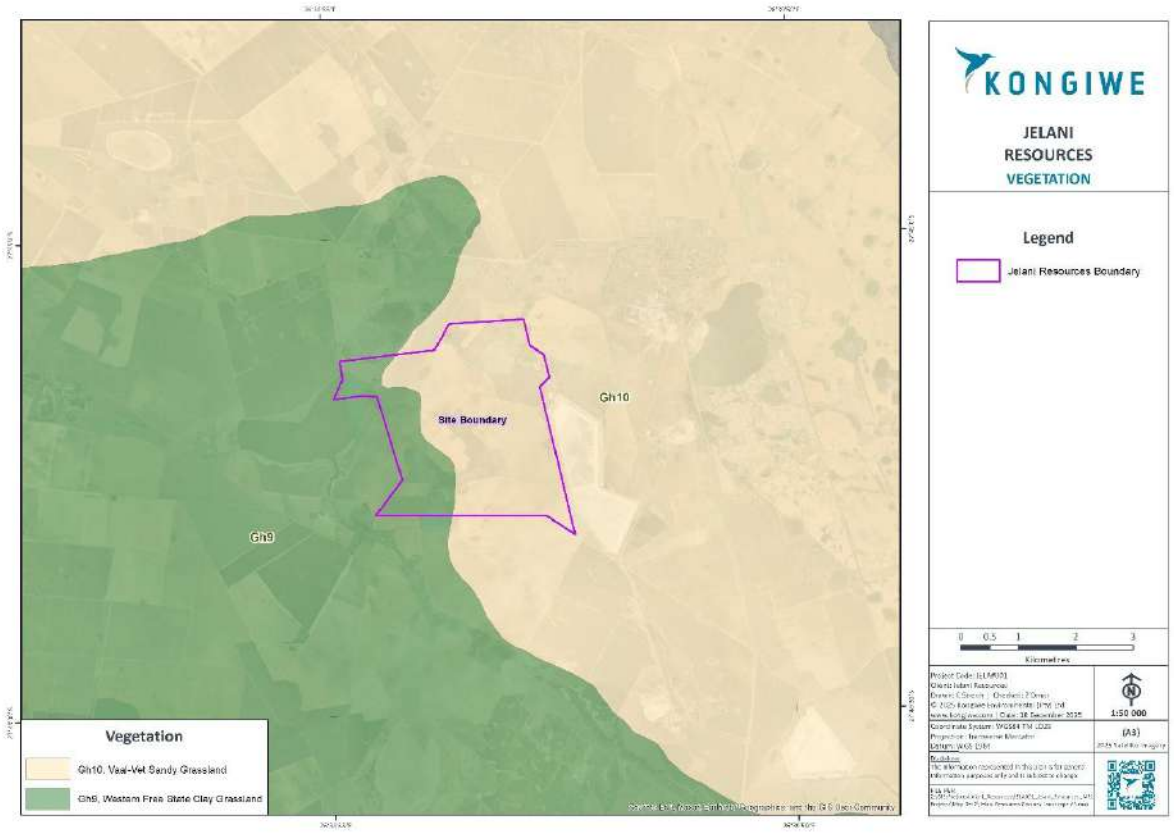


Figure 7-36: Vegetation Map

At a broad landscape scale, the above-mentioned vegetation types were used as the reference state against which floral communities were compared to ascertain habitat integrity and deviance from, and/or similarity to, the expected state.

The verified site conditions differed from the background data, with less representative habitat present than what was expected from the RLE database. The study area consisted of large, cultivated areas (i.e., transformed habitat), grassland communities and various freshwater habitats. Therefore, floral communities identified during

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the terrestrial biodiversity specialist site assessment are described below under three (3) broad[43] habitat units (Figure 7-37). The three broad habitat units were delineated based on vegetation structure and the dominant plant groups observed within the vegetation communities, as well as on habitat integrity and the ecological processes the habitats provide or support. The delineated habitat units thus included:

- **Grassland habitat**: Consisting of the Vaal Vet Sandy Grasslands and Modified Grasslands communities.
- **Transformed Habitat**: Including the cultivated areas and built-up areas (including farmhouses, old mining infrastructure and roads).
- **Freshwater Ecosystems**, which comprised of two subunits, namely:
    - Artificial impoundments;
    - Seep wetlands and Depression Wetlands.

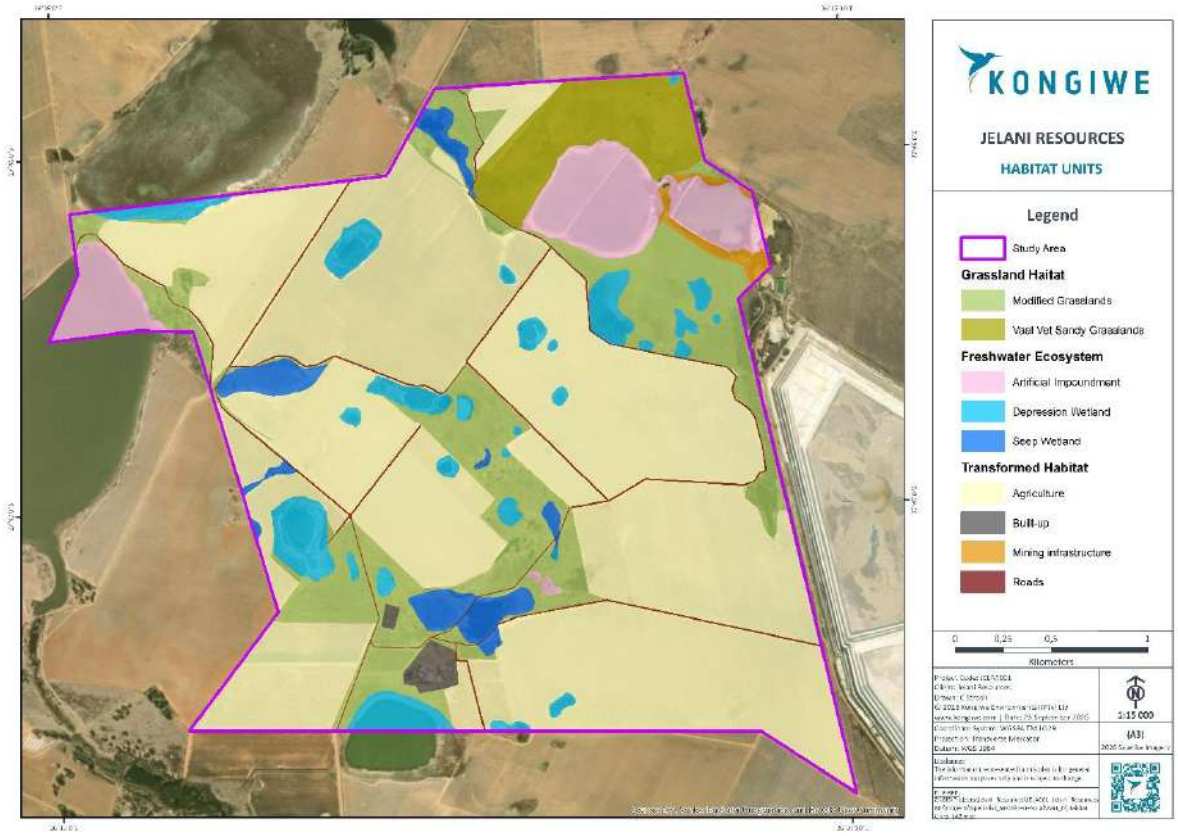


Figure 7-37: Conceptual illustration of the habitat units within the study area.

The deviance of each vegetation type from its reference state (where applicable), including the ecological condition of each of the habitat units, is further described and discussed in the dashboards below under Table 7-14 to Table 7-16 The extent of the habitat units observed within the study area (and the breakdown of each where applicable) is shown in Table 7-13 below.

[43] Broad habitat categories have been delineated and provide an indication of the main vegetation types associated with the mining right area.

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Table 7-13: The extent of identified habitat units associated with the study area.

Habitat Unit	Extent (Ha)
Transformed Habitat	**616**
Agriculture	596
Build-up areas	6
Mining infrastructures	6
Roads	7
Freshwater Ecosystem	**144,91**
Artificial impoundment	63
Depression wetland	56
Seep wetland	26
Grasslands	**198,46**
Modified grasslands	152
Vaal Vet grasslands	46

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Table 7-14: Grassland Habitat.

Habitat & Species Overview		
Vaal Vet Sandy Grassland		
		
A relatively small portion of the total study area (i.e., only 46 ha) consists of a primary grassland[44] community (according to the SANBI definition). Based on desktop review and satellite imagery, the area had not undergone any significant changes over at least the past two decades (SANBI, 2013). The species composition within the habitat supports the notion of primary vegetation; that is, the predominance of *Themeda triandra* (as seen in the habitat photographs above) and the high prevalence of many more species associated with the reference vegetation type (i.e., Vaal Vet Sandy Grassland specifically). The grassland community is similar in species composition and vegetation structure than the representative of the EN Vaal Vet Sandy Grassland. Despite its location to sources of disturbance and edge effect, the Vaal Vet Sandy Grassland had a low abundance and diversity of AIPs (e.g., *Bidens Pilosa, Cirsium vulgare, Richardia brasiliensis and Verbena bonariensis*). The vegetation structure of the Vaal Vet Sandy Grassland habitat is described as a tall, closed grassland. Considering the above the Vaal Vet Sandy Grassland is considered to be in an overall good[45] ecological condition. The overall plant species diversity in this habitat depicts a representative subset of the reference state; the species composition of the Vaal Vet Sandy Grassland habitat unit contains various floral species representative of the reference vegetation type. Examples of species observed in the Vaal Vet Sandy Grassland include:		

[44] Primary grasslands are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristic.
[45] Areas that are natural or near-natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem.

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Habitat & Species Overview

- Forb component: *Arctotis venusta, Barleria macrostegia, Bulbine narcissifolia, Chlorophytum cooperi, Commelina africana, Dipcadi viride, Drimia elata, Felicia muricata, Geigeria aspera var. aspera, Helichrysum dregeanum, Ipomoea ommanneyi, Hibiscus pusillus, Ledebouria marginata, Ledebouria luteola, Monsonia burkeana, Selago densiflora and Wahlenbergia undulata;*
- Graminoid component: *Cymbopogon pospischilii, Digitaria eriantha, Eragrostis plana, Eragrostis superba, Enneapogon scoparius, Hyparrhenia hirta, Melinis repens, Themeda triandra and Triraphis andropogonoides; and*
- Woody component: *Gomphocarpus fruticosus.*

Modified Grassland





The Modified Grassland habitat has a higher abundance of woody species and is generally more associated with the mapped Western Free State Clay Grassland reference vegetation type (i.e., the western portions of the study area as per the desktop databases). The impacts from the surrounding agriculture activities have had a much more significant impact on the habitat integrity of the Modified Grassland as compared to the Vaal Vet Sandy Grassland (as described above) and as illustrated in the photographs above, with various woody AIPs present (including Datura stramonium, Lantana camara and Melia azedarach). Based on the current habitat condition and influence from historic and current land uses the Modified Grasslands is considered to be secondary grasslands (as per SANBI definition)[46]. The vegetation structure of the Modified Grassland can be described as short, closed grassland.

[46] Secondary grasslands are those that have undergone extensive modification and a fundamental shift from their original state (e.g., to cultivated areas) but have then been allowed to return to a 'grassland' state (e.g., when old, cultivated lands are re-colonised by a few grass species). Although secondary grasslands may superficially look like primary grasslands, they differ markedly with respect to species composition, vegetation structure, ecological functioning and the ecosystem services they deliver.

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Habitat & Species Overview

While the Modified Grassland shares some affinity (especially vegetation structure and location- i.e., scattered between various pans) with the Western Free State Clay Grassland vegetation type, the dissimilarities in species composition have been modified from the reference vegetation type, especially with the apparent incidence of AIP species. The vegetation structure is similar to the Western Free State Clay Grassland however the species composition has diverged significantly (due to AIP proliferation and historic land use). Given the modified of the Modified Grassland this habitat is considered to be in an overall fair[47] ecological condition.

The overall plant species diversity in this habitat falls short of what is anticipated for its reference state; the species composition of the Modified Grassland habitat unit contains some floral species representative of the Western Free State Clay Grassland vegetation type, but these species are also common species occurring throughout the grassland biome in many vegetation types and some are also an indication of disturbed veld, with the forbs and grasses present also commonly found in other highveld grassland types. These species have a broad distribution and can thrive in various habitat types. Examples of species observed in the Modified Grassland include:

- Forb component: *Chlorophytum cooperi, Commelina africana, Conyza bonariensis, Felicia muricata, Gnaphalium declinatum, Helichrysum rugulosum, Kohautia amatymbica, Ledebouria luteola, Nidorella microcephala, Oxalis depressa, Pentzia incana, Salvia stenophylla;*
- Graminoid component: *Cynodon dactylon, Digitaria eriantha, Enneapogon scoparius, Eragrostis lehmanniana, Eragrostis plana, Eragrostis superba, Hyparrhenia hirta, Megathyrsus maximus, Melinis repens, Panicum coloratum and Setaria sphacelata; and*
- Woody component: *Asparagus laricinus, Gomphocarpus fruticosus, Searsia pyroides and Vachellia karoo.*

Collage of Grassland Species



Example species, from left to right, observed within the Grassland Habitat: Opuntia ficus-indica (an AIP species), Eragrostis superba, Chlorophytum cooperi, Dipcadi

[47] Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised.

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Habitat & Species Overview		
viride, Bulbine narcissifolia, and Verbena bonariensis (an AIP species).		
Species of Conversation Concern		
Protected Species	Vaal Vet Sandy Grassland Protected species under the NEMBA TOPS Regulations (GN R152 of 2007): • None were recorded and none were anticipated to be present. Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022): • None were recorded and none were anticipated to be present. Specially Protected and Protected Species (FSNCO -protected): • Aloe sp. (Status = Species-specific. POC = Medium); • Boophone sp. (Status = Species-specific. POC = Medium); • Erythrina zeyheri (Status = LC. POC = High); • Haemanthus sp. (Status = Species-specific. POC = High); • Gladiolus sp. (Status = Species-specific. POC = High) • Nerine sp. (Status = Species-specific. POC = Medium); • Orchidaceae sp. (Status = Species-specific. POC = High); • Watsonia sp. (Status = Species-specific. POC = Medium); and • Helichrysum rugulosum and Helichrysum dregeanum	Modified Grassland Protected species under the NEMBA TOPS Regulations (GN R152 of 2007): • None were recorded and none were anticipated to be present. Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022): • None were recorded and none were anticipated to be present. Specially Protected and Protected Species (FSNCO -protected): • Boophone sp. (Status = Species-specific. POC = Medium); • Gladiolus sp. (Status = Species-specific. POC = High); • Orchidaceae sp. (Status = Species-specific. POC = Medium); and • Helichrysum rugulosum (Status = LC. POC = Confirmed).

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Habitat & Species Overview		
	(Status= LC. POC = Confirmed).	
Threatened species	None anticipated.	

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Table 7-15: Transformed Habitat

Habitat & Species Overview		
		
The Transformed Habitat includes areas where all vegetation has been either removed to erect buildings and roads or where habitat has been significantly modified (altered composition and function). Most of the study area, 616 ha, is currently utilised for agriculture where the native vegetation has been completely removed. Although some of these areas, especially along roadsides and farm steads, are still vegetated, they do not accurately represent the reference vegetation type in terms of vegetation structure or species composition. Ultimately, the areas where grasslands have been significantly modified now is represented by various weeds and common species prone to disturbance. The ecological condition of the Transformed Habitat is regarded as poor, encompassing areas that are severely or irreversibly modified, where both ecological function and structure have been compromised in composition. The vegetation within the Transformed Habitat is no longer considered to be indigenous (as per NEMA definition). The condition of the Transformed Habitat is considered to be in a poor ecological condition[48]. From a species perspective, the Transformed Habitat is of low diversity and associated with species that are not representative of the reference state. Examples of species observed in the Transformed Habitat include: • Forb component: *Conyza bonariensis, Plantago lanceolata and Scabiosa columbaria;* • Graminoid component: *Cynodon dactylon, Hyparrhenia hirta, and Melinis repens;* • Succulent component: *None, and none anticipated for this habitat; and*		

[48] Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem.

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Habitat & Species Overview	
• Woody component: *Gomphocarpus fruticosus, Searsia lancea and Vachellia karroo.*	
Collage of Grassland Species	
     	
Example species, from left to right, observed within the Transformed Habitat: Tagetes minuta, Cirsium vulgare (an AIP species), Tamarix ramosissima (an AIP species), Argemone ochroleuca subsp. ochroleuca (an AIP species), Verbena bonariensis (an AIP species) and Xanthium strumarium (an AIP species).	
Species of Conversation Concern	
Protected Species	The Transformed Habitat are not important for populations of protected plant species. Although some FSNCO -listed species have the potential to be present, the incidence of these species in these grasslands would be low. Refer to the outcome of the SCC assessment for these habitat units below. Protected species under the NEMBA TOPS Regulations (GN R152 of 2007): • None were recorded and none were anticipated to be present. Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022): • None were recorded and none were anticipated to be present. Specially Protected and Protected Species (FSNCO -protected):

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Habitat & Species Overview	
	• Helichrysum sp. (Status = Species-specific. POC = High).
Threatened species	None anticipated.

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Table 7-16: Freshwater Ecosystems.

Habitat & Species Overview		
Seep and Depression Wetland		
		
Within the study area two HGM units, namely the seep wetlands and depression wetland were identified as true watercourses[49] in terms of the NWA (SAS 25 – 0190, 2026), Approximately, 81 ha of seep wetlands[50] and depression wetland[51] was identified within the study area (Ollis et al., 2013). The vegetation community associated with the seep wetlands and depression wetland were very similar is composition and structure and thus they are explained together. A dominant species associated with the peripheries (or boundary) of wetlands within the study area was Tamarix ramosissima (NEMBA category 1b), however the floral habitat was often dominated by graminoid species (both grasses and sedge species). The seep wetland was associated with a slightly higher diversity of forbs compared to the depression wetlands. Considering the wetland habitat (seep wetlands and depression wetland) current condition the overall ecological condition is fair. The vegetation structure of the wetland habitats can be described as tall, closed grasslands. From a species perspective, the seep wetlands and depression wetland has a relatively low diversity. Examples of species observed in the seep wetlands and depression		

[49] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:1) a river or spring, 2) a natural channel which water flows regularly or intermittently, 3) a wetland, dam, or lake into which, or from which, water flows, and 4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. Reference to a watercourse includes, where relevant, its bed and banks.
[50] A wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley, but they do not, typically, extend into a valley floor.
[51] A wetland with closed (or near-closed) elevation contours which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates, giving rise to vertical water fluctuations. Depressions may be linked to a river and have channelled in and out flow (exorheic) but may also form in the absence of a river where the water table (groundwater input) intercepts the land surface, with no in and outflow channel present (known as endorheic isolated depressions).

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Habitat & Species Overview

wetland include:

- Forb component: *Denekia capensis, Drimia elata, Lobelia erinus, Monsonia angustifolia and Senecio coronatus;*
- Graminoid component: *Afroscirpoides dioeca, Aristida congesta, Cyperus congestus, Cyperus laevigatus, Cyperus marginatus, Imperata cylindrica, Juncus rigidus, Kyllinga alba, Phragmites australis, Sporobolus africanus and Typha capensis;*
- Succulent component: *None, and none anticipated for this habitat given the increased moisture levels therein; and*
- Woody component: *Asparagus laricinus and Gomphocarus fruticosus.*

Artificial Impoundments





The anthropogenic impoundments are not defined as a true watercourse (based on the Freshwater report; SAS 25 – 0190, 2025). Alien Invasive plants (especially Tamarix ramosissima) have encroached along the Anthropogenic impoundments, and this encroachment is likely to intensify as a result of disturbances relating to the current land use (i.e., agriculture). The Anthropogenic impoundments are considered to be in a poor ecological condition based on the predominantly AIP vegetated and artificial nature (with little indigenous vegetation). The vegetation structure of the Anthropogenic impoundments can be described as either tall, closed grasslands and or short, closed woodlands.

From a species perspective, the Anthropogenic impoundments are of very low diversity. Examples of species observed in the Anthropogenic impoundments:

- Forb component: *Monsonia angustifolia and Senecio coronatus;*

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Habitat & Species Overview		
• Graminoid component: *Hyparrhenia hirta, Imperata cylindrica, Phragmites australis and Typha capensis;* • Succulent component: *None, and none anticipated for this habitat given the increased moisture levels therein; and* • Woody component: *Asparagus laricinus.*		
Collage of Freshwater Species		
		
Example species, from left to right, observed within this habitat unit: Tamarix ramosissima (an AIP species), Juncus rigidus, Cyperus congestus, Sporobolus africanus, Denekia capensis and Lobelia erinus.		
Species of Conversation Concern		
Protected Species	Watercourses (seep & depression wetlands) Protected species under the NEMBA TOPS Regulations (GN R152 of 2007): • None were recorded and none were anticipated to be present. Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):	Anthropogenic impoundments The Anthropogenic impoundments are not important for populations of protected plant species. Although some FSNCO listed species have the potential to be present, the incidence of these species in these habitats be low. Protected species under the NEMBA TOPS Regulations (GN R152 of 2007): • None were recorded and none were anticipated to be present.

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Habitat & Species Overview		
	• None were recorded and none were anticipated to be present. Specially Protected and Protected Species (FSNCO -protected): • Haemanthus sp. ((• Status = Species-specific. POC = High); • Gladiolus sp. (Status = Species-specific. POC = High); • Nerine sp. (Status = Species-specific. POC = Medium); • Orchidaceae sp. (Status = Species-specific. POC = Medium); • Kniphofia sp. (Status = Species-specific. POC = Medium); • Zantedeschia sp. (Status = Species-specific. POC = Medium); and • Helichrysum sp. (Status = Species-specific. POC = High).	Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022): • None were recorded and none were anticipated to be present. Specially Protected and Protected Species (FSNCO -protected): • Kniphofia sp. (Status = Species-specific. POC = Medium); • Zantedeschia sp. (Status = Species-specific. POC = Medium); and • Helichrysum sp. (Status = Species-specific. POC = High).
Threatened species	None anticipated.	

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7.6.1.1 Biodiversity Priority Area/ Conservation Significance

The conservation features and their relation to the habitat units identified for the study area are presented in the table below.

Table 7-17: Biodiversity Priority Areas / Conservation Significance.

Critical Biodiversity Area (CBA) 1	The northeastern corner of the study area was identified as CBA 1 (by the background database and which overlaps with Vaal Vet Sandy Grassland, Modified Grassland, Transformed Habitat and Seep wetland habitats), along with a central portion of the study area (associated with a large depression wetland). The presence of watercourses, such as seep wetlands and depression wetland in the areas identified as CBA 1 confirm the importance of this area with regards to ecological functioning and ecosystem services. Furthermore, the Freshwater Ecosystem does provide habitat for confirmed avifaunal SCC (STS 25 – 2059, 2026). Therefore, these watercourses confirm the presence of CBA 1 within the study area (especially the northeastern portion and central depression wetland). However, the area within the northeastern portion that correspond to transformed habitat (such as cultivated fields and old mining infrastructure) is not considered to be CBA 1. CBA 1 are sites that are irreplaceable or near irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the site. Such sites are therefore critical, and they need to be maintained to ensure that future targets are achieved and that such features persist (Collins, N.B. 2018b).
Ecological Support Area (ESA) 1 & 2	A patch in the southern portion of the study area and a section of the study area in the west are indicated as ESA 1 from a desktop perspective, while the majority of the study area is identified as ESA 2. The areas associated with ESA 1 corresponds to depression wetlands, modified grasslands, anthropogenic impoundments and transformed habitat. The definition of ESA 1 based on the Free State Biodiversity Plan (FSBP) Dataset (2019) states that an “ESA 1 are sites with minimal degradation (Collins, N.B. 2018b)”, therefore the transformed habitat (cultivated areas and anthropogenic impoundments) is not considered to be ESA 1 but the presence of modified grassland and watercourses are confirmed as ESA 1. The ESA 1 areas still provide an important role in supporting the ecological functioning of the area and support associated CBAs. ESA 2 are sites with degradation, i.e., they can be totally degraded but not totally transformed. Based on this classification in the FSBP the transformed habitat (i.e., cultivated areas and built-up areas) is not considered ESA 2 since they have been significantly modified. The remaining areas identified as ESA 2 by the database include modified grassland and watercourses (seep wetlands and depression wetlands) which is confirmed to represent ESA 2.
EN Vaal Vet Sandy Grassland	According to the 2022 RLE, the majority of the eastern portion of the study is located within the remaining extent of the Vaal Vet Sandy Grassland threatened ecosystem. Based on the filed verified conditions, only a portion of the study area

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	(in the northeastern section) was confirmed to be representative of the EN Vaal Vet Sandy Grassland (namely the habitat unit identified and termed "Vaal Vet Sandy Grasslands"). The remainder of the study area has been significantly impacted by anthropogenic activities (such as agriculture and/or transformation) either directly or indirectly (edge effects). The 46 ha in the northeastern section of the study area is considered to be primary grassland (i.e., little to no habitat modification) for at least two decades and the species composition and vegetation structure reflect that of the reference vegetation type. Therefore, the presence of threatened vegetation type is confirmed, only in the sections overlapping confirmed primary Grassland (i.e., ground-truthed and mapped Vaal Vet Sandy Grasslands".
Highest Biodiversity Importance	The areas associated with the Highest Biodiversity Importance as indicated by Mining and Biodiversity Guidelines (2012) correspond to habitat that are confirmed as EN Vaal Vet Sandy Grassland, CBA 1 and ESA 2. Therefore, the Highest Biodiversity Importance is confirmed.

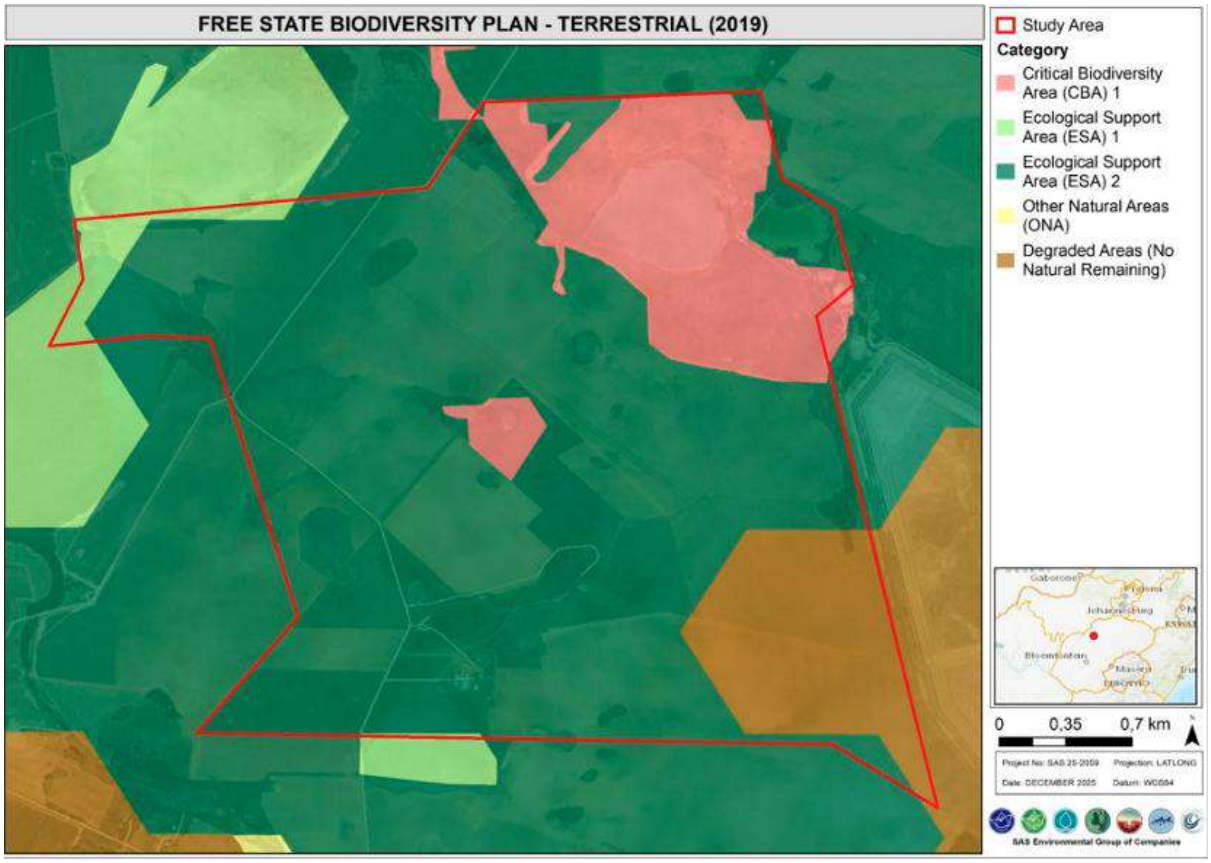


Figure 7-38: The important biodiversity areas (e.g., CBAs) in relation to the study area.

7.6.1.2 Alien and Invasive Plant (AIP) Species

The study area is characterised by a moderate to high diversity of AIPs; the Modified Grassland and Transformed Habitat are associated with the highest abundance of AIPs specifically.

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In total, 21 AIPs were recorded during the 2025 site assessment, of which 8 species are not currently listed. Species like Bidens pilosa, Tagetes minuta, and Verbena aristigera are not listed on the NEMBA list of invasive species, but these species tend to become problematic and proliferate in areas where there are increased disturbances. There is a risk that these problem plants may negatively impact indigenous species if not controlled. The remaining 14 species are NEMBA listed species with 12 Category 1b and one Category 2 NEMBA species.

Refer to Table 7-18 below for more information on the AIPs recorded within the various habitat units.

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Table 7-18: Alien and invasive alien species recorded in the study area.

Scientific name	Common Name	Origin	NEMBA Status	Grassland Habitat	Freshwater Ecosystems	Transformed Habitat
Agave americana	American Century Plant	Arid Chihuahua desert and the southwest United States	Not Listed	X	X	
Argemone mexicana	Yellow-Flowered Poppy	Mexico	1b	X	X	X
Argemone subsp. ochroleuca	Mexican Poppy	Mexico	1b	X	X	X
Bidens pilosa	Blackjack	Cosmopolitan weed native to South and Central America	Not Listed	X		X
Campuloclinium macrocephalum	Pompom Weed	Native to South America (Argentina and Brazil), Central America and Mexico	1b	X		
Cirsium vulgare	Spear Thistle, Scotch Thistle	Europe, western Asia, and northern Africa	1b	X	X	X
Conyza bonariensis	Flax-Leaved Horseweed	Central America or South America	Not Listed	X	X	X
Datura stramonium	Thorn Apple	Central America	1b	X		X
Lantana camara	Common Lantana	Central and South America	1b	X		
Melia azedarach	Chinaberry	Native to China, Japan, the Indian sub-continent	1b	X	X	
Opuntia ficus-indica	Prickly Pear	Mexico	1b	X		
Pinus pinaser	Cluster Pine	Mexico	2	X		
Phoenix canariensis	Date Palm	Canary Islands	Not Listed	X		
Richardia brasiliensis	Tropical Mexican Clover	South America	Not Listed	X		
Tagetes minuta	Wild Marigold	South and North America	Not Listed		X	X
Tamarix ramosissima	Pink Tamarisk	Western Europe and the Mediterranean to	1b		X	

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Scientific name	Common Name	Origin	NEMBA Status	Grassland Habitat	Freshwater Ecosystems	Transformed Habitat
		North Africa, Northeastern China, India and Japan				
Taraxacum officinale	Dandelion	Eurasia	Not Listed	X		X
Tecoma stans	Yellow Bells	American southwest, from Texas to Arizona, and regions of Chihuahua and Sonora, Mexico	1b	X		
Verbena aristigera	South American Mock Vervain	South America	Not Listed	X		X
Verbena bonariensis	Purpletop Vervain	South America	1b	X	X	X
Xanthium strumarium	Large Cocklebur	North America	1b	X		

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7.6.1.3 Site Ecological Importance (SEI) and Areas of Concerns

This section aims to (1) present the sensitivity of the receptors identified within the study area (e.g., SCC, the vegetation/fauna community or habitat type present on the site), and (2) clearly define and map areas where avoidance mitigation is strongly recommended if significant, negative residual impacts are to be avoided (and to prevent potential fatal flaws).

All habitats within the study area were allocated an importance category, i.e., SEI category. SEI is a function of the biodiversity importance (BI) of the receptor and its resilience to impacts (receptor resilience [RR]). BI, in turn, is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

For an SEI of "Very High" and "High", avoidance mitigation is. Table 7-19 indicates the individual SEI scoring for each habitat unit/receptor. Figure 7-39 illustrates the SEI for the receptors identified in the study area.

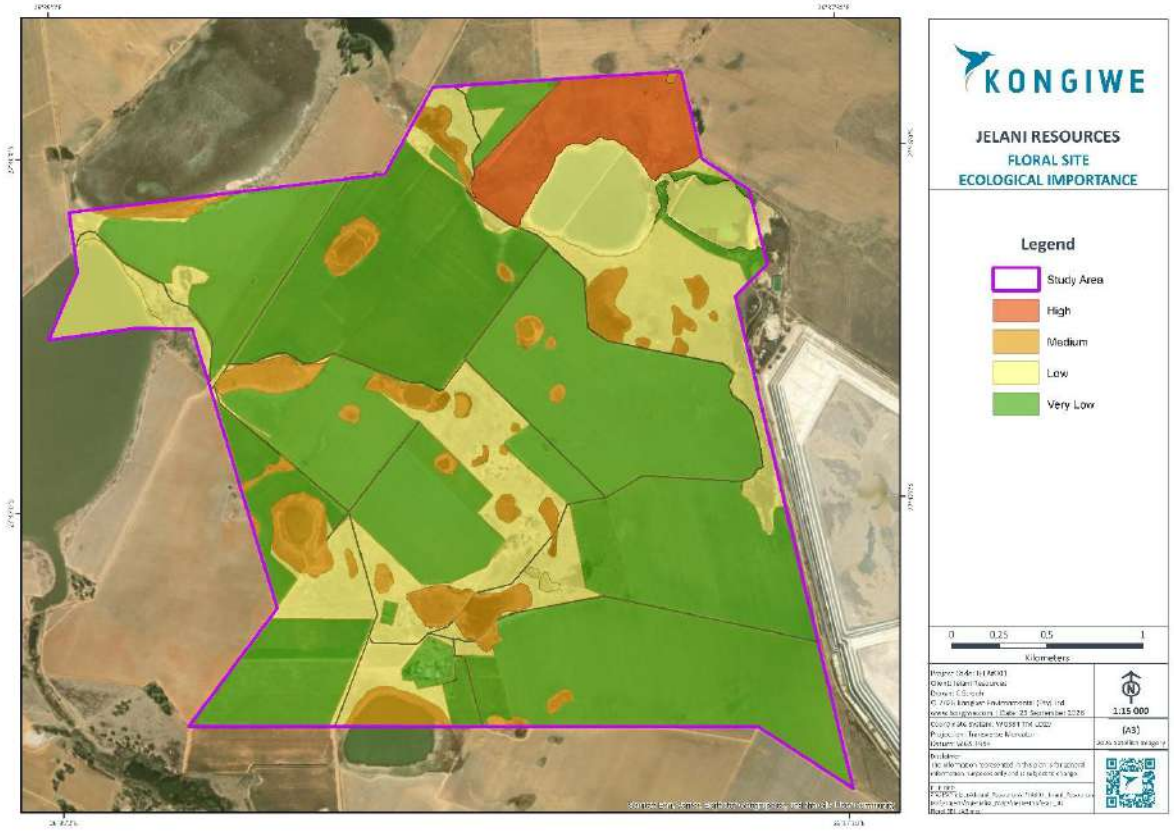


Figure 7-39: Conceptual illustration of the floral SEIs within the study area.

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Table 7-19: SEI importance for the different habitat units (i.e., receptors) in the study area. Acronyms in the table header row include BI = biodiversity importance, CI = conservation importance, FI = functional integrity, RR = receptor resilience, and SEI = Site Ecological Importance.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Vaal Vet Sandy Grassland	**Low** No confirmed or highly likely populations of threatened SCC.	**High** Large (> 20 ha but < 100 ha) intact area of EN ecosystem types. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High	Minimisation and restoration mitigation - development activities of medium impact acceptable followed by appropriate restoration activities.
Modified Grassland	**Low** No confirmed or highly likely populations of threatened SCC.	**Medium** Medium (> 5 ha but < 20 ha) semi-intact area. Only narrow corridors of good habitat connectivity. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Low	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

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Freshwater Ecosystems: Seep wetland and Depression wetland	**Low** No confirmed or highly likely populations of threatened SCC.	**Medium** Medium (> 5 ha but < 20 ha) semi-intact area. Only narrow corridors of good habitat connectivity between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Low	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	Medium	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Transformed Habitat and Anthropogenic impoundments	**Very Low** No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	**Very Low** Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.	Very Low	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

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7.6.2 Faunal Habitats

Following the site assessment, three (3) broad habitat units were distinguished within the study area. These habitat units are discussed briefly in terms of faunal utilisation and importance and are visually depicted in Figure 7-37.

7.6.2.1 Ecological Functioning within the Landscape

The study area is surrounded by large open areas. Although not specifically important suitable habitat conditions for faunal species, movement through these areas is still possible and enables species to access adjacent areas. It is however, noted that historical and current anthropogenic activities have led to the displacement of many faunal species which would have once occurred in this area. Mostly common faunal species adapted to live in habitats of increased disturbance are expected to occur within the study area. It is noted however that the study area and surrounding region will be utilised as part of several larger mammal and birds of prey species' home ranges and foraging grounds, though they are unlikely to centralise or permanently reside within or adjacent the study area.

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7.6.2.2 Mammals

Table 7-20: Field assessment results pertaining to mammal species within the study area.

Mammal species			
Photographs			
			
Geosciurus inauris, (South African Ground Squirrel, LC); b.) Cynictis penicillata, (Yellow Mongoose, LC); c.) Raphicerus campestris, (Steenbok, LC); d) Domestic livestock (i.e. cattle and sheep) in the region.			
Mammals SCC			
Species	**Habitat and Resources in the Sites**	**Status**	**POC**
Hydrictis maculicollis (Spotted-necked Otter)	This species primarily inhabits undisturbed and unpolluted freshwater systems, with a preference for shallow waters surrounded by dense reed beds, which provide an ideal environment for their preferred prey, such as crabs and fish. They require dense vegetation near water for breeding and shelter. On land, these otters seek refuge in underground burrows, beneath rocks, roots, or within thick vegetation. There have been no observations of the species on iNaturalist in the surrounding area. However, the Artificial impoundments in the Freshwater Habitat provides sufficient shallow water habitat with nearby dense vegetation, providing suitable habitat for this, resulting in a medium POC.	VU	Medum
Aonyx capensis (Cape Clawless Otter)	The Cape Clawless Otters inhabit a variety of freshwater habitats as well as estuaries and coastal areas. This species occupies areas with dense vegetation along the water's edge, as well as rocky or sandy riverbanks, which provide cover and places to rest. Cape Clawless Otters are opportunistic feeders and	NT	Medium

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Mammal species			
	will eat a wide variety of prey depending on the availability, ranging from fish and crustaceans to invertebrates and small reptiles. In some parts of their range, their habitat has been either drastically changed or lost, following bush clearing, deforestation, overgrazing, siltation, expansion of human settlements, draining of wetlands, water extraction or denudation of riparian vegetation. There have been no observations of the species on iNaturalist in the surrounding area. However, the Artificial impoundments in the Freshwater Habitat provides sufficient habitat with nearby dense vegetation, providing suitable habitat for this, resulting in a medium POC.		
Mammal Discussion			
There was a reduced abundance and diversity of observed mammal assemblage and activity in the study area. Smaller-bodied species that are adapted to disturbance, which were observed on site include: Geosciurus inauris, (South African Ground Squirrel, LC), Cynictis penicillata, (Yellow Mongoose, LC), and Raphicerus campestris, (Steenbok, LC). During the field assessments, no SCC or signs thereof were observed, however, two species have a medium POC due to potential suitable habitat. These species: Aonyx capensis (Cape Clawless Otter, NT) and Hydrictis maculicollis (Spotted-necked Otter, VU) are likely to utilise the site only occasionally as temporary foraging grounds or as a movement corridor. Freshwater habitats within the study area provide important resources for mammal species, particularly for drinking, foraging, and movement, although many species are equally likely to forage within adjacent grassland habitats. More disturbance-tolerant mammals may also utilise Transformed Habitats, such as common rodent species occurring around cultivated fields and farmsteads. The overall low abundance and diversity of mammals within the study area are largely attributable to long-term agricultural practices, which have reduced habitat connectivity, simplified vegetation structure, and increased levels of human disturbance and persecution. Consequently, mammal assemblages are dominated by widespread, adaptable species capable of utilising modified landscapes. Given this context, anticipated impacts on mammal species are expected to be low, as habitat loss will predominantly affect already transformed or sub-optimal habitats and is unlikely to result in significant reductions in mammal abundance or diversity.		

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Table 7-21: Field assessment results pertaining to avifaunal species within the study area.

Avifaunal species			
Photographs			
			
a) Mycteria ibis (Yellow-billed Stork, VU); b.) Phoenicopterus roseus (Greater Flamingo, NT); c.) Podiceps cristatus (Great Crested Grebe, VU); d.) Anhinga rufa (African Darter, NT).			
Avifaunal SCC			
Species	**Habitat and Resources in the Sites**	**Status**	**POC**
Hydroprogne caspia (Caspian Tern)	The Caspian Tern breeds at coastal sites as well as at larger inland water bodies. Its diet primarily consists of small fish. There have been no recordings of this species on iNaturalist and SABAP 2 in the surrounding area or pentads. The open water in the Freshwater Habitat was deemed suitable for this species and therefore given a medium POC.	VU	Medium
Anas undulata (Yellow-billed Duck)	This species is a common resident breeder found in southern and eastern Africa. While it is not migratory, it may wander during the dry season in search of suitable water sources. Outside of the breeding season, this duck often forms large flocks. It inhabits freshwater environments in relatively open areas and primarily feeds by dabbling for plant material, typically in the evening or at night. The duck nests on the ground in dense vegetation located near water. This species was found in the Freshwater Habitat.	NT	Confirmed
Anhinga rufa (African Darter)	This diving bird requires close proximity to freshwater and brackish environments of shallow lakes, swamps, lagoons as well as slow-moving rivers bordered by trees, reeds, or mangroves that are suitable for roosting. It stays away from fast flowing rivers, areas with thick floating plants, and is rare in open	NT	Confirmed

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Avifaunal species			
	sea. The African Darter is a solitary feeder and mainly feed on fish, although they also eat crustaceans, frogs, insects and occasionally molluscs, small terrapins and aquatic snakes. This species roosts nightly in groups in trees, bushes, or reedbeds. This species was found in the Freshwater Habitat.		
Mycteria ibis (Yellow-billed Stork)	Yellow-billed Storks forage in a variety of permanent and seasonal wetland habitats characterised by open, shallow water that is typically devoid of vegetation. Their diet consists of frogs, small fish, and other small aquatic prey. This species was found in the Freshwater Habitat and seen flying over the Vaal Vet Sandy Grassland.	VU	Confirmed
Spatula smithii (Cape Shoveler)	The species occurs virtually entirely within southern Africa, most abundant in the lowlands. Cape Shoveler prefers shallow, plankton-rich wetlands and dams, but it also occurs on tidal estuaries, saltpans, saline lagoons, and in the shallow bays and upper reaches of large dams. They feed primarily on insects, crustaceans, molluscs, tadpoles, and planktonic invertebrates. This species was found in the Freshwater Habitat.	NT	Confirmed
Podiceps cristatus (Great Crested Grebe)	Great Crested Grebe prefers large inland wetlands, lakes, and pans usually fringed with emergent vegetation. May occasionally be found on saltpans and rarely seen in the sea. Mostly restricted to deep permanent water. This species requires clean water so it can be considered as an indicator for water quality. The primary food source for the Great Crested Grebe consists mainly of sizable fish, complemented by aquatic insects, crustaceans like crayfish and shrimps, amphibians and tadpoles. This species was found in the Freshwater Habitat.	VU	Confirmed
Phoenicopterus roseus (Greater Flamingo)	This species is typically found in estuaries, salt pans, dams, and wetlands. Flamingos are filter feeders, primarily consuming aquatic plants and small aquatic animals, such as crustaceans, molluscs, and worms. This species was found in the Freshwater Habitat.	NT	Confirmed
Anas erythrorhyncha (Red-billed Teal)	The Red-billed Teal is found across much of South Africa, although it is sparse or absent in arid regions. The largest populations are located on the Highveld and in the Western Cape. This species prefers shallow, permanent or temporary eutrophic freshwater wetlands, such as dams, sewage ponds, and other artificial wetlands, which typically have submerged, floating, and peripheral vegetation. Their diet mainly consists of plant materials, particularly the seeds of various grasses and aquatic plants, as well as the stems of these plants. This species was found in the Freshwater Habitat.	NT	Confirmed
Sarkidiornis melanotos (Knob-	This species uses various wetlands such as rivers, freshwater swamps, lakes, rice fields, and artificial ones such as dams but not for breeding. The nest is built in a cavity in a tree, (often a dead tree that	NT	Confirmed

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Avifaunal species			
billed Duck)	has been hollowed out by insects), occasionally on the ground in a cavity. Diet is primarily vegetable matter, particularly seeds of grasses, sedges, and aquatic plants. It also consumes grains and supplements its diet with terrestrial and aquatic invertebrates, such as insects and molluscs. This species was found in the Freshwater Habitat.		
Phoeniconaias minor (Lesser Flamingo)	This species occurs within open, shallow, alkaline and saline wetlands (e.g., saltpans). They feed on diatoms and cyanobacteria when wading through shallow water. There have been observations of this species on iNaturalist in the surrounding area, and with confirmed sightings of a similar species, the Phoenicopterus roseus (Greater Flamingo), this species is given a high POC. This species will likely be found in the Freshwater Habitat.	NT	High
Oxyura maccoa (Maccoa Duck)	The Maccoa Duck, despite its extensive distribution across Africa, is a localized and relatively scarce species. It prefers shallow, nutrient-rich freshwater habitats during the breeding season but relocates to larger, deeper water bodies outside of this period. Its diet consists of aquatic plants, seeds, roots, and aquatic insects. The Freshwater Habitat provides suitable habitat; and observations in the study area's pentad on SABAP 2, and in the surrounding area on iNaturalist, give this species a high POC.	NT	High
Elanus caeruleus (Black-winged Kite)	The black-winged kite is a species primarily of open land and semi-deserts in sub-Saharan Africa and tropical Asia, but it has a foothold within Europe, Spain and Portugal. Their prey includes grasshoppers, crickets and other large insects, lizards, and rodents. Injured birds, small snakes and frogs have also been reported. This species can occur in more transformed habitats where they can use current anthropogenic infrastructure. The Grassland and Transformed Habitat provide suitable habitat; and a high recording rate in the study area's pentad on SABAP 2 give this species a high POC.	NT	High
Nycticorax nycticorax (Black-crowned Night Heron)	It is widespread in Southern African but typically absent from dry regions such as Northern Cape. They inhabit wetlands, rivers, lakes, swamps, marshes, estuaries as well as dams and ponds where they have a wide tolerance for water conditions. A generalist feeder, known to eat a wide variety of shoreline and aquatic species such as fish, frogs, tadpoles, turtles, snakes, lizards, adult and larval insects etc. The Freshwater Habitat provides suitable habitat; and a high recording rate in the study area's pentad on SABAP 2 give this species a high POC.	NT	High
Dendrocygna bicolor (Fulvous Whistling-Duck)	The Fulvous Whistling Duck typically inhabits shallow freshwater or brackish wetlands characterized by tall grasses. These habitats include freshwater lakes, seasonal pools, slow-flowing streams, marshy areas, swamps in open flat terrain, and flooded grasslands. During periods of molting, when it is	NT	High

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Avifaunal species			
	flightless and vulnerable, the Fulvous Whistling Duck seeks refuge in densely vegetated wetlands. While its diet mainly consists of plant material, it occasionally supplements this with small aquatic insects. This species has no recording in the study area's pentad on SABAP 2 but has been recorded on iNaturalist in the surrounding area. With the existence of suitable habitat in the Freshwater Habitat, this species is given a high POC.		
Asio capensis (Marsh Owl)	The Marsh Owl's habitat preference is open grassland, marshlands and short scrub, typically near marshy grounds, vleis or dams. Marsh Owls are typically found singly or in pairs. They are usually crepuscular; sometimes active during early morning and late afternoon. The marsh owl typically feeds on small rodents, insects and other small vertebrates. This species has no recording in the study area's pentad on SABAP 2 but has been recorded on iNaturalist in the surrounding area. With the existence of suitable habitat in the Vaal Vet Sandy Grassland Habitat adjacent the Freshwater Habitat, this species is given a high POC.	NT	High
Circus ranivorus (African Marsh Harrier)	This species relies on permanent wetlands, both inland and coastal, for breeding, feeding, and roosting. It also hunts over drier floodplains, grasslands, croplands, and Fynbos, primarily preying on small rodents, as well as birds, reptiles, frogs, and insects. Nests are typically situated in reedbeds over water, although breeding has also been observed in adjacent sedges, Fynbos, scrub, and agricultural fields, though such occurrences are considered rare. This species requires expansive and ecologically connected wetlands, which is not available even when combining the Vaal Vet Sandy Grassland Habitat and Freshwater Habitat. This species has no observations on iNaturalist in the surrounding area but has been recorded in the study area's pentad on SABAP 2. Therefore, this species is unlikely to utilise this habitat extensively and may only forage briefly and thus is given a medium POC.	EN	Medium
Sagittarius serpentarius (Secretarybird)	This species prefers open grasslands and savannahs with scattered trees for nesting sites. As a carnivore, its diet consists primarily of insects and reptiles, including snakes and lizards. This species has no recording in the surrounding area's pentad on SABAP 2 and on iNaturalist. However, the Vaal Vet Sandy Grassland Habitat provides suitable habitat giving the species a medium POC since this species is unlikely to utilise this habitat extensively.	EN	Medium
Calidris ferruginea (Curlew Sandpiper)	Curlew Sandpiper is found at coastal lagoons, estuaries, and sheltered shorelines with abundant stranded algae. Inland, it inhabits wetlands with muddy edges and areas where water levels are receding. Curlew Sandpiper primarily feeds on insects. This species has no recording in the surrounding	VU	Medium

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Avifaunal species			
	area's pentad on SABAP 2 and on iNaturalist. However, the Freshwater Habitat provides suitable habitat giving the species a medium POC since this species is unlikely to utilise this habitat extensively.		

Avifauna Discussion

Data from the SABAP2 Pentad 2745_2635 was consulted to provide insight into the bird assemblages potentially present within the study area as part of the avifaunal assessment. The study area has experienced some transformation from development, and current and historical cultivation. However, habitat within the study area remains suitable for several avifaunal species.

Freshwater habitats within the study area provide suitable foraging and resting habitat for waterfowl and a wide range of other avifaunal species, including several SCC. In contrast, Transformed Habitats primarily support common, disturbance-tolerant bird species capable of utilising modified landscapes. Modified grasslands containing scattered trees further enhance avifaunal habitat value by providing roosting and perching opportunities, including vantage points for hunting raptors and temporary refuge for birds moving between adjacent habitats. During field surveys, commonly observed bird species included Streptopelia capicola (Ring-necked Dove, LC), Bostrychia hagedash (Hadeda Ibis, LC), Ploceus velatus (Southern Masked Weaver, LC),

Afrotis afraoides (Northern Black Korhaan, LC), and Scleroptila gutturalis (Orange River Francolin, LC), amongst others.

Eight avifaunal SCC was observed during the field assessment in the Freshwater Habitat: *Anas undulata (Yellow-billed Duck, NT), Anhinga rufa (African Darter, NT), Mycteria ibis (Yellow-billed Stork, VU), Spatula smithii (Cape Shoveler, NT), Podiceps cristatus (Great Crested Grebe, VU), Phoenicopterus roseus (Greater Flamingo, NT), Anas erythrorhyncha (Red-billed Teal, NT) and Sarkidiornis melanotos (Knob-billed Duck, NT). For additional avifaunal SCC with an increased POC, suitable foraging and, in some cases, breeding habitat is present within the study area. These species are therefore likely to occur as either resident or regular visitors, with the site being utilised on an ongoing or opportunistic basis depending on seasonal conditions. These include species with a high POC such as: Phoeniconaias minor (Lesser Flamingo, NT), Oxyura maccoa (Maccoa Duck, NT), Elanus caeruleus (Black-winged Kite, NT), Dendrocygna bicolor (Fulvous Whistling-Duck, NT), Asio capensis (Marsh Owl, NT) and Nycticorax nycticorax (Black-crowned Night Heron, NT). Three species have been assigned a medium POC, due to the existence of suitable habitat but historically do not have a high recording rate; Hydroprogne caspia (Caspian Tern, VU), Circus ranivorus (African Marsh Harrier, EN), Sagittarius serpentarius (Secretarybird, EN), and Calidris ferruginea (Curlew Sandpiper, VU).*

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Table 7-22: Field assessment results pertaining to herpetofaunal species within the study area.

Herpetofaunal species
Photographs

a) and b.) The Grassland Habitat provides rocky features that offer suitable basking sites for reptiles, as well as areas of softer soils that facilitate burrowing and refuge; c.) The increased moisture levels in the Freshwater Habitat will be suitable for amphibians; d.) The agricultural land in the Transformed Habitat may attract pest species such as certain small mammals, which may attract predatory snake species.
Herpetofauna SCC
No amphibian or reptile SCC are anticipated for the study area.
Herpetofauna discussion
Amphibians and reptiles pose a challenge in sampling due to their elusive behaviours, habitual avoidance of predators, and, in the case of amphibians, their different life stages. This might explain the low abundance and diversity of herpetofauna observed during the site visit. Reptiles are inherently adaptable and capable of surviving in and utilising transformed and degraded habitats. Common resilient species may still be found in these areas of increased disturbance, but low abundances are expected. It is likely that snakes and some other reptiles will be able to move into and utilise areas of the study area, but larger reptiles are likely to face levels of persecution here from people in and outside the study area. Amphibian diversity and abundance are expected to increase closer to the suitable Freshwater Habitats, where there are elevated moisture levels and open water, as most species require a temporary or permanent water source for breeding and foraging. The Grassland Habitat will likely support the greatest abundance and diversity of reptiles within the study area as it provides basking opportunities for reptiles and food resources due to the likelihood of small mammals and invertebrates, which act as food resources for many herpetofauna species. Considering the adaptability of reptiles, it is improbable that reptile species associated with the study area will experience

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Herpetofaunal species
significant impact unless directly killed. Conversely, certain species may thrive, as the structures will offer suitable refuge areas and new potential foraging grounds. No amphibian or reptile SCC were observed during the assessment; or are expected to occur on site. No species were observed during the field assessment, however, common herpetofauna species are expected to occur on site such as Rhinotyphlops lalandei (Delalande's Beaked Blind Snake, LC), Afrotyphlops bibronii (Bibron's Blind Snake, LC), and Panaspis wahlbergii (Wahlberg's Snake-eyed Skink, LC), amongst others. Fragments of suitable habitat are interspersed throughout the study area, however, no SCC have a medium or high POC within the study area, due to the lack of distribution overlaps. Natural habitat for amphibians and reptiles is unlikely to be disturbed, ensuring that the proposed mining activities are unlikely to impact on herpetofauna abundance and diversity in the region.

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Table 7-23: Field assessment results pertaining to invertebrate species within the study area.

Invertebrate species
Photographs

a.) A Clearwing Moth from the Family Sesiidae; b.) Anoplolepis custodiens (Large Pugnacious Ant, NYBA); c.) Pontia helice (African Meadow White, LC); d.) Crocothemis erythraea (Broad Scarlet, LC)
Invertebrate SCC
No Invertebrate SCC are anticipated for the study area.
Invertebrate Discussion
In terrestrial landscapes, insects typically represent the most abundant macro-organisms and play a critical role in ecosystem functioning. They provide essential ecosystem services, including pollination, decomposition of plant and animal material, predation on pest species, parasitism, and the removal of dung and scat from larger mammals. As such, insect abundance and diversity are often used as indiecators of ecosystem health. Flowering plants, inclfuding AIP species, can provide important seasonagl food resources for insects, while insects in turn hcontribute to pollination processes across both indigenous and non-indigenous flora. Insects also constitute a key food resource for many vertebrate species, and substantial declines in insect populations may have cascading ecological effects. Although insect communities can be relatively resilient to disturbance, this resilience is contingent on the continued availability of suitable habitat and food resources. Within the study area, insect and arachnid observations were lower than expected. This reduced observed abundance can be attributed to historical and ongoing disturbances that have degraded habitat quality and simplified vegetation structure, thereby limiting insect diversity and activity. To address these limitations, observational data were supplemented with available database records and findings from previous studies conducted in the broader area. Arachnid abundance was similarly low in field observations; however, this is likely influenced by their cryptic behaviour and predominantly nocturnal activity, which reduces detectability during

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Invertebrate species
standard daytime surveys, rather than indicating true absence. There is expected to be a higher insect diversity and abundance in and around the Freshwater Habitat due to the number of micro-habitats providing refuge and important nutrients. The increased moister levels are also often an important factor in many insect life cycles. No insect SCC were observed in the study area or may potentially occur within the study area, as their known distribution ranges do not intersect with the study area. Species observed during the field assessment include a Clearwing Moth from the Family Sesiidae, Anoplolepis custodiens (Large Pugnacious Ant, NYBA), Pontia helice (African Meadow White, LC), and Crocothemis erythraea (Broad Scarlet, LC). Other common invertebrate species that are expected to occur on site are Rhyothemis semihyalina (Phantom Flutterer, LC) and Conchyloctenia punctata (African Spotted Tortoise Beetle, NYBA).

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7.6.2.3 Site Ecological Importance (SEI) and Areas of Concerns

This section aims to (1) present the sensitivity of the receptors identified within the study area (e.g., SCC, the vegetation/fauna community or habitat type present on the site), and (2) clearly define and map areas where avoidance mitigation is strongly recommended if significant, negative residual impacts are to be avoided (and to prevent potential fatal flaws).

All habitats within the study area were allocated an importance category, i.e., SEI category. The SEI is a function of the biodiversity importance (BI) of the receptor and its resilience to impacts (receptor resilience [RR]). The BI, in turn, is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

Table 7-24 below indicates the individual SEI scoring for each habitat unit. Figure 7-40 indicates the SEI for the study area.



Figure 7-40: Faunal habitat sensitivity map for the study area.

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Table 7-24: Faunal SEI importance for the different habitat units within the study area.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Vaal Vet Sandy Grassland	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	**High** Large (> 20 ha but < 100 ha) intact area of EN ecosystem types. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Modified Grassland	**Low** No confirmed or highly likely populations of threatened SCC. (< 50% of receptor contains natural habitat with limited potential to support SCC).	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Low	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

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Freshwater Ecosystems: Seep wetland and Depression wetland	High Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.	Medium Only narrow corridors of good habitat connectivity between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Transformed Habitat	Very Low No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	Very Low Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.	Very Low	Very High Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

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7.6.3 Site Sensitivity Verification

The site sensitivity verification took place on the 10th of December 2025. A South African Council for Natural Scientific Professions (SACNASP) registered consultant ground-truthed the terrestrial biodiversity aspects (i.e., faunal, floral and terrestrial), and the surveys were restricted to the study area.

The study area consists of several habitats, which have been impacted in various degrees through historic and current anthropogenic activities (especially agriculture). The largest habitat unit within the study area consisted cultivated fields and built-up areas. These transformed areas are of low plant and terrestrial importance with no significant floral assemblages and ecosystems functionality. The remaining natural areas are made up of various freshwater ecosystems. Additionally, the study area did have a high abundance and diversity of Alien and Invasive Plant (AIP) species, especially within the freshwater ecosystems and secondary grasslands that are very closely associated with agricultural activities.

The vegetation cover of the Grasslands Habitat may provide refuge for a number of faunal species, such as small mammals, which in turn could attract several predatory herpetofauna and avifauna, as well as house an abundance of pollinating invertebrate species. Good grazing is provided within this habitat, and this will likely support SCC as well as a great diversity and abundance of faunal species, particularly invertebrates. The Modified Grassland habitat has a more heterogeneous vegetation layer that offers a variety of possible host plants, as well as foraging and nesting opportunities. Species that are adapted to disturbance and that can utilise increased transformed landscapes, such as reptiles and smaller-bodied mammals, are more likely to be found in the Transformed Habitat; especially species which can utilise the food resources in the cultivated areas when crops are producing. The combination of open water, dense wetland vegetation, and elevated moisture levels in the Freshwater Habitat supports amphibians, invertebrates, and wetland-associated vertebrates, contributing to the overall faunal importance of these habitats within the study area. Several SCC were recorded utilising these wetlands, primarily for foraging and refuge. The availability of standing water within an otherwise transformed landscape attracts a wide range of water- associated fauna, making these impoundments focal points for feeding and temporary habitat use.

The table below presents the site-verified results for the study area compared with the screening tool outcomes. It also indicates the required minimum reporting protocols.

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Table 7-25: Specialist comparison with the screening tool sensitivity rating and professional rating. The table further provides the specialist's recommendation for biodiversity reporting.

Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
Animal Species Theme	Medium	There were medium and low-sensitivity areas for the Animal Species, with the low areas covering large parts of the study area. No triggered faunal SCC were observed in the study area. Although there is a confirmed presence of other SCC in the study area, there remains a medium probability of occurrence of the Screening tool species Hydroprogne caspia (Caspian Tern, VU) and Hydrictis maculicollis (Spotted-necked Otter, VU) due to historic and current anthropogenic impacts affecting theses specific species. In some parts of the study area the low sensitivity is disputed, due to the occurrence of suitable habitat for triggered SCC, and a medium sensitivity verified instead. In the remaining areas the low sensitivity is verified.	Medium	Animal Species Specialist Assessment	GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).
			Medium		
	Low		Low		
Plant Species Theme	Low	The screening tool identified the study area to be of low plant sensitivity. No threatened plant species were observed during the site visit, and none are anticipated to occur within the study area. Based on the historic and current impacts associated with cultivation the likelihood of floral SCC being present within the study area is highly unlikely. While the study area does consist of other secondary and	Low	Plant Species Compliance Statement	GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species as published in Government Gazette 43855 dated 30 October

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Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
		primary vegetation no additional threatened floral SCC are anticipated to occur within the area (based on background review and general habitat conditions).			2020 (as amended in GN 3717 of 2023).
Terrestrial Biodiversity Theme	**Very High**	The terrestrial biodiversity theme is considered to be of very high sensitivity area. The triggered features for the very high sensitivity include CBA 1, ESA 1, ESA 2 (as indicated by the FBSP (2019)) and presence of EN Vaal-Vet Sandy Grassland. The presence of threatened ecosystems was confirmed for the study area, given the confirmed presence of EN Vaal-Vet Sandy Grassland. As such, the very high sensitivity as triggered for the study area was confirmed. Furthermore, the presence of CBA 1 is associated with the EN Vaal-Vet Sandy Grassland and is therefore also confirmed. Large portions of the study area is represented by ESA 1 and ESA 2 (based on desktop information). The remaining portions of secondary grasslands and freshwater systems do represent functioning ESA 1 and ESA 2 habitat which further contributed to the very high terrestrial biodiversity sensitivity.	**Very High**	Terrestrial Biodiversity Specialist Assessment	GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020.
	Very High	Large areas (central) of the study area is identified as ESA 2 habitat. However, the study area has been heavily impacted by cultivation (across large portions of the study area) that are currently utilised as cultivated areas.	Low	Terrestrial Biodiversity Specialist Assessment- If one is of the study area is identified as very high	GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for

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Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
		Therefore, large portion of the study area (that are transformed) are no longer considered to be ecologically functional and therefore the presence of ESA 2 is disputed in these areas.		that applies to the whole study area.	Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020.

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7.7 Aquatic Biodiversity

Refer to Specialist Study: Appendix D4 – Freshwater and Aquatic Assessment

7.7.1 Freshwater Ecosystem Characterisation

The freshwater ecosystems associated with the proposed underground mining operation (namely the seep and depression wetlands) were classified according to the Classification System (Ollis et al., 2013) as an Inland System within the Dry Highveld Grassland Groups 3 WetVeg (wetland vegetation) group, classified by Mbona et al. (2015) as "Vulnerable". At Levels 3 (Landscape Unit) and 4 (Hydrogeomorphic (HGM) Type) of the Classification System, the wetlands are classified as per the summary in the table below.

Table 7-26: Characterisation at Levels 3 and 4 of the Classification System (Ollis et al., 2013) of the freshwater ecosystems within the study area.

Freshwater Ecosystem	Level 3: Landscape unit	Level 4: HGM Type
Depression wetland	Valley floor: The base of a valley, situated between two distinct valley side-slopes.	A wetland with closed (or near-closed) elevation contours which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates, giving rise to vertical water fluctuations. Depressions may be linked to a river and have channelled in and out flow (exorheic) but may also form in the absence of a river where the water table (groundwater input) intercepts the land surface, with no in and outflow channel present (known as endorheic isolated depressions).
Seep wetland		A wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley, but they do not, typically, extend into a valley floor.

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7.7.2 Anthropogenically derived artificial features

Two artificial features were identified within the study and associated investigation areas.

According to Ollis et al., (2013) an artificially created system is defined as a feature that is "produced by humans, not naturally occurring". Ollis et al., (2013) further elaborates "artificial features are aquatic ecosystems where hydric soil features have developed, or where wetland plants have colonised, in historically non-wetland areas due to human activities". In addition to the identified freshwater ecosystems, anthropogenically derived features in which water ponds, were also noted within the study area and associated investigation area. Two large artificial impoundments were identified within the northern portion of the study area and two smaller impoundments in the southern portion. Multiple smaller impoundments were identified during the site assessment but have not been delineated further due to their artificial nature. The impoundment located in the northeastern portion of the study area is associated with the current mining activities, while the impoundment located in the northwestern portion of the study area is associated with the current agricultural activities.

These features have formed due to land-use changes prompting increased runoff and ponding, as well as historic excavation activities which have altered the natural topography, thus allowing water to collect. As these features are of an artificial origin and anthropogenically derived they were not further assessed, however these were included for mapping purposes to indicate locality within the landscape. Figure 7-41 below presents photographs of the artificial features in relation to the wetlands.



Figure 7-41: Representative photographs of the artificial impoundments within the study area. (Left) The large agricultural dam in the northwestern portion of the study area which is downstream of the CVB wetland and (Right) the artificial impoundment related to the existing mining activities, located in the northeastern portion of the study area.

7.7.3 Freshwater Ecosystem Delineation

The freshwater ecosystem assessment was limited to the study area and associated investigation area as provided by the proponent. It was confirmed during the site assessment that various land transformation had occurred within the study area and immediate surrounds over time with the most significant impact from the ongoing agricultural activities and mining activities (to a lesser degree). As a result, changes to the topography, soil and vegetation profiles were evident. Thus, where necessary, delineations were refined and augmented with the use of digital satellite imagery, historical aerial imagery and 5 m contours to improve the accuracy of the

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delineations, where necessary. The delineations as presented in this report are, nevertheless, deemed the best estimate of the temporary zone boundaries of the freshwater ecosystems based on site conditions present at the time of the assessment, and are considered adequate to allow for informed decision-making.

During the site assessment (undertaken in December 2025), the following indicators were used to verify the boundaries of the freshwater ecosystems:

- Terrain units were used as the primary indicator. Despite transformation of the landscape associated with the investigation area, the terrain provided an indication of low-lying areas where water is likely to collect and/or move through the landscape;
- Vegetation was utilised in conjunction with the soil indicators associated with the freshwater ecosystems, where feasible. The distinction between obligate, facultative, and terrestrial vegetation was relatively discernible;
- Soil wetness indicator, duration and frequency of saturation in the soil profile is a diagnostic indicator since it influences the colour change in the soil. Low chroma (grey and muted colours) as well as mottles are more prominent in soil which have higher saturation frequency. Moist soil also indicates an increased hydroperiod and thus the potential presence of hydromorphic characteristics. This was utilised with the vegetation as the secondary indicator; and
- Soil morphological characteristics typically associated with freshwater ecosystem conditions, such as gleying or mottling were utilised in conjunction with saturation as the secondary indicator.

The delineated freshwater ecosystems and artificial features are conceptually depicted in Figure 7-42 below:

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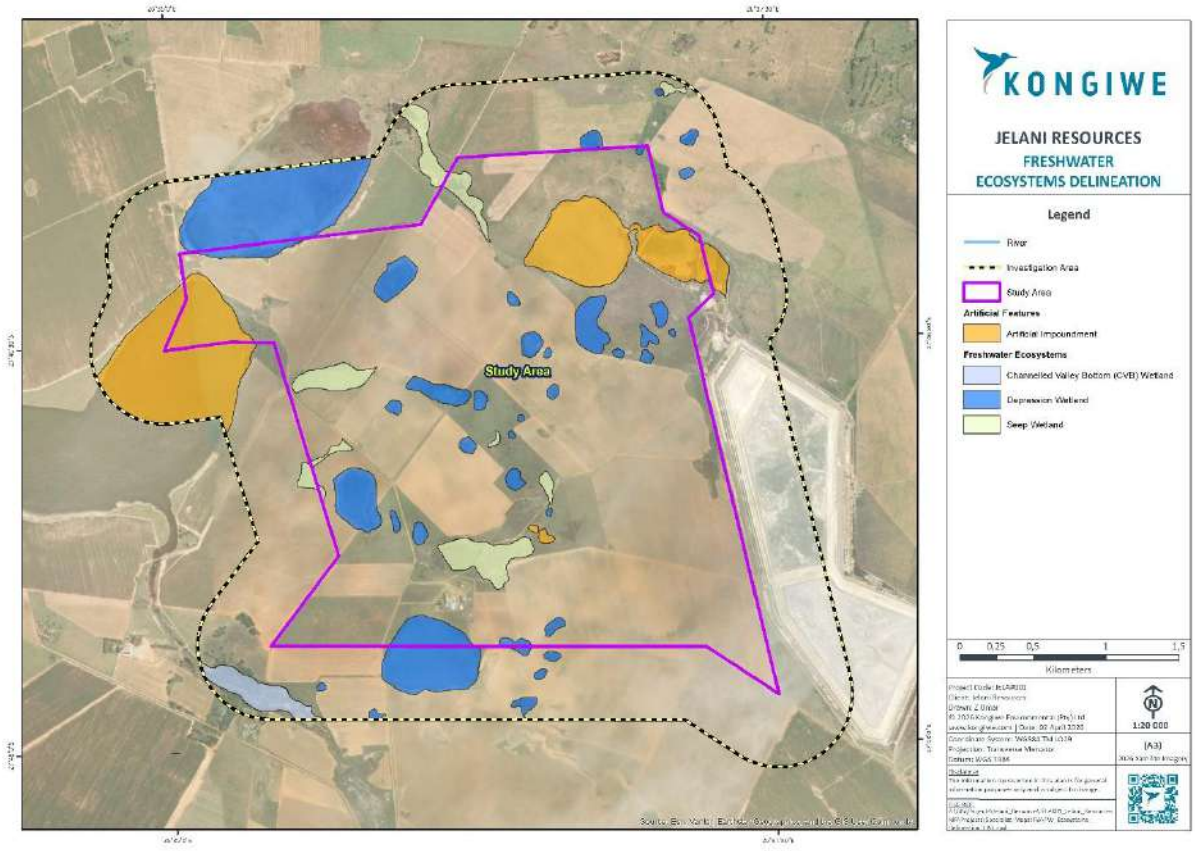


Figure 7-42: Map depicting the delineated freshwater ecosystems and artificial features associated with the study and investigation areas.

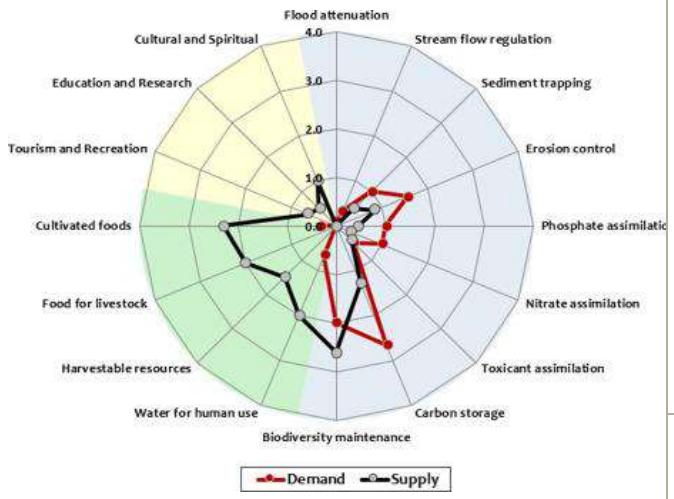
7.7.4 Freshwater Ecosystem Site Verification Results

Following the site assessment, the assessments outlined in Section 1.2 of the Freshwater and Aquatic Assessment were applied. The results of the ecological assessment are discussed in the dashboard style reports which follow.

Considering the nature of the proposed activities (i.e. Restricted to underground mining only) and due to similar catchment wide impacts posed on the wetlands (cultivation with livestock grazing husbandry, informal road crossings and AIP proliferation), the assessments were undertaken in a combined manner for each HGM type. Only the freshwater ecosystems within the study area were assessed, i.e. the seep wetlands and depression wetlands.

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Table 7-27: Summary of the assessment of the seep wetlands associated with the proposed underground mining operation.

<table>
<tr>
<td colspan="2">Ecological & socio-cultural service provision graph:

</td>
<td colspan="2"> 
Representative photographs of the seep wetlands and the various impacts affecting the ecological condition of the wetlands including linear infrastructure, agricultural activities, embankment erosion and Alien and Invasive Plant (AIP) encroachment.</td>
</tr>
<tr>
<td>PES Discussion</td>
<td>PES Category: C (Moderately modified)

The seep wetlands were assessed to be in a moderately modified ecological condition due to changes in the natural functioning and ecological state of the wetlands. Numerous anthropogenic impacts relating to catchment wide mining, agricultural activities and urbanisation has resulted in changes to the natural timing and pattern of flows, increased sediment loads and erosion, altered water quality which has subsequently led to a transformed habitat with numerous AIP species outcompeting the natural vegetation.</td>
<td>Ecoservice provision</td>
<td>Ecoservices importance category: Very Low to Low

The Ecosystem service provided by the seep wetlands of greatest importance is biodiversity maintenance. These wetland areas provide some of the only remaining natural habitat in the area and as such are important in terms of biodiversity maintenance, as well as for livestock grazing. The wetlands are also identified by the Screening Tool (2020), NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale, thus increasing their ecosystem provision for biodiversity maintenance. The importance of sediment trapping, phosphate, nitrate and toxicant assimilation is due to increased hardened surfaces and stormwater inputs into the</td>
</tr>
</table>

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			seep wetlands from the surrounding catchment, and cultivated areas. The limited ecological service provisioning across all components was primarily attributed to the degraded ecological integrity of the wetlands.
EIS discussion	**EIS Category: Moderate** The seep wetlands are considered to be of moderate ecological importance and sensitive. This is mainly due to the systems being identified by the Screening Tool (2020), as well as the NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale. The wetlands are also considered importance for biodiversity maintenance as they provide some of the only remaining natural habitat in an area dominated by agricultural and mining activities, as well as rural settlements.	**REC, RMO & BAS Category**	**REC: C / BAS: C/ RMO: Maintain** The Recommended Management Objective (RMO) of the seep wetlands is to maintain the PES. The maintenance of the PES of these systems is likely as only underground mining activities are proposed. Any decrease in the PES of these systems would potentially be as a result of the ongoing agricultural activities over which the proponent has no control. Potential improvement of the PES of these systems would require a catchment-wide approach by all stakeholders, and ecological restoration of the wetlands is not the sole responsibility of a single stakeholder. Please refer to the discussion below pertaining to impacts and mitigation measures.

Freshwater Ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):

Alterations to the natural hydraulic regime and geomorphological processes of the seep wetlands have occurred. These impacts include road crossings as well as disturbed and hardened surfaces due to catchment wide agricultural and mining activities. The road crossings cause head cut erosion on lateral inflows due to the flow being concentrated and has exacerbated gully erosion within the wetlands. Upstream impoundments and road crossings alter the natural flow path and velocity of flow within the wetlands which can negatively impact habitat and ecoservice provision of the systems. Increased hardened surfaces reduce infiltration rates and increase inputs of sediment laden runoff to the wetlands and subsequently changes in water quality. These impacts have resulted in AIP proliferation.

Basic water quality parameters were taken, during the December 2025 assessment of the seep wetland in the southern portion of the study area (See Figure 13 below for sampling site locations), and the water quality was noted to be poor. Temperature was 32.1 ºC, whilst Electrical Conductivity (EC) was 12.6 mS/m, which is within the acceptable (<30mS/m) to tolerable (≤ 85 mS/m) range limit and pH of 10.61 which is well above the acceptable range limit (≥ 6.5 mS/m - ≤ 8.0 mS/m) according to the Research Water Quality objectives (RWQO) of South Africa (DWA, 2011).

High levels of agricultural and mining activities were noted within the surrounding area, which have had a significant impact on the habitat provisioning of the seep wetlands due to the limited existing buffer zone around the wetlands. However, the wetlands provide isolated habitat for biota with numerous provincially protected

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floral species present (STS, 2026a) such as Haemanthus sp., Gladiolus sp., Helichrysum sp. (Status = Species-specific. Probability of Occurrence [POC] = High), as well as Nerine sp., Orchidaceae sp. and Kniphofia sp. (Status = Species-specific. POC = Medium). The wetlands are well vegetated with the following species (STS, 2026a):

- AIP species: Agave americana, Argemone ochroleuca subsp. ochroleuca, Cirsium vulgare, Tamarix ramosissima, Verbena bonariensis and Xanthium strumarium;
- Forb species: Conyza bonariensis, Denekia capensis, Drimia elata, Lobelia erinus, Monsonia angustifolia and Senecio coronatus;
- Graminoid species: Afroscirpoides dioeca, Aristida congesta, Cyperus congestus, Cyperus laevigatus, Cyperus marginatus, Imperata cylindrica, Juncus rigidus, Kyllinga alba, Phragmites australis, Sporobolus africanus and Typha capensis; and
- Tree species: Asparagus laricinus and Gomphocarus fruticosus.

Overall, the wetlands are considered likely to provide some roosting, breeding and feeding habitat for avifauna, small mammals, amphibians, reptiles and invertebrates, albeit less sensitive species. Although the extent of anthropogenic activity surrounding the wetlands will largely deter faunal activity. According to STS (2026b), several vulnerable bird species were found within the wetlands, including the Yellow billed stork and the Great crested grebe. Many bird species of Least Concern (Not threatened) were also identified, such as the Yellow billed duck, African darter, Cape shoveler, Great flamingo, Red billed teal and the Knob-billed duck (STS, 2026b).

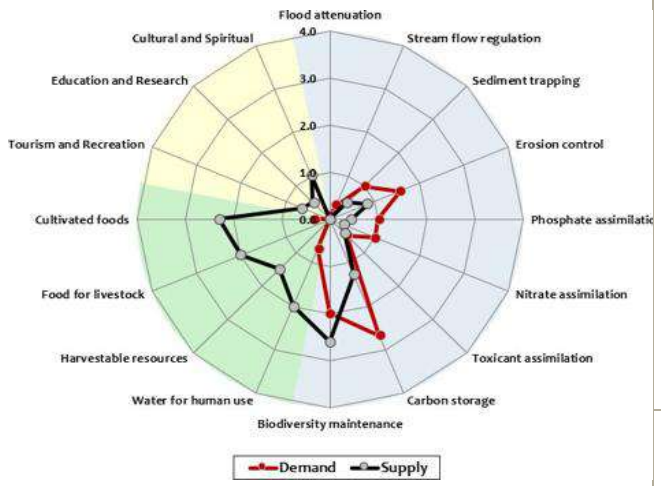
Extent of modification anticipated	The proposed undermining of the seep wetlands has the potential to alter the functioning of the wetlands to an overall low degree. The extraction of ore can potentially lead to destabilisation of the surrounding environment and to subsequent potential subsidence of the land and creation of a cone of depression. Water entering the underground mining area as a result of ingress into underground mine workings may necessitate dewatering of the underground mining area, which may result in the discharge of dirty water into the wetland environment. Possible decant from the underground mining also poses a low threat to the seep wetlands as contaminated water may alter water quality, flow regimes and lead to a subsequent loss of biodiversity of the wetlands. Thus, strict implementation of the recommended mitigation measures will need to occur to prevent direct impacts and edge-effects from occurring.
Risk Assessment Outcome & Business Case: The DWS Risk Assessment (2023) only considers activities within the delineated extent of freshwater ecosystems and/or within the regulated zone (GN 4167 500 m ZoR). As such, the seep wetlands located within the study area were considered in this assessment.	
Low	Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a “Low” risk to the ongoing functionality of the systems. Key mitigation measures include: • Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and

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	• It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.

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Table 7-28: Summary of the assessment of the depression wetlands associated with the proposed underground mining operation.

<table>
<tr>
<td colspan="2">Ecological & socio-cultural service provision graph:

</td>
<td colspan="2"> 
Representative photographs of the depression wetlands and the various impacts affecting the ecological condition of the wetlands including animal grazing, embankment erosion and algal blooms.</td>
</tr>
<tr>
<td>PES Discussion</td>
<td>PES Category: D (largely modified)

The largely modified ecological condition of the depression wetlands is ascribed to numerous changes to the hydraulic regimes, geomorphological processes and vegetation composition which have occurred within the wetlands as well as the catchments thereof. Impacts such as ongoing agricultural activities, road crossings, hardened surfaces, historical and current mining activities, as well as dense alien vegetation have altered the ecological condition of the wetlands.</td>
<td>Ecoservice provision</td>
<td>Ecoservices importance category: Very Low to Moderate

The Ecosystem service provided by these seep wetlands of greatest importance is biodiversity maintenance. These wetland areas provide some of the only remaining natural habitat in the area and as such are important in terms of biodiversity maintenance, as well as for livestock grazing. The wetlands are also identified by the Screening Tool (2020), NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale, thus increasing their ecosystem provision for biodiversity maintenance. The importance of sediment trapping, phosphate, nitrate and toxicant assimilation is due to increased hardened surface and stormwater inputs into the seep wetlands from the surrounding catchment, and cultivated areas. The limited ecological service provisioning across all components was primarily</td>
</tr>
</table>

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			attributed to the degraded ecological integrity of the wetlands.
EIS discussion	**EIS Category: Moderate** The depression wetlands are considered to be of moderate ecological importance and sensitive. This is mainly due to the systems being identified by the Screening Tool (2020), NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale. The wetlands are also considered importance for biodiversity maintenance as they provide some of the only remaining natural habitat in an area dominated by agricultural and mining activities.	**REC, RMO & BAS Category**	**REC: D / BAS: D/ RMO: Maintain** The Recommended Management Objective (RMO) of the depression wetlands is to maintain the PES. The maintenance of the PES of these systems is likely as only underground mining activities are proposed. Any decrease in the PES of these systems would potentially be as a result of the ongoing agricultural activities over which the proponent has no control. Potential improvement of the PES of these systems would require a catchment-wide approach by all stakeholders, and ecological restoration of the wetlands is not the sole responsibility of a single stakeholder. Please refer to the discussion below pertaining to impacts and mitigation measures.
Freshwater ecosystems drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):			
Alterations to the natural hydraulic regime and geomorphological processes of the depression wetlands have occurred. These impacts include hardened surfaces due to catchment wide agricultural and mining activities. Increased hardened surfaces reduce infiltration rates and increase inputs of sediment laden runoff to the wetlands, especially due to the inward draining characteristics of the wetlands, and subsequently changes in water quality. These impacts has subsequently also led to AIP proliferation. Although no onsite specific water quality testing was undertaken for the depression wetlands, water quality is likely to be similar to that of the seep wetlands as these HGM types occur in close proximity to one another and are influenced by similar impacts. High levels of agricultural and mining activities were noted within the surrounding area, which have had a significant impact on the habitat provisioning of the depression wetlands due to the limited existing buffer zone around the wetlands. However, the wetlands provide isolated habitat for biota with numerous provincially protected floral species present (STS, 2026a). Overall, the wetlands are considered likely to provide some roosting, breeding and feeding habitat for avifauna, small mammals, amphibians, reptiles and invertebrates, albeit less sensitive species. Although the extent of anthropogenic activity surrounding the wetlands will largely deter faunal activity. Flora and fauna species present in the depression wetlands were largely similar to those in the seep wetlands (see full list in Table 3 above), with the exception of Forb species which were more abundant in the seep wetlands.		
Extent of modification	The proposed undermining of the depression wetlands has the potential to alter the functioning of the wetlands to an overall low degree. The extraction of ore can potentially lead to destabilisation of the surrounding environment and to subsequent potential subsidence of the land and		

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anticipated	creation of a cone of depression. Water entering the underground mining area as a result of ingress into underground mine workings may necessitate dewatering of the underground mining area, which may result in the discharge of dirty water into the wetland environment. Possible decant from the underground mining also poses a low threat to the depression wetlands as contaminated water may alter water quality, flow regimes and lead to a subsequent loss of biodiversity of the wetlands. Thus, strict implementation of the recommended mitigation measures will need to occur to prevent direct impacts and edge-effects from occurring.
Risk Assessment Outcome & Business Case: The DWS Risk Assessment (2023) only considers activities within the delineated extent of freshwater ecosystems and/or within the regulated zone (GN 4167 500 m ZoR). As such, the depression wetlands located within the study area were considered in this assessment.	
Low	Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a "Low" risk to the ongoing functionality of the systems. Key mitigation measures include: • Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and • It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.

Diatom Analysis Results (See Figure 7-43 below for sampling site locations)

Parameter	J1	J2	Discussion
Dominant Taxa	Navicula sp., Cyclotella meneghiniana, Nitzschia palea, Gyrosigma sp., Nitzschia sp.,Rhopalodia gibba, Fragilaria biceps.	Cyclotella meneghiniana, Diploneis elliptica, Navicula sp.	Site J1 has a moderate species diversity with a high species evenness. The site is considered to be in a Poor ecological condition (Category D) with meso-eutrophic nutrient conditions, elevated electrolyte concentrations, and very heavily to extremely contaminated conditions, as per the calculated SPI score (9.5) and dominant diatom taxa. The dominant diatom taxa included Navicula sp., Cyclotella meneghiniana, Nitzschia palea, Gyrosigma sp., Nitzschia sp., Rhopalodia gibba, and Fragilaria biceps, representing a community dominated by motile taxa with contributions from planktonic and high-profile forms. The dominance of Navicula sp., Nitzschia sp., and Gyrosigma sp. further indicates nutrient enrichment, elevated electrolytes, and physical disturbance (sedimentation, scouring, erosion, trampling, etc.), while the presence of Fragilaria sp. and Rhopalodia sp. indicates some periods of substrate stability. The functional groups indicate mixed habitat conditions with sedimentation and variable flow regimes. The diatom size
Functional Groups	Mix of benthic motile, planktonic centric, and erect taxa.	Mix of planktonic centric and benthic motile taxa with adnate forms present.	
Ecological Guilds	Motile guild dominate site, with low-profile and high-profile guilds also present.	Low-profile guild dominant at site with motile and adnate	

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		guilds present.	classes ranged from small motile taxa to larger benthic forms, consistent with mixed disturbance and nutrient enrichment. The calculated %PTV score (15.1%) indicates that the site is free from organic contamination. Site J2 has a low species diversity with a moderate species evenness. The site is considered to be in a Moderate ecological condition (Category C) with mesotrophic nutrient conditions, moderate electrolyte concentrations, and contaminated conditions, as per the calculated SPI score (13.1) and dominant diatom community. The dominant diatom taxa included Cyclotella meneghiniana, Diploneis elliptica, and Navicula sp., indicating a community dominated by low-profile taxa with some motile and adnate forms present. The dominance of Cyclotella sp. further indicates nutrient enrichment and possible hydrological variability, while the presence of Navicula sp. indicates physical disturbances and possibly industrial contamination. The functional groups indicate relatively stable substrate conditions with moderate nutrient enrichment. The diatom size classes consisted mostly of small to medium-sized taxa with some larger adnate forms present, supporting the results of moderately enriched but stable conditions. The calculated %PTV score (0%) indicates that the site is free from organic contamination. While some of the observed diatom community patterns may reflect natural geomorphological variability for the sites, the consistent dominance of motile and tolerant taxa across multiple sites indicates anthropogenic impacts and influences at the sites.
Size Classes	Wide range of size classes with small–medium taxa dominant and some larger forms present.	Mostly small to medium-sized taxa with some larger adnate forms present.	
SPI	9.5 - Poor quality (Category D); Meso-eutrophic	13.1 – Moderate quality (Category C); Mesotrophic	
%PTV	15.1 – Site free from organic pollution	0.0 – Site free from organic pollution	
Diversity	2.73 – Moderate	1.41 – Low	
Evenness	0.97 – High	0.89 – Moderate	

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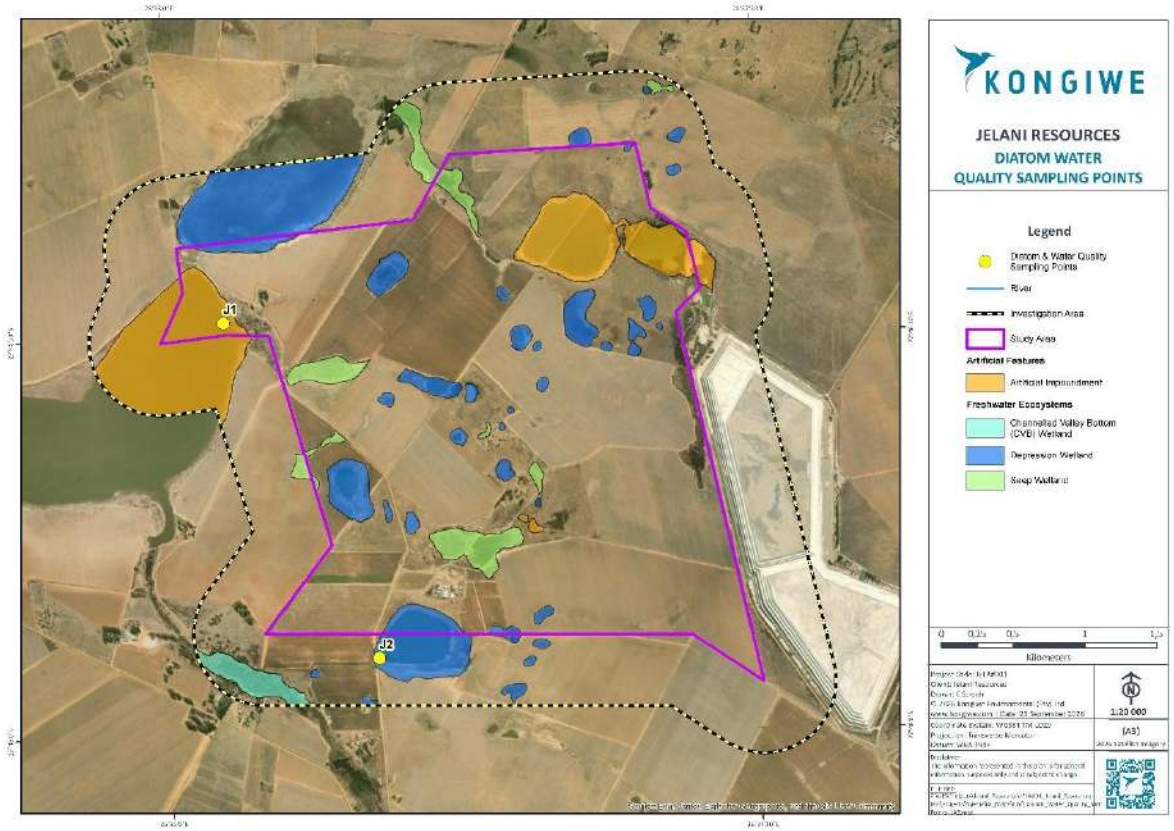


Figure 7-43: Sampling locations sites for diatom and water quality analyses

Following the freshwater ecosystem assessment, the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2023) was applied to determine the significance of impacts of the proposed undermining of the wetlands. Provided that all mitigation measures outlined in this report are adhered to throughout the life of the proposed underground mining operation, the perceived impact significance is “Low” provided that the mitigation measures as outlined in this report are strictly adhered to.

The assessment of potential impacts to groundwater was not part of the scope of this report but was considered, at a high level, as the potential for decant relates to surface freshwater resource management. As such, the mitigation measures as outlined in the Technical Report (Bara Consulting, 2025) to mitigate against potential subsidence, creation of a groundwater pollution plume, that poses a risk to surface water resources, and possible decant must be implemented and strictly adhered to in order to ensure a low impact significance. It is also recommended that the pillar safety factor under the wetlands be included as an additional margin of safety to ensure that no subsidence of the wetlands takes place.

A summary of the DWS Risk Assessment is provided in Table 7-29 below.

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Table 7-29: Summary of DWS Risk Assessment applied to the freshwater ecosystems associated with the proposed underground mining operation.

Phase	No.	Activity	Impact	Risk Rating
Operational	1	Operation of the underground mining area related to the undermining of the freshwater ecosystems.	Potential creation of a cone of depression, which may drain water from the wetlands, thus resulting in desiccation of the systems.	L
			Potential destabilisation of the surrounding environment through the extraction of ore and subsequent potential subsidence of the land.	L
Closure/ Post Closure	2	Post-closure management activities. (Decant of contaminated water from the rehabilitated mine area into the receiving environment subject to confirmation by a suitably qualified geohydrologist).	• Contamination of water within the receiving environment, and subsequent reduction in water quality (increase in salts and specific contaminants of concern and reduced pH); • Post-operational subsidence; • Subsequent negative impacts on biota and vegetation; • Altered flow regimes (increased hydroperiod); and Habitat degradation.	L

7.8 Soil, Land Use and Agricultural

7.8.1 Land Use

Based on site assessment observations, the study area is primarily comprised of commercial agricultural (dryland) cultivation of crops such as maize and sunflower, open grassland often utilised for livestock (cattle and sheep) grazing, as well as several watercourses distributed across the study area.

The current land uses identified within the study area are illustrated in Figure 7-44 and Figure 7-45 below.

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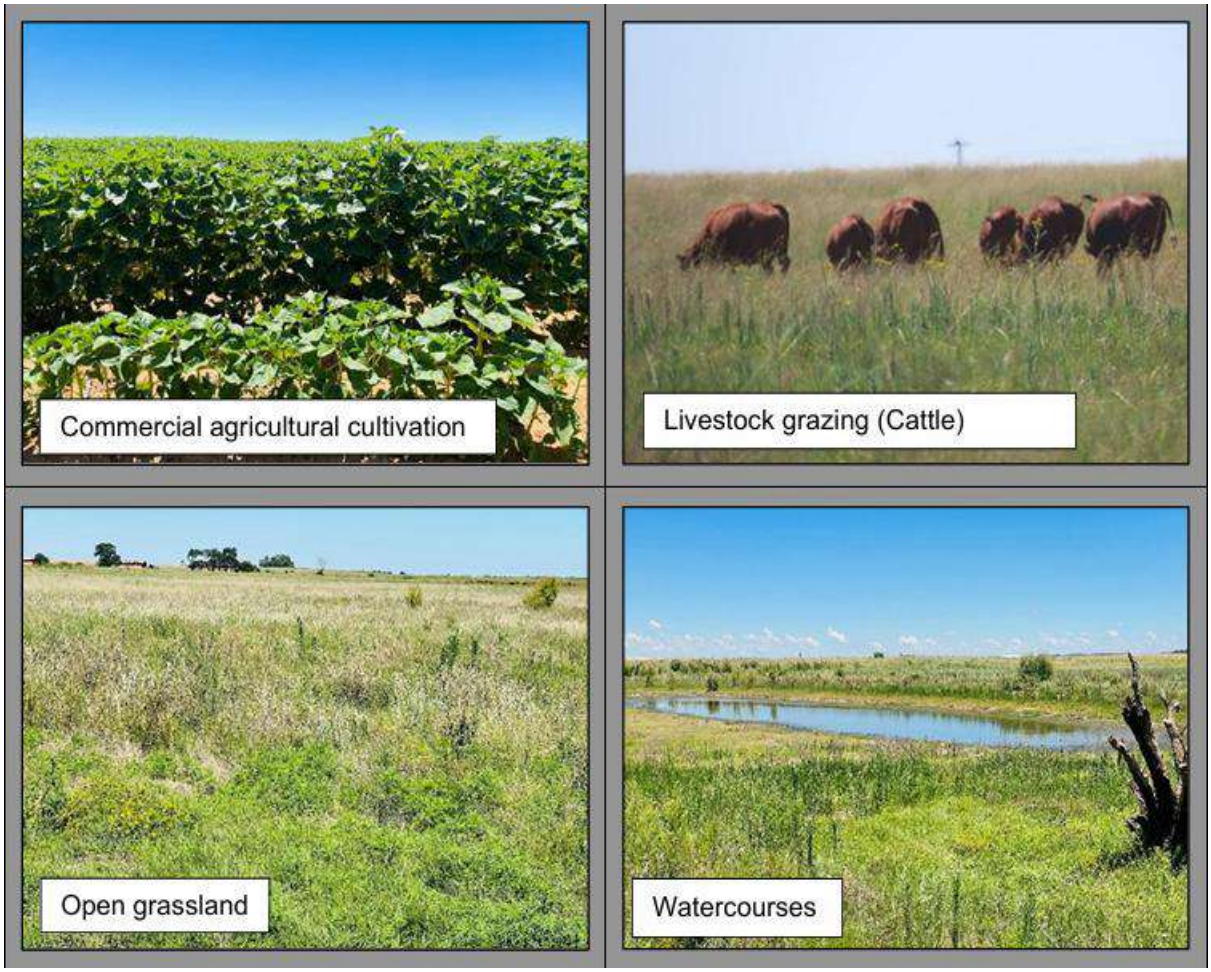


Figure 7-44: Photographs depicting the current land uses within the study area.

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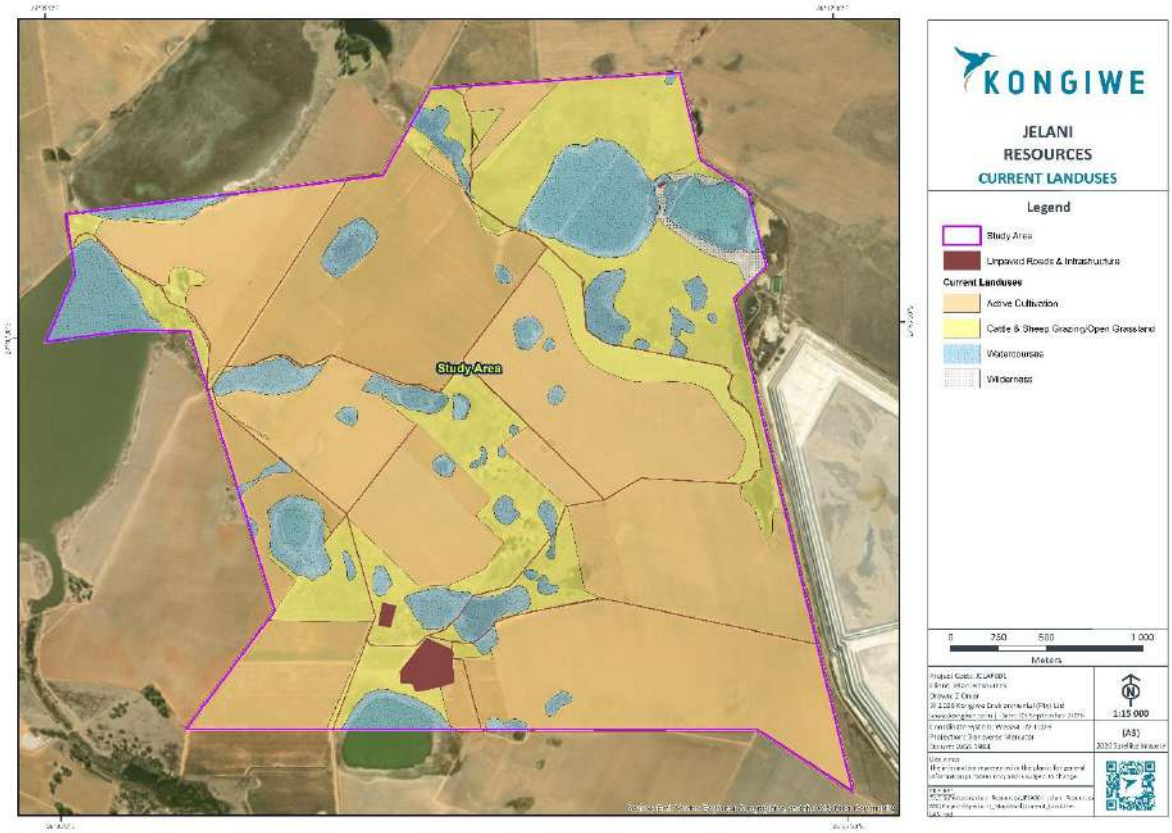


Figure 7-45: Current land uses identified within the study area during the time of site assessment.

7.8.2 Soil

7.8.2.1 Dominant Soil Forms

The identified soil forms within the study area largely comprise dystrophic red and/or yellow brown apedal, infrastructural areas grouped as disturbed soils, shallow lithic soils, as well as soils susceptible to waterlogging conditions associated with the watercourses.

7.8.2.2 Arable Land

The arable soils in the study area were classified as Clovelly, Ermelo/Hutton, and Clovelly/Hutton. These soils typically exhibit a dystrophic red and/or yellow brown apedal textural class. These are oxidic soils which are highly weathered and are dominated by iron (hematite/goethite) oxides. The soils are deep, well aerated with good porosity to support agricultural crops. Although these soils are not inherently fertile, oxidic soils are suitable for agricultural cultivation of crops with relatively few physical limitations.

7.8.2.3 Grazing Land (Watercourses)

The wet based soils were identified as Dundee (including surface water) and Katspruit. The topsoil directly overlies an alluvial/gleyed horizon which is characterised by prolonged periods of saturation with uniform grey colours which is an indication of waterlogging conditions. The wetness limitation associated with these soils means anaerobic conditions develop in the root-zone (30 cm) which is not suitable for cultivated crops.

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Consequently, these soils are classified as being of low to moderate agricultural value. However, these soils can be considered for marginal livestock grazing.

7.8.2.4 Grazing Land

The study area also comprised of shallow and lithic soil associated with the Glenrosa formation. This soil is associated with poor physical properties for plant root system penetration and water infiltration due to the shallow nature of the soil and/or limiting impeding layer of the underlying parent material. Based on the degree of weathering some lithic material of varying sizes can be mixed closely with soil material. Glenrosa soil form is usually avoided for intensive use and thus left for grazing, forestry, and wildlife land uses.

7.8.2.5 Disturbed Soils

The Witbank (Disturbed) soil form is related to soil which has been subjected to physical disturbances. In this context, Witbank soil includes historical mining and related activities as well as surface infrastructure which buried the soil material such that the diagnostic horizons could not be identified. As a result, this soil is not ideal for agricultural cultivation.

The spatial distribution of all identified soil forms within the study area is presented in a soil map in Figure 7-46. Table 7-30 below presents the dominant soil forms and their respective diagnostic horizon sequence.

Table 7-30: Dominant soil forms as identified within the study area and their respective diagnostic horizon sequence.

Soil Form	Code	Diagnostic Horizon Sequence
Ermelo/Hutton	Er/Hu	Orthic/ Yellow Brown/ Red Apedal (thick)
Clovelly/Ermelo	Cv/Er	Orthic/ Yellow Brown (thick)/ Lithic/
Clovelly	Cv	Orthic/ Yellow Brown/ Lithic/
Watercourses (Dundee – including surface water)	Du	Orthic A/ Alluvial (thick)
Katspruit	Ka	Orthic A Gley
Glenrosa	Gs	Orthic A/ Lithic
Witbank	Wb	Anthrosols

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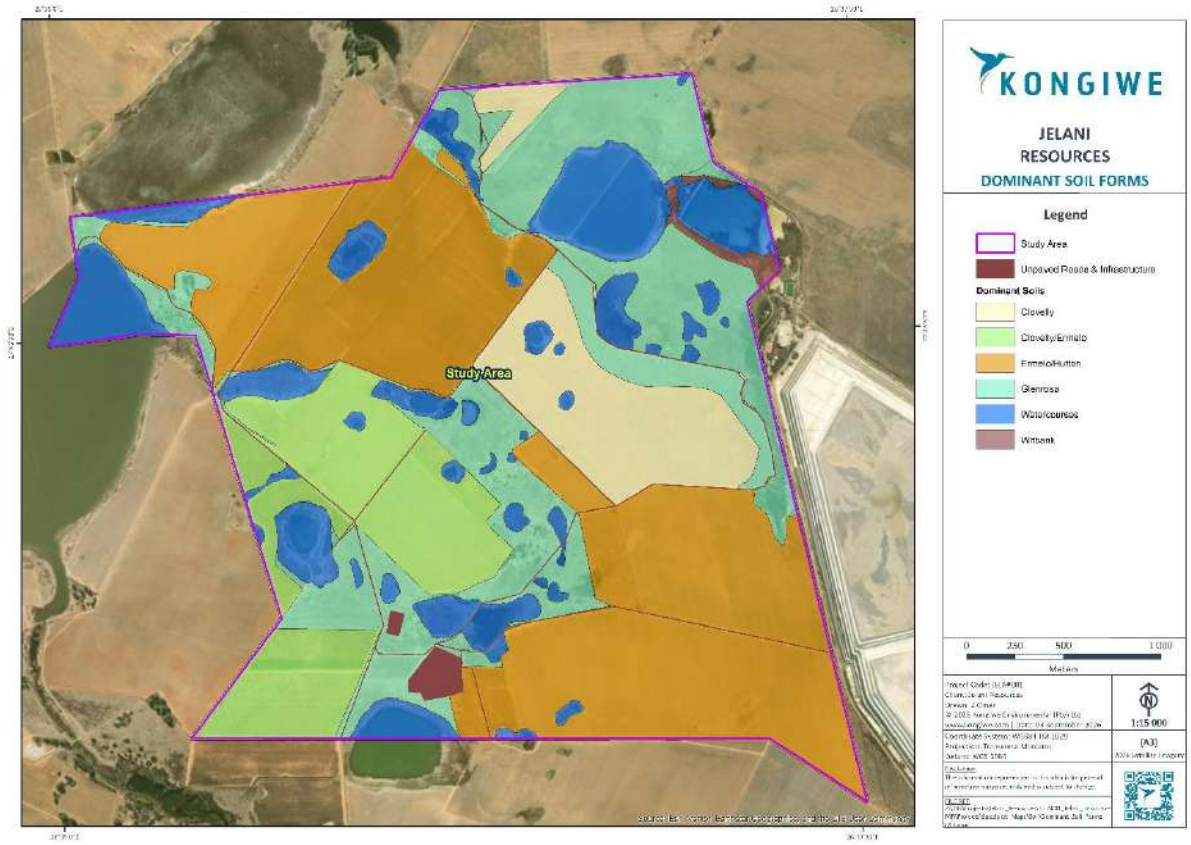


Figure 7-46: Dominant soil forms identified within the study area.

7.8.3 Land Capability Classification

The study area falls under Climate Capability Class 5 which has a moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may grow at risk of some yield loss.

The identified land capability limitations for the identified soils are discussed in comprehensive "dashboard style" summary tables presented from Table 7-32 to Table 7-35 below. The dashboard report's aim is to present all the pertinent information in a concise and visually engaging fashion.

Table 7-31: Identified soil forms within the study area and their respective land capability classification.

Soil Forms	Average Soil Depth (cm)	DALRRD (2018) Classification	Land Potential	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	>120	11. High	Good – L3	361.9	36.8
Clovelly/Ermelo				134.9	13.7
Clovelly	100			106.0	10.7
Watercourses (Dundee – including surface water)	40	6. Low - Moderate	Wetland – L5	149.3	15.1
Katspruit	55				
Glenrosa	35	5. Low	Restricted – L5	224.4	22.8

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Soil Forms	Average Soil Depth (cm)	DALRRD (2018) Classification	Land Potential	Area Extent (ha)	Percentage (%)
Witbank	N/A	2. Very Low	Very Low – L8	6.3	0.6
Total Enclosed Area				**983.0**	**100**

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Table 7-32: Summary discussion of the [11. High) land capability class currently under active agricultural cultivation of crops.

Land Capability: 11. High (Arable - Class II)			
View of the identified class II soil forms currently cultivated under rainfed farming			
			
Terrain Morphological Unit (TMU)	Relatively flat terrain with less than 0.5% slope.	Photograph notes	View of the identified red and/or yellow brown apedal horizons associated with the idenitfied soil forms.
Soil Form(s)	Clovelly, Ermelo/Hutton, and Clovelly/Ermelo	Area Extent (ha)	602.9 ha (61.3%)
Diagnostic Horizon Sequence	Orthic A/ Red/ Yellow Brown Apedal B/ (thick)/ Lithic	Land Capability The (11. High) land capability (Class II) is suitable for arable agricultural land use with relatively few to no restrictions. The identified soil forms are of good potential (L3) particularly when they occur under Climate Capability Class (C5) which is characterised by moderately restricted growing season due to low temperatures and severe frost. Therefore, these soils are considered to make a significant contribution to agricultural productivity on a regional and provincial scale.	
Land Potential	Good Potential – L3: Infrequent and/or moderate limitations due to soil, slope, temperatures, or rainfall. Appropriate contour protection must be implemented and inspected.		
Physical Limitations	No significant constraints. These soils are relatively deep (approximately >120 cm) which is considered sufficient		

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Land Capability: 11. High (Arable - Class II)			
	to allow plants' roots to extract moisture to sustain growth and development.		
Overall impact significance prior to mitigation	M	The overall impact on land capability is anticipated to be medium (M) without mitigation due to these soils being currently under dryalnd cultivation and contributing significantly towards provincial food production. However, if better managed, the overall anticipated impacts can be reduced to a very low level (VL) with effective application of soil conservation mitigation measures.	Consideration of Integrated Environmental Management and Sustainable Development principles: These are prime agricultural soils and are highly suitable for arable crops and can yield good profit returns under prudent crop selection and soil conservation management practices. However, with mitigatory measures such as avoidance of infrastructure placement on cultovated farming plots and minimisation of impact on arable soils, the proposed development and related activities remain viable. The co-existence of both must aim to ensure preservation of soil resources while ensuring sustainable development principles without compromising food safety and security as advocated for by CARA and PDALA acts.
Overall impact significance post mitigation	VL		

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Table 7-33:Summary discussion of the [6. Low – Moderate] – (Watercourses)] land capability class associated with watercourses.

Land Capability: 6. Low - Moderate (Watercourse - Class V)				
View of the identified class V soil forms within the study area				
				
Terrain Morphological Unit (TMU)	Relatively flat landscapes of < 0.5% slope gradient.		Photograph notes	View of the identified wet-based soils characterised by watercourses within the study area.
Soil Form(s)	Dundee (including surface water), and Katspruit		Area Extent (ha)	149.3 ha (15.1%)
Physical Limitations	These soils are not ideal for cultivation due to their occurrence within watercourses. Furthermore, the susceptibility to waterlogging conditions disqualifies these soils from both subsistence and commercial agriculture.		Land Capability These soils were classified as (6. Low – Moderate: Class V – Wetland/Watercourse) land capability due to land use limitations related to their occurrence within a watercourse. These soils are not considered to contribute significantly to local, provincial and/or national agricultural productivity.	
Land Potential	Watercourse/Wetland - L4: Watercourse and land with wetness limitations.			
Overall impact significance prior to	L	The overall impact of the proposed development and related activities on land	Consideration of Integrated Environmental Management and Sustainable	

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Land Capability: 6. Low - Moderate (Watercourse - Class V)			
mitigation		capability and land potential is anticipated to be low (L) prior to mitigation and very low (VL) with mitigation measures in place. Although these are not considered prime agricultural soils, development must be cognisant of these areas and mitigate sufficiently to prevent and/or avoid contamination and sedimentation of these watercourses.	Development Principles: These soils are not considered prime agricultural production soils due to the limitations in terms of the type of plants (hydrophytes) that can be grown. The cultivation of common crops is not feasible in these areas due to waterlogging conditions, anaerobic conditions in the root zone, as well as nutrient eluviation; thus, rendering the soils most suitable for livestock grazing under intensive management practices. The development has the potential to have an impact on the water quality of the study area. Thus, monitoring and protection of these watercourses under the National Water Act (36 of 1998) is deemed essential.
Overall impact significance post mitigation	VL		

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Table 7-34: Summary discussion of the [5. Low] grazing land capability class associated with the identified soil forms.

Land Capability: 5. Low (Grazing - Class VI)				
View of the identified class VI soil forms within the study area				
				
Terrain Morphological Unit (TMU)	Relatively flat to gently sloping landscape of < 1.5% slope gradient.		Photograph notes	View of the morphology of lithic and shallow soils as identified within the study area.
Soil Form(s)	Glenrosa		Area Extent (ha)	224.4 ha (22.8%)
Physical Limitations	Shallow effective rooting depth is the primary limitation of the land capability of the Glenrosa soil form, which is due to the occurrence of an impermeable lithic material at a relatively shallow depth (<35 cm) and/or exposed hard rock surfaces which hinders penetration of plant roots.		Land Capability The identified soils are of (5. Low: (Class VI) poor land capability and are not suitable for arable agricultural land use. These soils are, at best, suitable for natural pastures and light grazing. Therefore, these soils make a limited contribution towards local and regional scale.	
Land Potential	Restricted Potential – L5: Regular and/or moderate to severe limitations due to soil, slope, temperature or rainfall.			
Overall impact	M	The overall impact of the proposed	Consideration of Integrated Environmental Management and Sustainable	

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Land Capability: 5. Low (Grazing - Class VI)			
significance prior to mitigation		development and related activities is anticipated to be medium (M) without mitigation and low (L) with mitigation measures in place. This is due to the inherently poor land capability of the identified soil forms for arable agricultural cultivation of crops.	Development Principles: The identified soil forms are, at best, suited for grazing and/or wilderness practices. These soils are generally not considered of significant agricultural productivity as any agricultural cultivation will require extensive management practices and therefore limiting the choice of crops. Future developments are viable on these soils due to their low agricultural potential.
Overall impact significance post to mitigation	L		

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Table 7-35: Summary discussion of the [2. Very Low] wilderness land capability class associated with the identified soils.

Land Capability: 2. Very Low: (Wilderness - Class VIII)]			
View of the identified class VIII soil forms within the study area			
			
Terrain Morphological Unit (TMU)	Witbank; highly disturbed areas.	Photograph notes	View of the morphology of the anthropogenically disturbed soils.
Soil Form(s)	Witbank - (Transported Technosols)	Area Extent (ha)	6.3 ha (0.6%)
Physical Limitations	Comprises of significantly disturbed areas due to anthropogenic activities (i.e. farmhouses and related infrastructure) to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils are characterised by various limitations, primarily the absence of soil horizon as a growth medium.	Land Capability The identified soils have a (2. Very Low) very poor (Class VIII) wilderness land capability due to the significant disturbance that has occurred because of infrastructural developments and related activities. This has led to the long-term alteration of the soil physical properties such that these soils are no longer viable for agriculture. These soils are not considered to make any contribution towards agricultural productivity even on a local scale.	
Land Potential	Very Low Potential – L8: Severe limitations due to soil, slope, temperature or rainfall. Non-arable.		

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Land Capability: 2. Very Low: (Wilderness - Class VIII)]			
Overall impact significance	VL	The overall impact on land capability of these soils is anticipated to be very low (VL) due to their already existing poor land capability because of existing infrastructural developments.	Consideration of Integrated Environmental Management and Sustainable Development Principles: The current state of these soils requires significant rehabilitation already. The development is not anticipated to cause any loss of agricultural resources since these soils have been disturbed and therefore are not ideal for cultivation.

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7.8.4 Agricultural Sensitivity & Screening Tool Verification

The national web-based screening tool depicts the study area as having a very high agricultural sensitivity. Given that the site encompasses active commercial (rainfed) cultivation of crops and comprises of land capabilities varying from very high to low, the very high agricultural sensitivity allocated to the study area is valid and confirmed. However, it is the opinion of the study team that the risk of impact is significantly low given that no surface infrastructure is proposed within the project footprint.

Upon site assessment and verification, the agricultural sensitivity classes with varying degrees of impact depending on the type of land use and/or soil classification were determined as follows:

- Actively cultivated areas on high land capability soil [11. High (Class II)] – Rated as very high sensitivity due to ongoing and active dryland commercial farming.
- Wet-based soil [6. Low - Moderate (Class V)] – Rated as low sensitivity due to wetness limitation.
- Grazing land [5. Low (Class VI)] – Rated as low sensitivity due to the dominance of lithic material as well as exposed hard rock surfaces in some instances.
- Disturbed footprint areas [2. Very Low (Class VIII)] – Rated as very low sensitivity due to significant transformation and modification (residential and infrastructural developments) to the land which makes it unsuitable for agricultural activities.

Table 7-36 below summarises the identified soils, and their respective field verified agricultural sensitivity while Figure 7-47 depicts field verified agricultural sensitivity of the study area.

Table 7-36: Field verified agricultural sensitivity of the identified soils within the study area.

Soil Forms		DALRRD (2018) Classification	Field Verified Agricultural Sensitivity	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	Actively cultivated	11. High	Very High	603.0	61.3
Clovelly/Ermelo	Actively cultivated				
Clovelly	Actively cultivated				
Watercourses (Dundee – including surface water)		6. Low - Moderate	Low	149.3	15.1
Katspruit					
Glenrosa		5. Low	Medium	224.4	22.8
Witbank		2. Very Low	Very Low	6.3	0.6
Total Enclosed Area				**983.0**	**100.0**

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Figure 7-47: Field verified agricultural sensitivity of the study area.

7.8.5 Free State Protected Agricultural Areas (PAAs)

The Protected Agricultural Areas (PAA) have been mapped out according to their agricultural potential within the Free State Province by the Department of Agriculture, Land Reform and Rural Development (DALRRD, 2018 - 2022). These PAAs are classified into two categories, the irrigated (IR) and the rainfed (RF) agricultural production systems.

It is of importance to identify and demarcate agricultural land, based on its inherent capability and suitability (agricultural potential), for it to be preserved for exclusive agricultural use. Preservation and Development of Agricultural Land Bill (PDALB) defined the "Protected Agricultural Areas" as a:

"Cartographic delineated area of agricultural land –

- preserved for purposes of ensuring high value agricultural land is protected against non- agricultural land uses to promote long-term agricultural production and food security;
- includes all areas demarcated as such."

According to (DALRRD, 2022) database, the study area is located within the rainfed (RF) protected agricultural areas. However, no surface infrastructure is proposed within the study area, only the underground mine and related activities. As a result, no impact is anticipated on the protected agricultural areas (provided no subsidence occurs) as well as the active commercial farming taking place within the study area. Therefore, it is recommended that all mine operation and related activities be restricted to underground. This is to ensure that impact on

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agricultural production as well as well as regional and provincial food security is preserved throughout the life of mine (LoM).

Figure 7-48 below give an indication of the PAAs in relation to the proposed underground mine and related activities on a high level for planning purposes. This is in line with the Conservation of Agricultural Resources Act (CARA) 1983 (Act No. 43 of 1983) and the Preservation and Development of Agricultural Land Act (PDALA), Act. No 39 of 2024 which advocates for the protection of scarce agricultural resources of the Republic of South Africa.



Figure 7-48: Protected Agricultural Areas (PAAs) in relation to the proposed development.

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7.9 Heritage and Palaeontology

Refer to Specialist Study: Appendix D8 – Heritage Impact Assessment

7.9.1 Site Description

The study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup). The project footprint is primarily underlain by the Volksrust Formation of the Ecca Group, part of the Karoo Supergroup. The Ecca Group is Early to Late Permian in age (~289253 Ma) and comprises dark greenish-grey shale, siltstone, and fine-grained sandstone. These lithologies are typically deeply weathered and poorly exposed, with outcrops scarce and restricted to thinly bedded shale showing well-defined bedding planes. Sedimentological evidence indicates that the Volksrust Formation accumulated as deep-water offshore marine deposits (Botha & Botha, 2002).

Trace fossils and abundant plant fossils are known from the Ecca Group, particularly in sandstone-rich units in the northern Karoo Basin. Notably, the upper Volksrust Formation has yielded the first African occurrence of the bivalve Megadesmus, preserved with articulated valves in interbedded shale–siltstone deposits indicative of deltaic deposition near the Ecca–Beaufort Group boundary (Cairncross et al., 2005).

Overlying dolerite and hillslopes are partially calcretised older alluvium deposits, while gravelly colluvial and eluvial deposits dominated by hornfels, sandstone, and dolerite rubble mantle most hillslopes and plateau surfaces. These deposits represent sediment remobilisation and slope processes and contribute to the low relief topography characteristic of the study area.

The youngest geological units are the Quaternary superficial deposits (Qs), formed during the last ~2.6 million years. These deposits are largely unconsolidated to weakly consolidated, comprising clay, silt, sand, gravel, and calcrete, occurring as relatively thin, discontinuous veneers. They include channel, floodplain, pan, spring, and stream-related sediments and preserve evidence of palaeoclimatic fluctuations, with alternating wetter and drier phases influencing river flow regimes, sedimentation patterns, and vegetation dynamics (Hunter et al., 2006; Tooth et al., 2004; Maud, 2012). Climatic fluctuations during the Quaternary, particularly over the last ~1.8 million years, were among the most pronounced of the Cenozoic Era and strongly shaped the modern geomorphology of the region (Barnosky, 2005).

Fossil assemblages within Qs deposits are generally of low diversity, but may be locally abundant, particularly in fluvial, spring, and pan environments. Fossils typically include diatoms, freshwater gastropods and bivalves, ostracods, trace fossils, mammalian bones and teeth, coprolites, freshwater molluscs, plant microfossils, and tortoise remains. Late Pleistocene deposits along the Modder River have preserved fossilised hyena burrows and lairs, as well as evidence of prehistoric human activity in association with Middle and Later Stone Age artefacts (Broom, 1909a, b; Cooke, 1955; Churchill et al., 2000; Rossouw, 2006; Scott & Brink, 1991; Horowitz et al., 1978; Butzer, 1984). Important fossil localities in the broader region include Florisbad, Baden-Baden, Liebenbergspan, Deelpan, and Erfkroon, with Florisbad designated as a Provincial Heritage Site (Brink, 1987, 1988; Scott & Rossouw, 2005).

Archaeologically, the Free State interior is known for Middle Stone Age (MSA) and LSA assemblages often associated with water sources, river terraces, and pan systems. Van der Walt (2013) notes that although MSA

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artefacts may be found around pans, the study area lacks such features, contributing to the absence of material culture within the development footprint. This absence is further explained by the scarcity of suitable raw materials for stone tool manufacture in the immediate landscape. As a result, no Early, Middle, or Later Iron Age sites are expected within the footprint, although isolated ceramics belonging to the Moloko branch of the Urewe tradition have been recorded further north (Maggs 1976; Mason 1986).

7.9.2 Archival and historical maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and for determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were assessed by overlaying the study area on the images or map sheets to observe the development of the area and to identify and locate historical structures, possible BGG and/or archaeological sites protected under sections 34 and 36 of the NHRA, present in, or immediately adjacent to, the area.

Historical topographic maps (1:50 000) for various years (1952, 1954, 1975, 1997 and 2009) were available for utilisation in the background study (Figure 7-49).

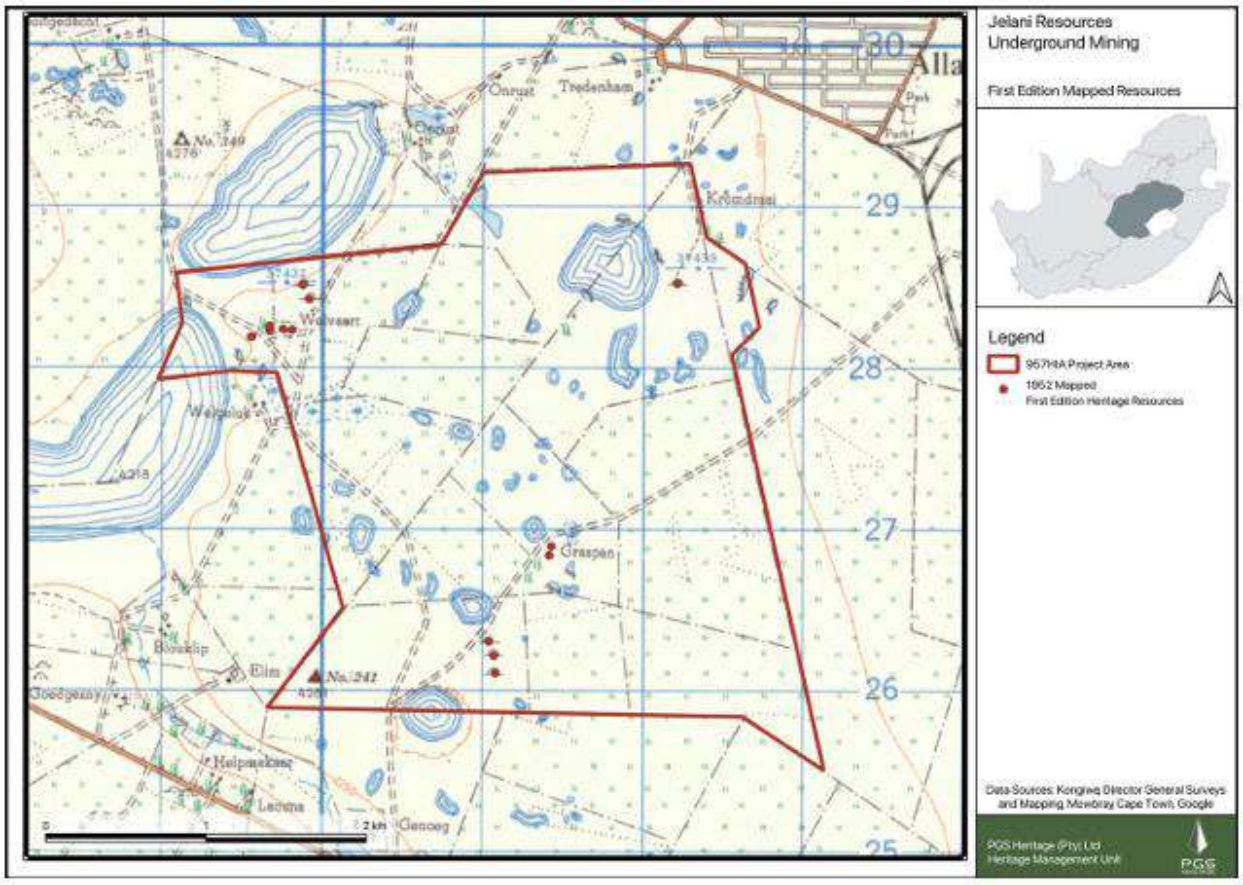


Figure 7-49: First edition 1:50000 topographic map with sensitive areas marked in red (1962).

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7.9.3 Previous heritage impact assessment reports from the study area and surroundings

A search of the SAHRIS database revealed that six previous archaeological, heritage and palaeontological impact assessments had been undertaken within the surroundings of the study area. These previous studies are listed below in ascending chronological order:

Russouw, L. 2012. Phase 1 Heritage Impact Assessment of a Proposed New Solar Facility at Grootspruit 252 near Allanridge, Free State Province.

Van der Walt, J. 2013. Archaeological Scoping Report for the Proposed Grootkop Solar Energy Facility.

Van der Walt, J. 2013. Archaeological Impact Assessment for the proposed Grootkop Solar Energy Facility, Free State Province.

Lavin, J., & Presnyakova, D. 2022. The development of various PV Facilities and their associated grid connections associated with Harmony Gold Mining activities throughout the Free State Province and in the Northwest Province.

Lavin, J. 2023. Proposed development of the 30MW Harmony Target Solar PV, Allanridge, Free State Province.

Millsteed, B. (nd). Desktop Palaeontology Heritage Impact Assessment Report for the Grootkop Solar Energy Facility.

7.9.4 Heritage Screening

A heritage screening was conducted by means of the DFFE National Web-based Environmental Screening Tool as required GN 982. According to the heritage screening report, the project area has a Low Heritage Sensitivity. The remote sensing has shown that scant archaeological and heritage resources were present in the study area and thus is in agreement with the original screening rating.

7.9.5 Heritage Sensitivity

Analysis of topographical maps and satellite imagery enabled the identification of possible heritage sensitive areas. By superimposition and analysis, it was possible to rate these structures according to age and thus their level of protection under the NHRA. Table 7-37 lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

Table 7-37: Tangible heritage site in the study area.

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA sections 3 and 35
Structures	Possibly older than 60 years	NHRA sections 3 and 34
Burial grounds	Graves	NHRA sections 3 and 36

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix (Table 7-38).

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Table 7-38: Landform type to heritage find matrix.

Landform Type	Heritage Type
Crest and foot hill	LSA and MSA scatters, Late Iron Age (LIA) settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Water holes/pans/rivers	MSA and LSA sites, LIA settlements
Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements

7.9.6 Remote sensing findings

No physical fieldwork was conducted, and the archival map and remote sensing findings are tabulated below:

Table 7-39: Potential Heritage Resources identified on archival maps and remote sensing.

Site ID	Resource Type	Resource Trigger	Verified	GPS Coordinates
JR_01	Kraal	Section 34 and 36	No	2959885, -3220354
JR_02	Structure	Section 34	No	2960014, -3220314
JR_03	Structure	Section 34	No	2960017, -3220283
JR_04	Structure	Section 34	Yes	2960100, -3220291
JR_05	Structure	Section 34	Yes	2960174, -3220309
JR_06	Structure	Section 34	No	2960299, -3220093
JR_07	'Hut' Structure	Section 34 and 36	No	2960270, -3220010
JR_11	Trig Beacon	Section 34	Yes	2960346, -3222775
JR_12	'Hut' Structure	Section 34 and 36	No	2961568, -3222506
JR_13	'Hut' Structure	Section 34 and 36	No	2961599, -3222611
JR_14	'Hut' Structure	Section 34 and 36	No	2961608, -3222729
JR_15	Structure	Section 34	No	2961986, -3221899
JR_16	Structure	Section 34	No	2962001, - 3221836
JR_17	'Hut' Structure	Section 34 and 36	No	2962891, -3219986

The historical and current maps for Odendaalsrus 2726DC (1:50 000) for the years 1952, 1954, 1975, 1997 and 2009 allowed for the plotting of 14 resources (Figure 7-50). Seven rectilinear structures (JR_02, JR_03, JR_04, JR_05, JR_06, JR_15, and JR_16); five 'hut' structures (JR_07, JR_12, JR_13, JR_14, and JR_17); one kraal (JR_01) and one trigonometrical survey beacon (JR_11).

With the use of ESRI and Google satellite imagery, three (JR_04, JR_05, and JR_11) of the 14 resources were able to be verified (Figure 7-51). These resources trigger section 34 of the NHRA, pertaining to historical structures. Due to there not being fieldwork that was conducted, it is not possible to ascertain full site extents or any status of these or other resources within the project area. As such, JR_04, JR_05 and JR_11 are graded by sine aspectu inference as NCW with low local heritage significance.

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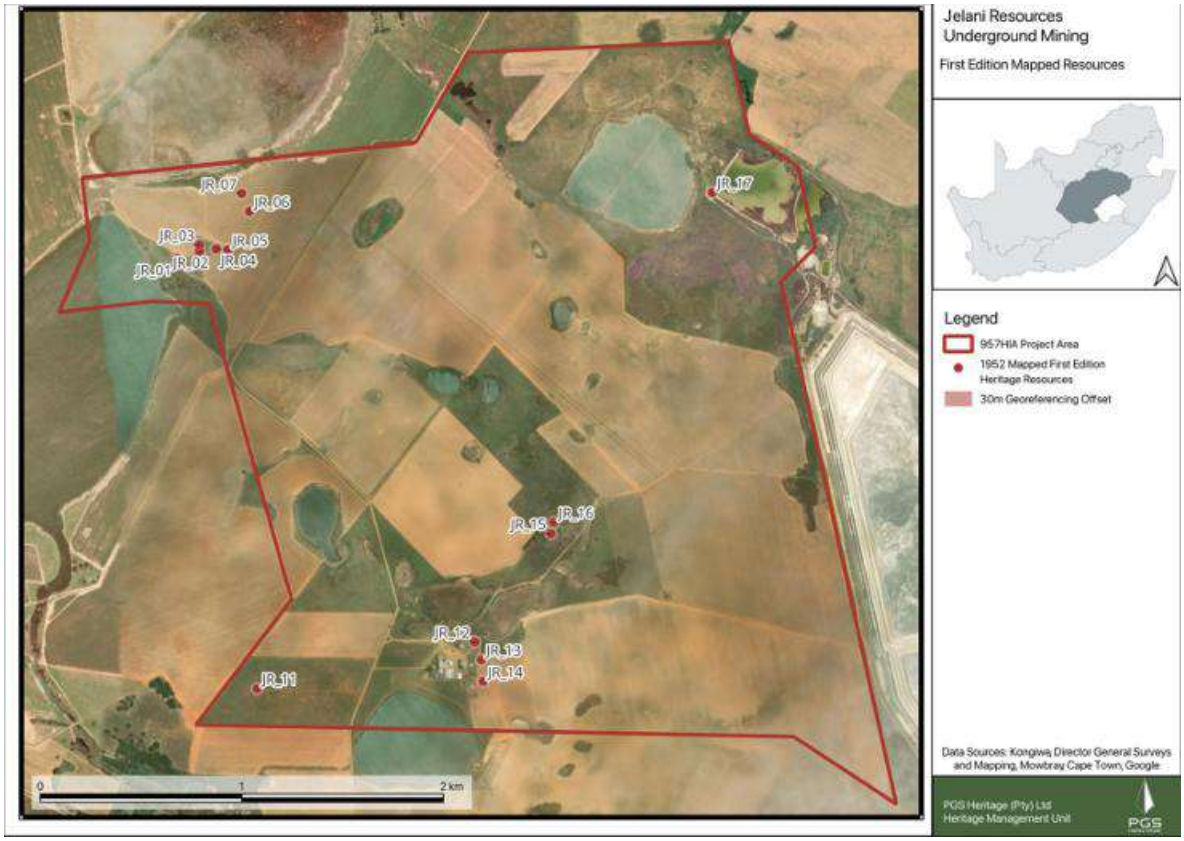


Figure 7-50: Identified heritage resources, as recorded on historical maps, within proximity of the proposed Jelani Resources mining operations.

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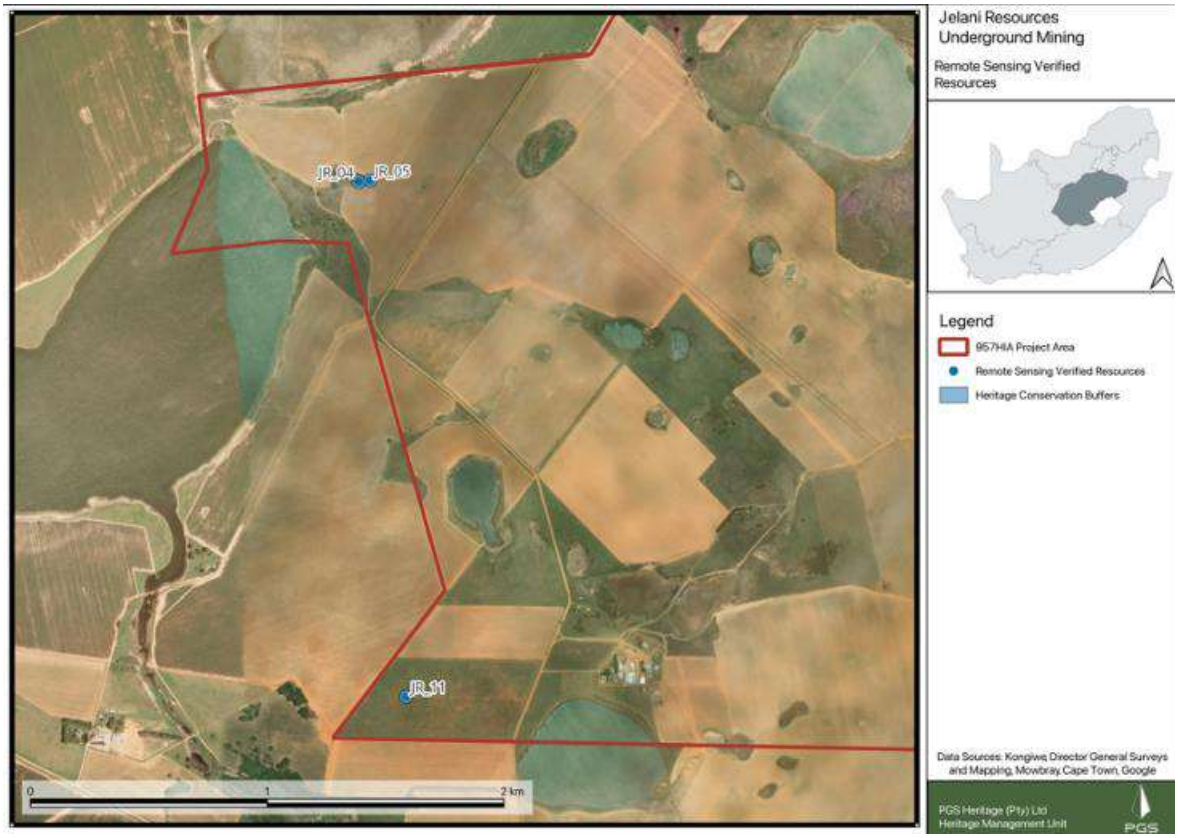


Figure 7-51: Remote sensing verified heritage sites with applicable buffer.

7.9.7 Palaeontology

The Proposed Project is shown on the 1:250 000 Kroonstad (2726) Geological Map (Council for Geoscience, Pretoria; Figure 7-52). The study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup). According to the SAHRIS PalaeoMap, the Volksrust Formation is classified as having High Palaeontological Sensitivity (orange), while the overlying Qs deposits are assigned a Moderate palaeontological sensitivity, both intersecting the proposed development footprint (Figure 7-53, Table 7-40) (Almond & Pether, 2008; SAHRIS website). The site is also classified as having High Palaeontology Theme Sensitivity (red) in the DFFE National Environmental Screening Tool (Appendix D1).

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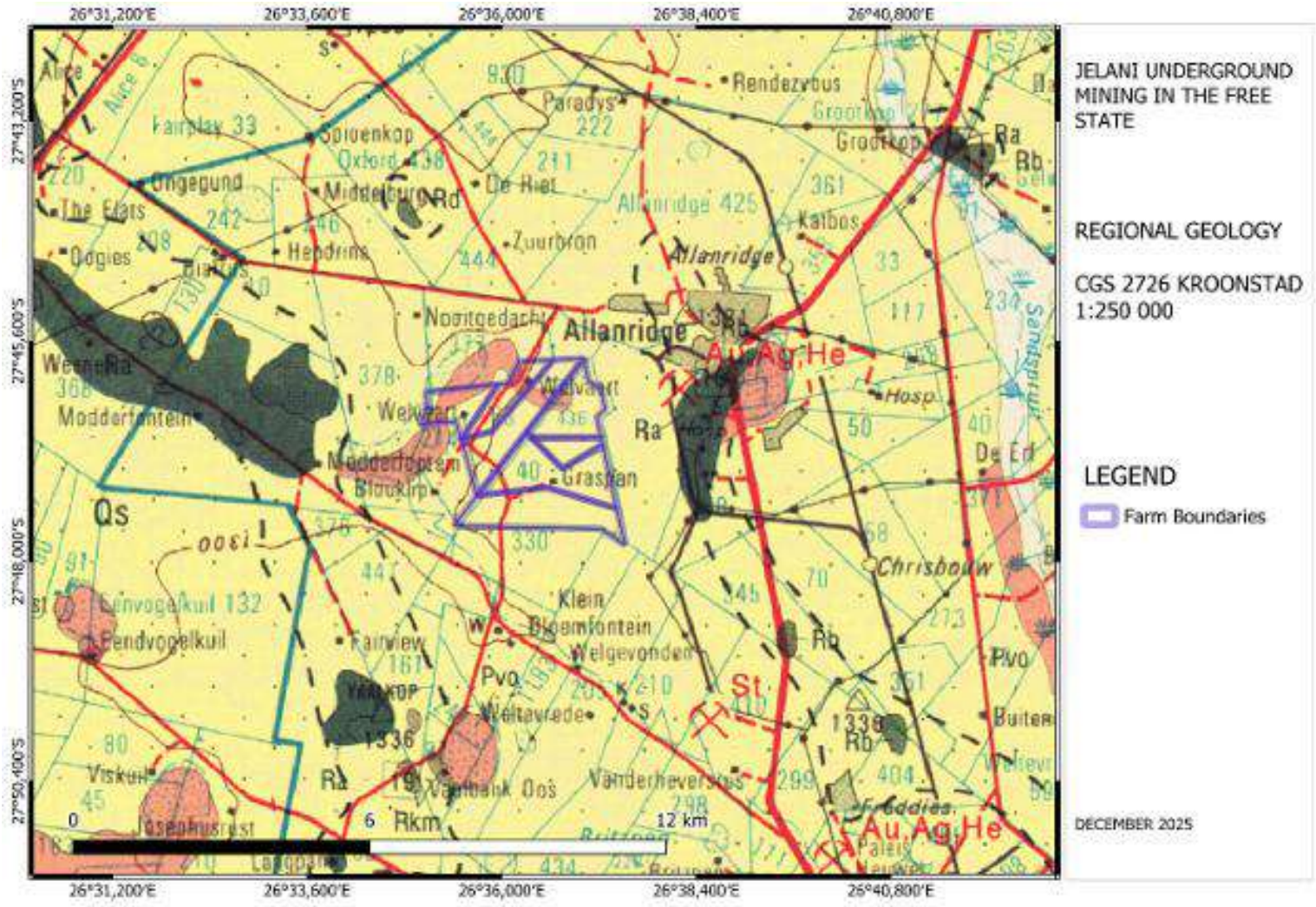


Figure 7-52: Extract of the 1:250 000 000 Kroonstad 2726 Geological Map (Council for Geosciences, Pretoria) indicates that the study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup (Butler 2025).

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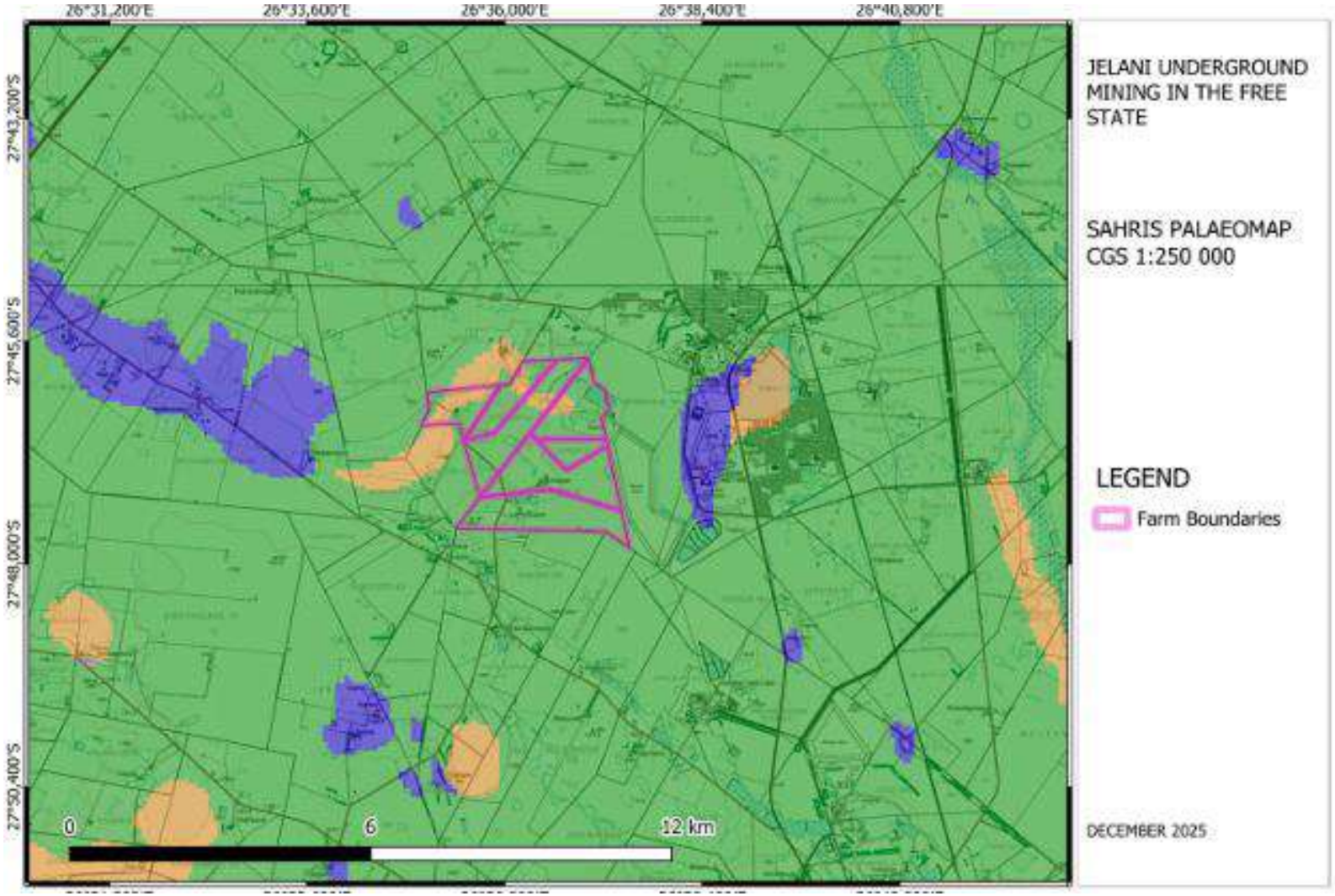


Figure 7-53: Extract of the SAHRIS PalaeoMap (Council for Geosciences) indicates that the study area is underlain by sediments with a High (orange) and a Moderate (green) Palaeontological Sensitivity (Butler 2025).

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Table 7-40: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).

Colour	Sensitivity	Required Action
Red	Very high	Field assessment and protocol for finds is required
Orange/Yellow	High	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
Green	Moderate	Desktop study is required
Blue	Low	No palaeontological studies are required however a protocol for finds is required
Grey	Insignificant/ Zero	No palaeontological studies are required
White/clear	Unknown	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Despite this High Sensitivity, no field-based palaeontological investigation was conducted at the site, and therefore the site's Palaeontological Sensitivity could not be irrefutably verified. However, desktop-based research indicates that the palaeontological sensitivity of the area is Low.

7.10 Air Quality

Refer to Specialist Study: Appendix D2 – Air Quality Impact Quality Assessment

As part of the Air Quality Impact Quality Assessment (AQIA), a baseline air quality assessment was undertaken through a review of meteorological monitoring data, available air quality monitoring data, air quality legislation and the identification of nearby sensitive receptors and existing emission sources surrounding the project site. The potential impact of emissions from the operational activities associated with the proposed project on air quality is evaluated through the compilation of an emissions inventory and subsequent dispersion modelling simulations using AERMOD. Comparison of predicted concentrations for criteria air pollutants is made with the South African National Ambient Air Quality Standards (NAAQS, 2009 and 2012) and the South African National Dust Control Regulations, 2026 where applicable.

7.10.1 Sensitive Receptors

A sensitive receptor is defined as a person or place where involuntary exposure to air pollutants released by the site's activities could occur. Identified sensitive (discrete) receptors within a 20km radius of the project site are shown in Table 7-41 and Figure 7-54.

The discrete receptors detailed in Table 7-41 were used for modelling purposes. Maximum predicted incremental concentrations are provided for the identified discrete receptors. Identified sensitive receptor points are located at the centre of residential areas, or near schools, hospitals, and old age homes, to determine the maximum concentrations that could be expected at or near the sensitive receptors. Discrete points are not plotted for each individual sensitive receptor but are used to represent a group of sensitive receptors located near to each other (e.g., several schools).

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Table 7-41: Discrete receptors within 20km radius of the project site. Receptors were identified through a desktop study.

SURROUNDING RECEPTORS (<20KM)				
Discrete Receptor ID	Name Edu = educational/school/training facilities HC = healthcare/clinic/hospital facilities Old = old age home Residential = Dwellings/ farmhouses	UTM Co-ordinates (35S)		Elevation (m)
		X (m)	Y (m)	
DR1	Dwellings (Farmhouse)	458673.77	6925594.00	1302.55
DR2	Dwellings (Farmhouse)/Stynenal (Pty) Ltd (Pig Farm)	459459.67	6925044.27	1301.77
DR3	Res (Allanridge)	464715.67	6929791.24	1322.69
DR4	Dwellings (Farmhouse)- inside boundary	460901.22	6925886.62	1304.31
DR5	Edu (Allanridge Combined School)	465123.36	6929768.96	1323.46
DR6	Res (Nyakallong)	465872.54	6926947.42	1313.18
DR7	Edu (SA Mokgothu Primary School)	466979.67	6927049.19	1319.64
DR8	Dwellings	454468.17	6931054.10	1300.80
DR9	Dwellings/Edu (Saamkom Primary School)	456619.84	6932180.89	1300.15
DR10	Dwellings	456718.95	6927019.53	1297.36
DR11	Dwellings	454231.69	6927822.98	1287.91
DR12	Dwellings/Edu (Thabang Primary School)	452867.81	6928708.75	1292.38
DR13	Dwellings	451876.86	6929216.96	1288.68
DR14	Dwellings/Edu (Itumeleng Primary School)	459935.97	6937383.59	1296.59
DR15	Res (Hospital Park)	467064.92	6917110.02	1331.77
DR16	Res (Ross Kent North)	469209.40	6917522.06	1335.60
DR17	Res (Kutlwanong)	475425.17	6919402.33	1342.07
DR18	Res (Thelma)	471214.69	6916993.48	1341.79
DR19	Res (Odandelruus)	469231.97	6916292.28	1336.71
DR20	Edu (Eendvogelkuil Primary School)	449668.84	6924151.20	1285.25
DR21	Dwellings (Farmhouse)	447635.60	6927065.24	1280.91

Notes:

*DR = discrete receptor

*No hospitals/healthcare/clinic facilities identified within 20km of the project site.

*<10 school/training/educational facilities within 20km of the project site (located in surrounding areas).

*No old age home facilities identified within 20km of the project site.
*Numerous dwellings in surrounding areas.

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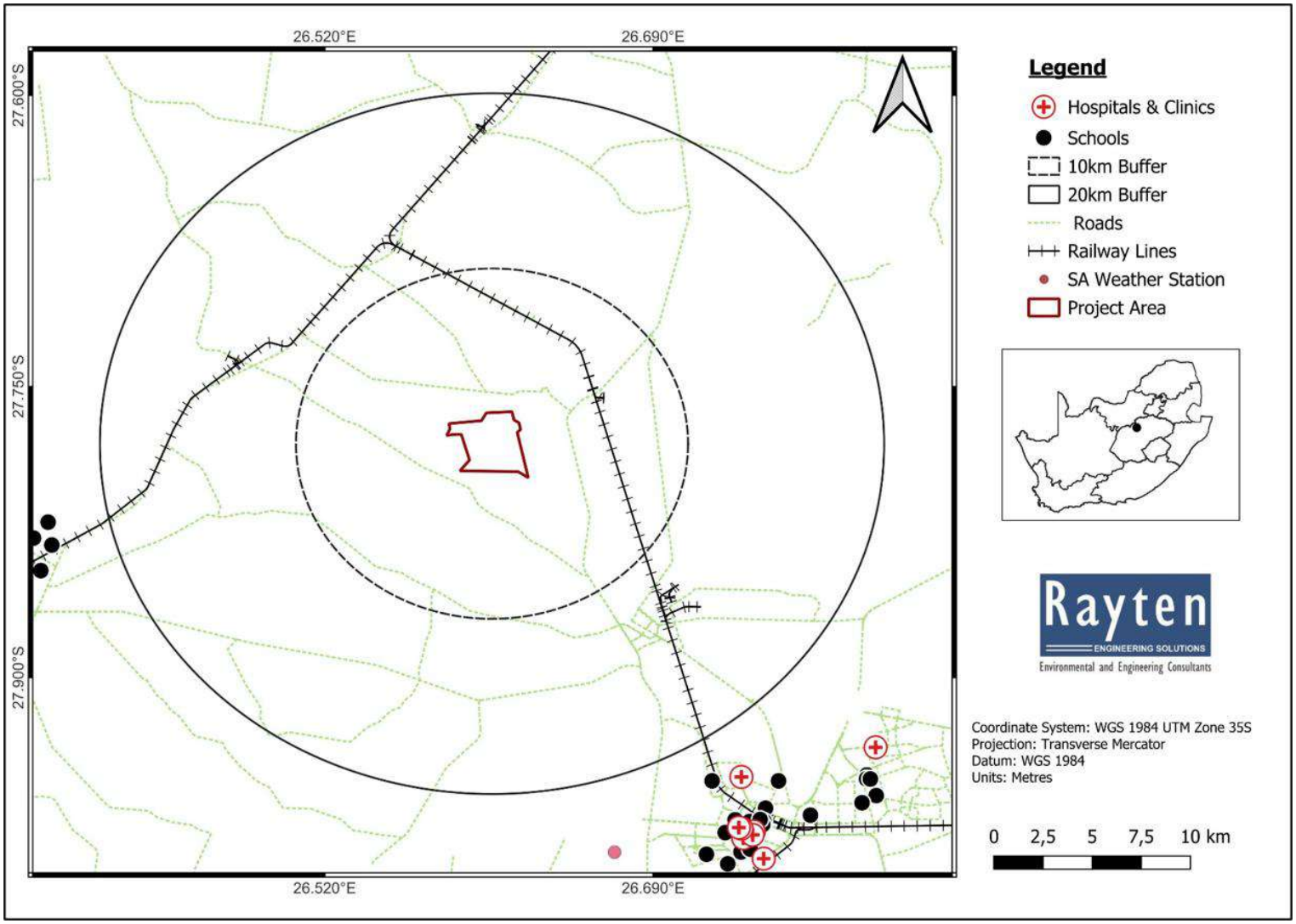


Figure 7-54: Site locality for the project site.

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7.10.2 Meteorological Overview

7.10.2.1 Local Wind Field

Figure 7-56 below provides the period wind rose plot for the project site for the period January 2023 to December 2025. The predominant wind directions for the period are observed from the north-eastern quadrant, with an average wind speed of 3.26 m/s. Wind conditions during the three-year period generally ranged from light air to fresh breezes, with the majority of winds occurring within the 0.5 – 2.1 m/s, 2.1 – 3.6 m/s and 3.6 – 5.7 m/s wind speed classes. Higher wind speed occurrences (>8.8 m/s) were relatively infrequent and recorded occasionally (~0.2% of the time). Calm conditions, defined as wind speeds equal to 0.0 m/s, were observed with a frequency of 7.5%, while light air to fresh breezes, ranging from 0.5 m/s to 8.80 m/s were observed for 91.4% of the time (Figure 7-55).

The morning (AM) and evening (PM) period wind rose plots for the period January 2023 to December 2025 are given in Figure 7-57 and show slight diurnal variation in the wind field data. During the morning (AM) and evening periods, winds predominantly originate from the north-eastern quadrant. However, during the evening (PM) period, an additional south-westerly wind component emerges but it is less frequent than the north-easterly winds (Figure 7-57). Wind intensities during both periods remain generally similar, with most winds falling within the light to moderate breeze categories. The average wind speeds recorded during the morning and evening periods were 3.53 m/s and 2.92 m/s, respectively.

Seasonal winds at the project site are shown in Figure 7-58 below. During all seasons, prevailing winds are from the north-eastern quadrant. Frequencies of calm conditions were 5.66% (summer), 10.85% (autumn), 8.18% (winter) and 5.05% (spring).

Based on the prevailing wind fields for the period January 2023 to December 2025, emissions from the proposed activities will likely be transported towards the south-westerly wind quadrant. Wind speeds observed during all time periods were generally classified as light air to fresh breezes, which may help in effective dispersion of pollutants from the proposed operations. However, higher wind speeds can facilitate fugitive dust emissions from open exposed areas such as stockpile areas and waste rock dumps.

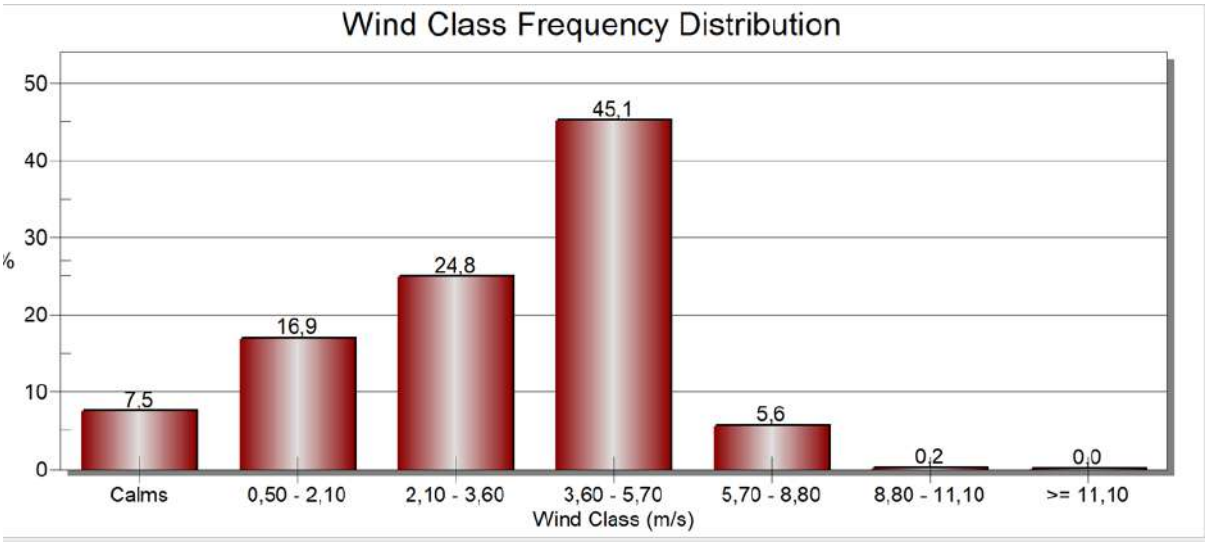


Figure 7-55: Wind class frequency distribution from the period January 2023 - December 2025.

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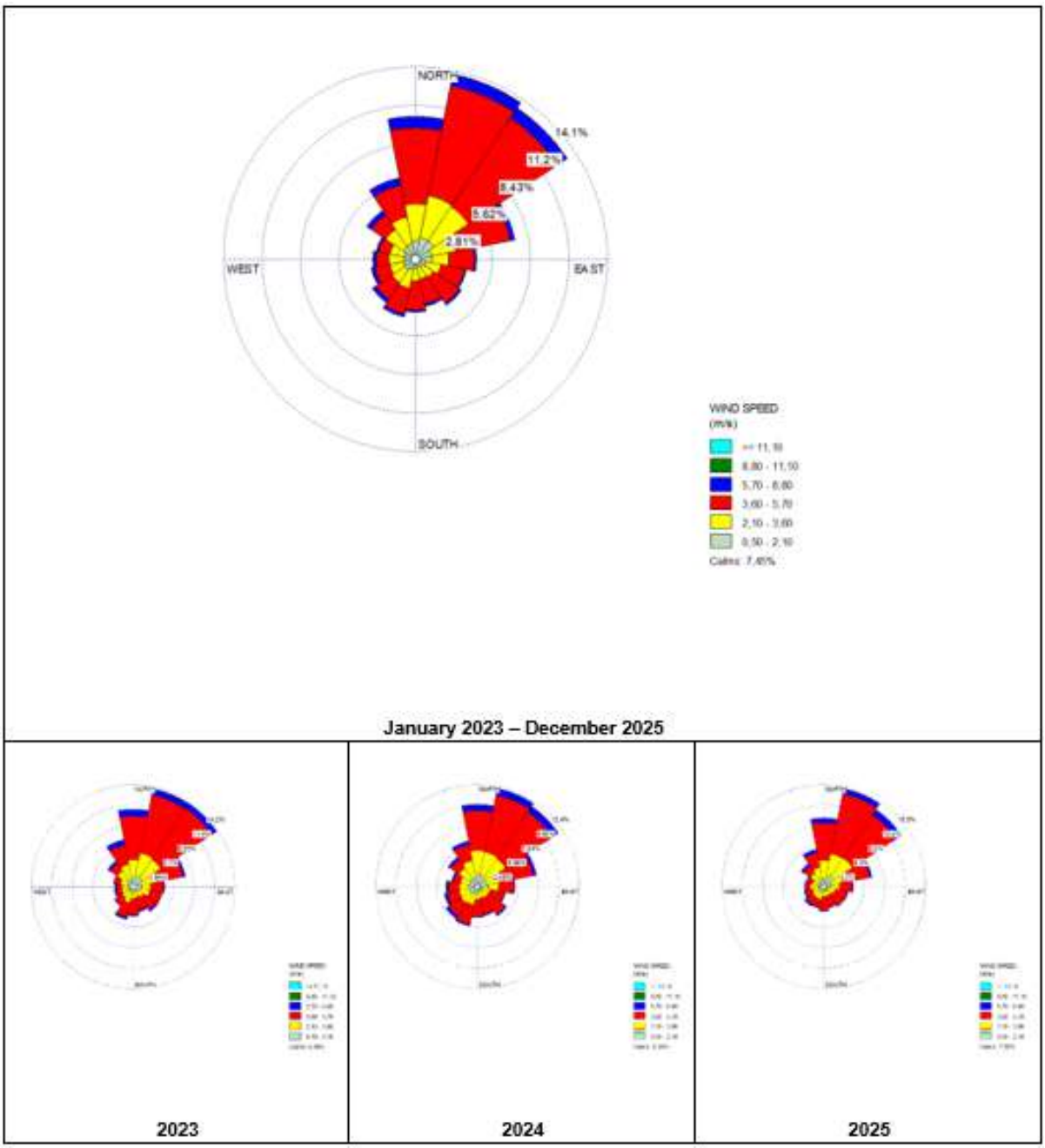


Figure 7-56: Period Wind Rose Plots for the project site from the period January 2023 - December 2025.

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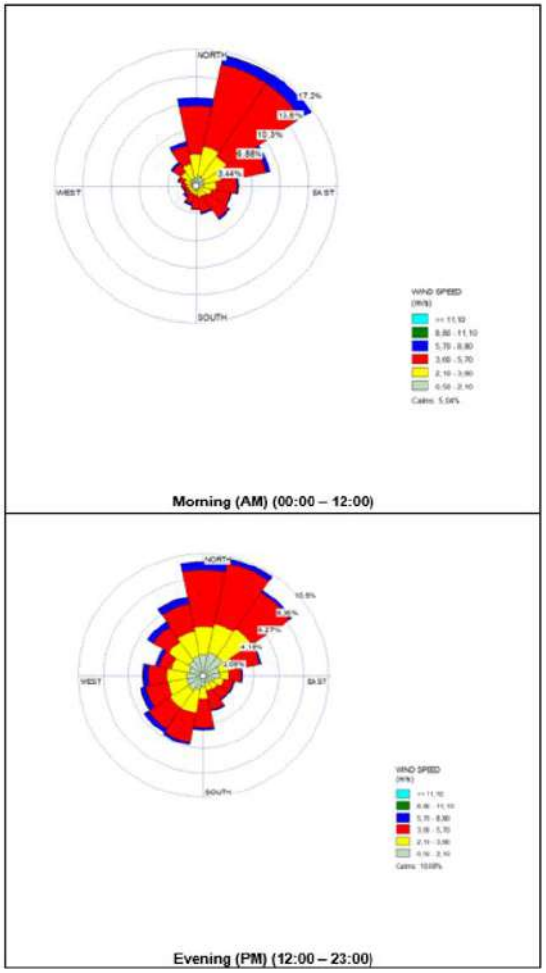


Figure 7-57: Morning (AM) (00:00 - 12:00) and Evening (PM) (12:00-23:00) Period Wind Rose Plots for the project site from the period January 2023 - December 2025.

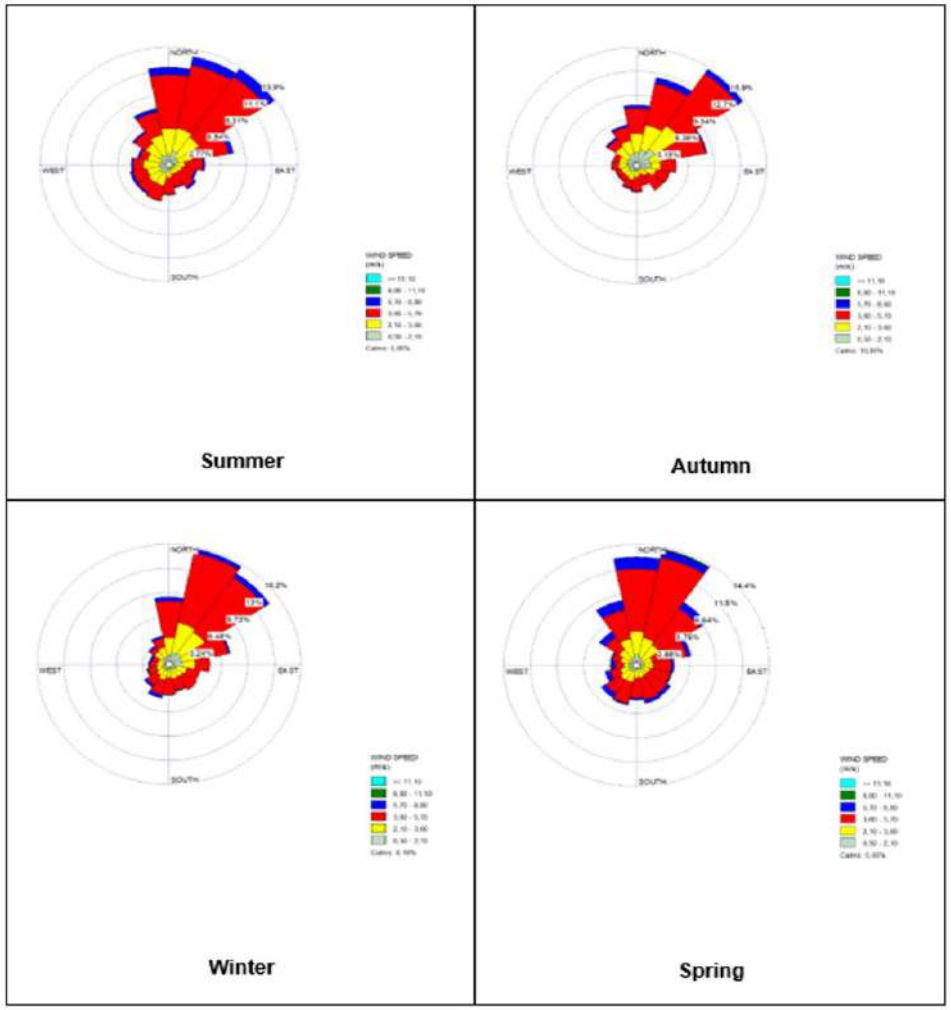


Figure 7-58: Seasonal Variation of Winds for the project site from the period January 2023 - December 2025.

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7.10.3 Baseline Air Quality Concentrations

The existing air quality situation is usually evaluated using available monitoring data from permanent ambient air quality monitoring stations and dustfall networks near the project site. The nearest air quality monitoring station to the project site is located at the Bayswater Clinic (-29.085052°S; 26.242689°E) in Bloemfontein, however, this station is located more than 10km away from the proposed mine (i.e., ~150km south-west of the mine) and would not provide an accurate representation of background concentrations for criteria air pollutants (PM10, PM2.5, CO, SO2, NO2) at the project site. There is no other ambient air quality monitoring station operated near the project site (within a ~10km radius) that data could be used to represent background air quality, thus, baseline air quality concentrations for the criteria air pollutants could not be determined for the project site.

Dustfall monitoring is undertaken near the project site, by Harmony Gold, using single-unit dust bucket stations. Thus, background dustfall data for the project area was obtained from Harmony's monitoring network for the July 2024 – June 2025 monitoring periods. The dustfall monitoring network consists of seven (7) dustfall monitoring sites. Six (6) of the sites are classified as non-residential, while the seventh site is classified as residential.

7.10.3.1 Baseline Dust fall Rates

Out of 70 dustfall rates recorded at the Harmony sites for the July 2024 – June 2025 monitoring periods, only one (1) exceedance of the residential area standard of 600 mg/m2/day was recorded at site HAR1, i.e., at Nyakallong (Table 7-42, Table 7-43and Figure 7-59). However, causes of the exceedance were unknown at the time of compilation of this report. The exceedance was recorded in March 2025. In terms of the National Dust Control Regulations, 2026, a total of two non-consecutive exceedances of the residential and non-residential area limits are permitted within a calendar year. Thus, based on Harmony's dustfall monitoring data for the July 2024 – June 2025 monitoring periods, background dustfall rates at the project site are compliant with the Dust Control Regulations.

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Table 7-42: Monthly dust fallout rates at the Harmony monitoring sites for July 2024 – June 2025.

Site ID	Site Description	Site Classification	Applicable Standard (mg/m2/day)	Jul-24	Aug-24	Sept-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Average
HAR1	Nyakallong	Residential	600		54	186	209	189	200	201	200	1570		394	102	202,86
HAR36	Allanridge Silos	Non-residential	1200	87	48	204	302	81	181	124	269	97	60	76	47	
HAR41	West from Target TSF	Non-residential	1200			247	261	196	80	145	213	605	255	67	58	
HAR42	South from Target TSF	Non-residential	1200			237	200	85	220	67	10	68	41	14	79	
HAR43	South from Freddies 9 TSF	Non-residential	1200			215	720	103	146	121	162	121	71	55	47	
HAR44	North from Freddies 9 TSF	Non-residential	1200			586	1130	205	134	83	150	50	36	86	166	
HAR45	East from Freddies 9 TSF	Non-residential	1200					237	326	280	215	39	169	306	212	

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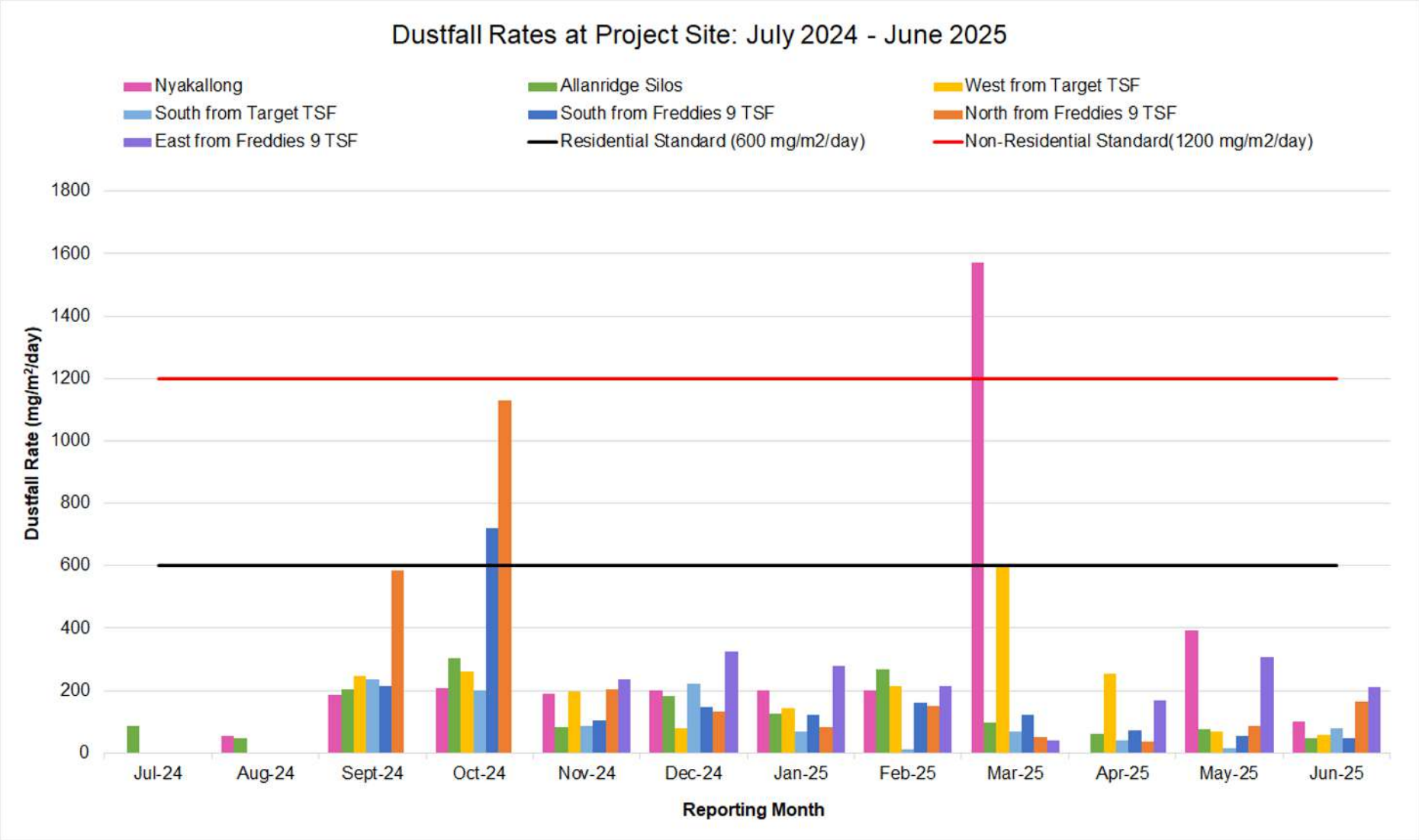


Figure 7-59: Dustfall rates associated with the Harmony monitoring network for the period July 2024 – June 2025.

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Table 7-43: Frequency of exceedances of dust control standards at the Harmony dust bucket sites for the period July 2025 – June 2025.

Harmony				Frequency of Exceedance of Applicable National Standard	Applicable National Standard
Site ID	Description	Unit Type	Classification	2024/2025	
Single Units - compared to non-residential standard					**mg/m²/day**
HAR36	Allanridge Silos	Single	Non-residential	0	1200
HAR41	West from Target TSF	Single	Non-residential	0	1200
HAR42	South from Target TSF	Single	Non-residential	0	1200
HAR43	South from Freddies 9 TSF	Single	Non-residential	0	1200
HAR44	North from Freddies 9 TSF	Single	Non-residential	0	1200
HAR45	East from Freddies 9 TSF	Single	Non-residential	0	1200
Single Units - compared to residential standard					**mg/m²/day**
HAR1	Nyakallong	Single	Residential	1	600

7.10.4 Surrounding Source of Air Pollution

Existing key sources of air pollution surrounding the project site were identified during a desktop exercise and include (Figure 7-60):

- Commercial agricultural activity (surrounding areas);
- Mining activities (surrounding areas);
- Wind erosion from exposed/bare surfaces (surrounding areas); and
- Vehicle dust entrainment on unpaved roads (surrounding areas).

Industrial areas, villages and informal settlement areas are found interspersed within the main land use types and they act as additional sources of air pollution in the area. Villages and informal settlements are typically associated with domestic solid-fuel burning emissions (Matandirotya, et. al., 2022), while industrial areas generally emit process emissions. As shown in Figure 7-60, agricultural activities dominate the identified pollution sources in the area. However, all nearby sources are expected to negatively influence air quality within the airshed.

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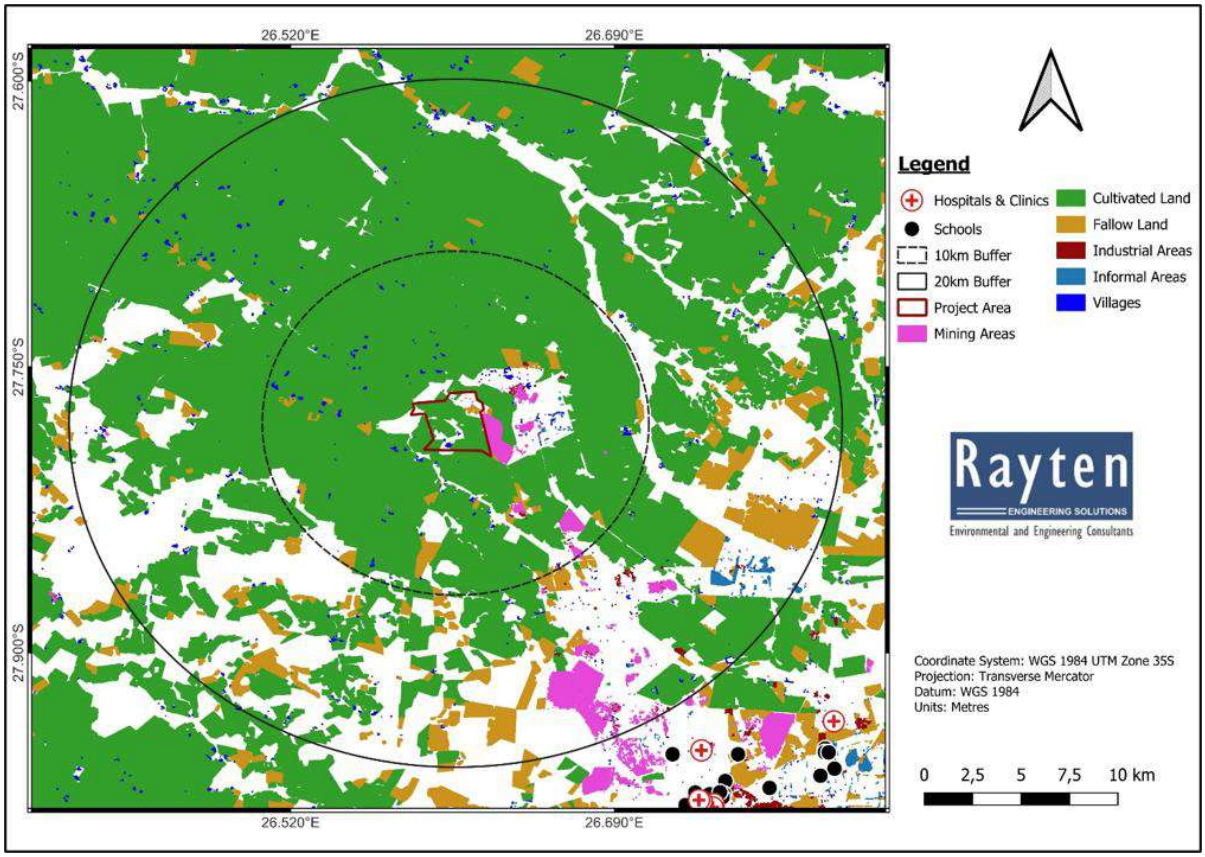


Figure 7-60: Identified surrounding emission sources within 20km of the project site.

7.10.4.1 Commercial Agriculture

There are several commercial agricultural areas surrounding the project site. Emissions from agricultural activities are difficult to control due to the seasonality of emissions and the large surface area producing emissions. Expected emissions resulting from agricultural activities include particulates associated with wind erosion and burning of crop residue, chemicals associated with crop spraying, and odiferous emissions resulting from manure and fertilizer. Dust associated with agricultural practices may contain seeds, pollen, and plant tissue, as well as agrochemicals, such as pesticides. The application of pesticides during temperature inversions increases the drift of the spray and the area of impact.

Dust entrainment from farming vehicles travelling on gravel roads may also cause increased particulates in an area. Dust from traffic on gravel roads increases with higher vehicle speeds, more vehicles and lower moisture conditions. The seasonal burning of the veld from July to September for field clearing in preparation for planting may also be a source of smoke. The nature of the activity has a potential impact on air quality in the area.

7.10.4.2 Mining Activities

Mining operations are known to produce significant amounts of fugitive dust. Fugitive dust emissions result from activities such as blasting and drilling, material handling, vehicle entrainment by haul vehicles, as well as windblown dust from stockpiles (Murzin & Gorlenko, 2021).

Some mining areas, including open bulk material storage areas and waste dumps that are susceptible to wind erosion, are identified within a 20km radius of the project site, particularly in the south-eastern quadrant.

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7.10.4.3 Wind Erosion from Exposed/Bare surfaces

There are some open exposed areas such as bare soil, eroded natural land, etc, around the project site, which represent a source of dust in the area. Dust emissions due to the erosion of exposed areas occur when the threshold wind speed is exceeded. The threshold wind speed is dependent on the erosion potential of the exposed surface, which is expressed in terms of the availability of erodible material per unit area (mass/area). Any factor which binds the erodible material or otherwise reduces the availability of erodible material on the surface, thus, decreases the erosion potential of the surface. Studies have shown that when the threshold wind speeds are exceeded, particulate emission rates tend to decay rapidly due to the reduced availability of erodible material.

7.10.4.4 Vehicle Dust Entrainment on Unpaved Roads

Vehicle-entrained dust emissions from the surrounding unpaved roads in the area potentially represent a source of fugitive dust. When a vehicle or truck travels on an unpaved road, the force of the wheels on the road surface causes the pulverisation of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

7.10.5 Dispersion Modelling Results

Dispersion simulations were undertaken for the following scenarios to determine:

1. The construction phase scenario, where emissions associated with construction and refurbishment activity due to the development and/or upgrade of infrastructure at Target No 2 Shaft, were modelled.
2. The operational phase scenario, where emissions associated with surface activities at the proposed mine were modelled. This scenario represents the potential impacts if the proposed mine were emitting under normal operating conditions and comprises two different operational configurations, representing Phase 1 and Phase 2, respectively.

The Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014), recommends the use of the 99th percentile concentrations for short-term assessment with the NAAQS since the highest predicted ground-level concentrations can be considered outliers due to complex variability of meteorological processes. This might cause exceptionally high concentrations that the facility may never actually exceed in its lifetime.

Isopleth plots of predicted dustfall rates and PM10 and PM2.5 concentrations are given in Figure 7-61 to Figure 7-65 for the construction phase and Figure 7-66 to Figure 7-70 for the operational phase. For short term averaging periods, the predicted 99th percentile concentrations are provided.

The AERMOD dispersion model plots shown below represent the maximum predicted incremental concentrations and deposition rates (for dustfall) calculated over the 3-year meteorological period.

Comparison of the predicted PM10 and PM2.5 ambient concentrations is made with the South African NAAQS to determine compliance. Comparison of the dustfall rates is made with the NDCR, 2026. In determining compliance, (as determined beyond the site boundary) predicted incremental concentrations are compared against the applicable standards. Inside the site boundary, air pollutant concentrations are typically required to

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comply with occupational health and safety standards. In this case, the shaft boundaries of the proposed mine are evaluated because all operational surface activities will centre on the No. 2 and No. 3 Shafts.

7.10.5.1 Construction Phase

Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.

The dispersion model output plots for dustfall rates, including PM10 and PM2.5 concentrations due to construction activities associated with the No. 2 Shaft are given in Figure 7-61 to Figure 7-65. Predicted dustfall deposition rates, as well as PM10 and PM2.5 concentrations, are indicated to be highest in the immediate vicinity of the construction area and decrease rapidly with increasing distance from the source. Localised on-site exceedances of the non-residential dustfall standard of 1 200 mg/m2/day (and, consequently, the more stringent residential standard of 600 mg/m2/day) (Figure 7-61), the daily and annual PM10 NAAQS (Figure 7-62 and Figure 7-63), and the daily PM2.5 NAAQS (Figure 7-64) are observed within the shaft boundary. Of these pollutants, only the short-term PM10 exceedances are predicted to extend locally just beyond the southern shaft boundary (Figure 7-62). However, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM standards. Incremental annual PM2.5 concentrations remain below the respective standard throughout the modelling domain (Figure 7-65).

The dispersion footprint extends predominantly towards the west and south-west, with the higher concentration contours largely confined to the shaft area. Sensitive receptor areas located around the No. 2 Shaft generally fall outside the higher-concentration contours. The results therefore indicate that dustfall, PM10 and PM2.5 impacts associated with the refurbishment activities at the No. 2 Shaft are predominantly localised around the construction areas, with substantially lower impacts expected at surrounding residential receptors.

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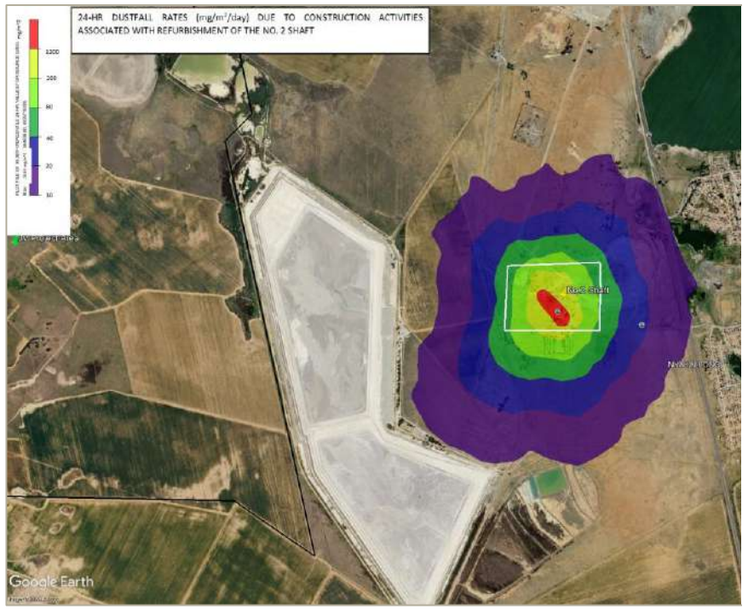


Figure 7-61: Predicted Dustfall Rates for the Proposed Mine - Construction Phase.

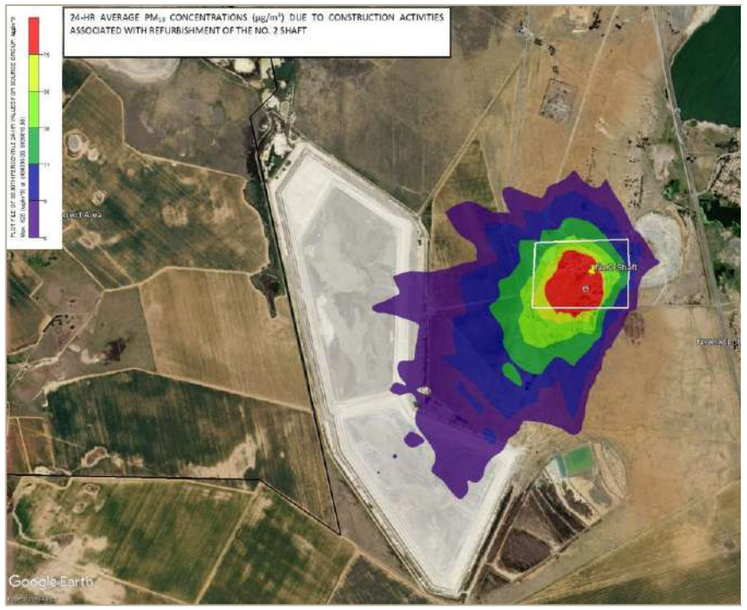


Figure 7-62: Predicted Daily Average PM10 Concentrations for the Proposed Mine - Construction Phase.

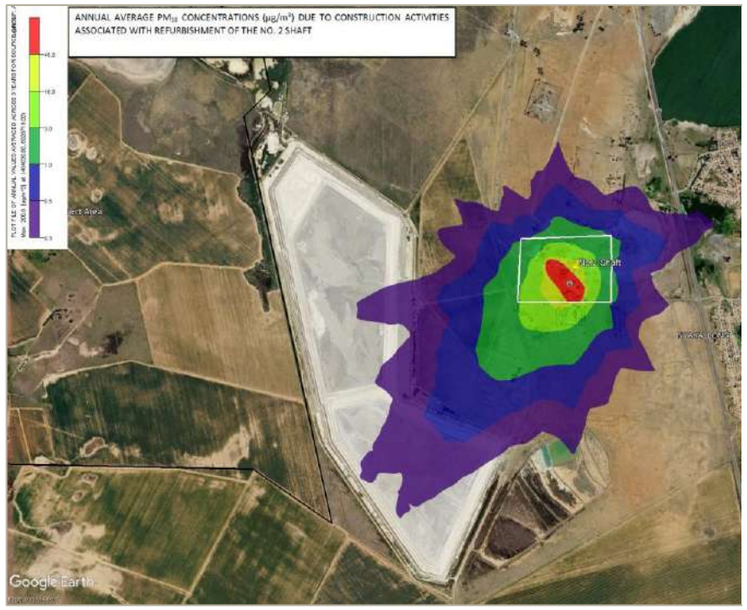


Figure 7-63: Predicted Annual Average PM10 Concentrations for the Proposed Mine - Construction Phase.



Figure 7-64: Predicted Daily Average PM2.5 Concentrations for the Proposed Mine - Construction Phase.



Figure 7-65: Predicted Annual Average PM2.5 Concentrations for the Proposed Mine - Construction Phase.

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7.10.5.2 Operational Phase

7.10.5.2.1 Phase 1

Phase 1 surface operations will be centred on the No. 3 Shaft. Based on the dispersion model output plots for the operational phase 1 associated with the proposed mining project, predicted incremental dustfall deposition rates, as well as PM10 and PM2.5 concentrations, are generally low, except for two isolated exceedances of the daily and annual PM10 NAAQS observed along the north-western shaft boundary

The dispersion model output plots for dustfall rates, including PM10 and PM2.5 concentrations due to Phase 1 operations are given in Figure 7-66 for dustfall, Figure 7-67 to Figure 7-68 for PM10, and Figure 7-69 to Figure 7-70 for PM2.5. Higher incremental concentrations are predicted in the vicinity of the shaft and along the haul route, with concentrations decreasing with increasing distance from the emission sources. The Phase 1 results show a relatively elongated dispersion footprint extending between the No. 3 Shaft and Target 1 Plant, reflecting the use of the approximately 7.67km haul route for transporting ore. The relatively elongated footprint also reflects the distributed nature of emissions from the approximately 7.67km haul route.

Low incremental concentrations are predicted to disperse from the shaft area to the surrounding sensitive receptor areas, with no exceedances of the respective standards occurring outside the shaft boundary.

7.10.5.2.2 Phase 2

Phase 2 surface operations will be centred on the No. 2 Shaft. Based on the dispersion model output plots for the operational phase 2, predicted incremental dustfall deposition rates, as well as PM10 and PM2.5 concentrations, are generally low at all the off-site locations surrounding the shaft.

The dispersion model output plots for dustfall rates, including PM10 and PM2.5 concentrations due to Phase 2 operations are given in Figure 7-71 for dustfall, Figure 7-72 and Figure 7-73 for PM10, and Figure 7-74 and Figure 7-75 for PM2.5. The Phase 2 dispersion model results show a more concentrated area of elevated dustfall, PM10 and PM2.5 incremental concentrations around the No. 2 Shaft, with the impact footprint extending towards Target 1 Plant along the conveyor alignment. This reflects the concentration of emissions associated with material handling and the open conveyor system around the No. 2 Shaft and along the approximately 2.45km conveyor route. Localised on-site exceedances of the respective dustfall and PM10 limits are predicted within the shaft boundary, with the short-term and long-term PM10 exceedances extending to a small section of the eastern shaft boundary. The proximity of the No. 2 Shaft to the Nyakallong residential area also results in receptors being located relatively close to the principal Phase 2 emission sources. However, despite predicted exceedances within the shaft boundary, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM10 standards. Predicted incremental daily and annual PM2.5 concentrations remain below the respective standards throughout the modelling domain.

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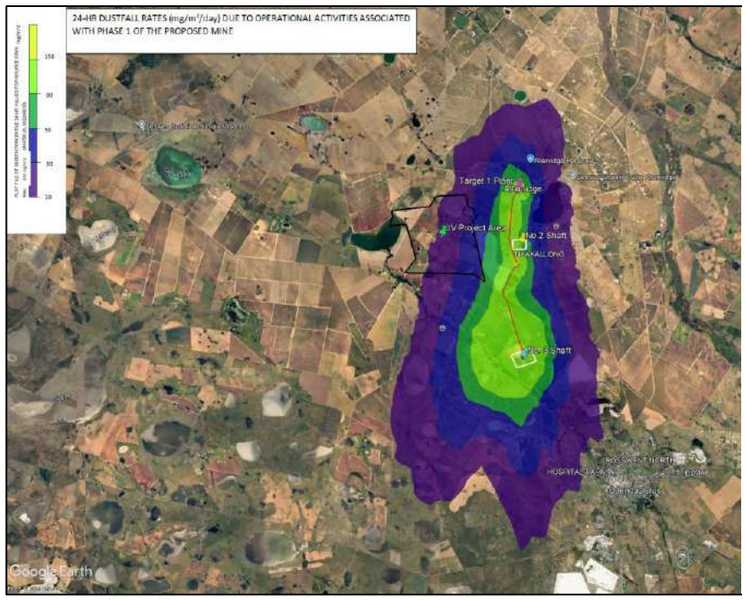


Figure 7-66: Predicted Dustfall Rates for the Proposed Mine – Operational 1.

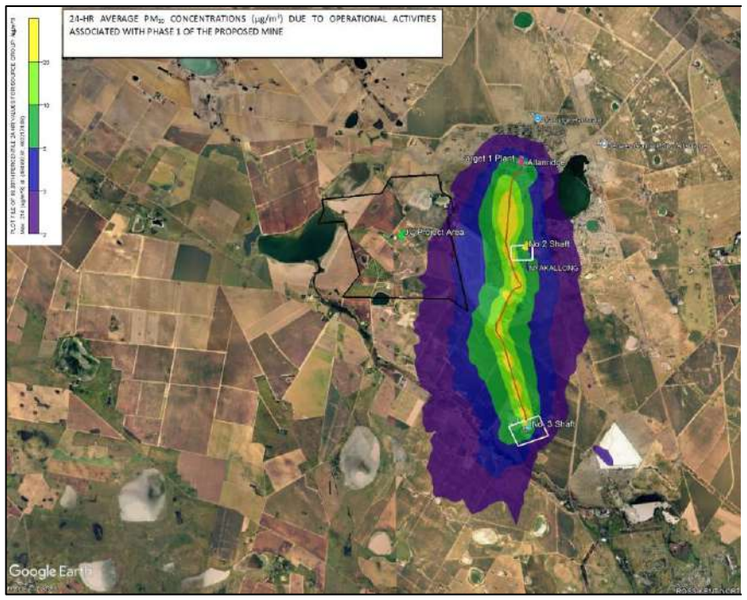


Figure 7-67: Predicted Daily Average PM10 Concentrations for the Proposed Mine – Operational Phase 1.

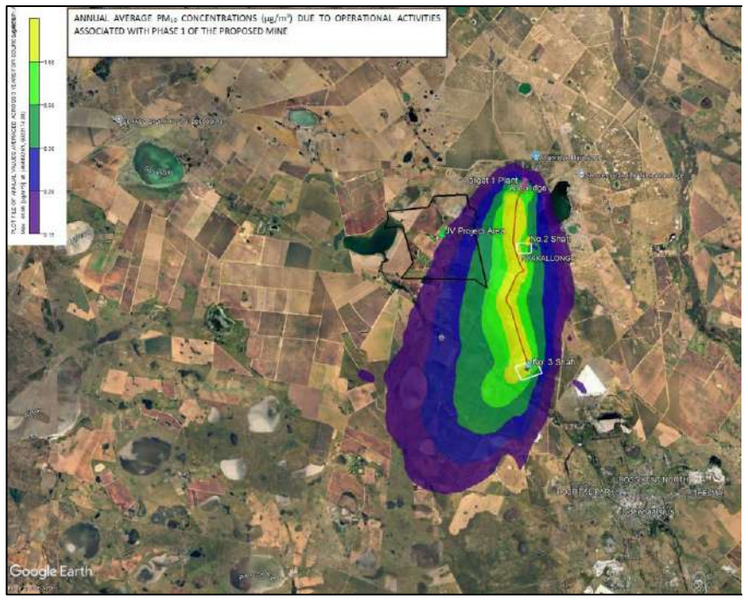


Figure 7-68: Predicted Annual Average PM10 Concentrations for the Proposed Mine – Operational Phase 1.

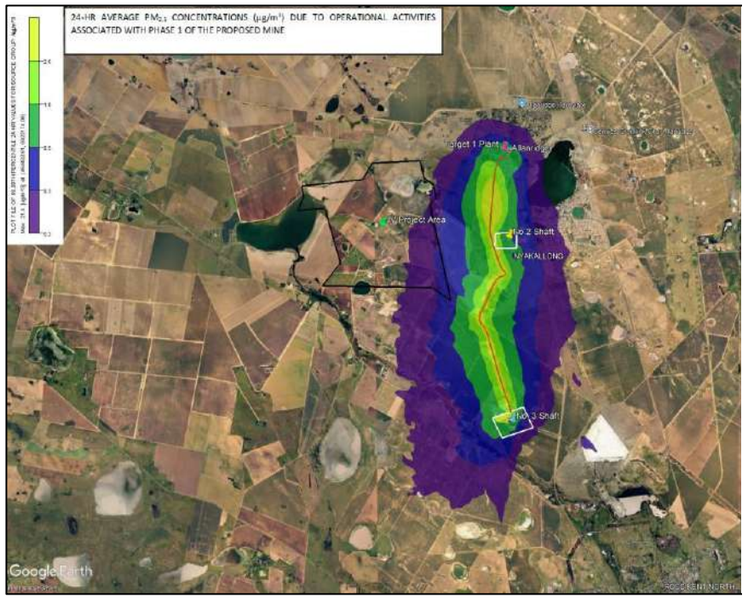


Figure 7-69: Predicted Daily Average PM2.5 Concentrations for the Proposed Mine – Operational Phase 1.

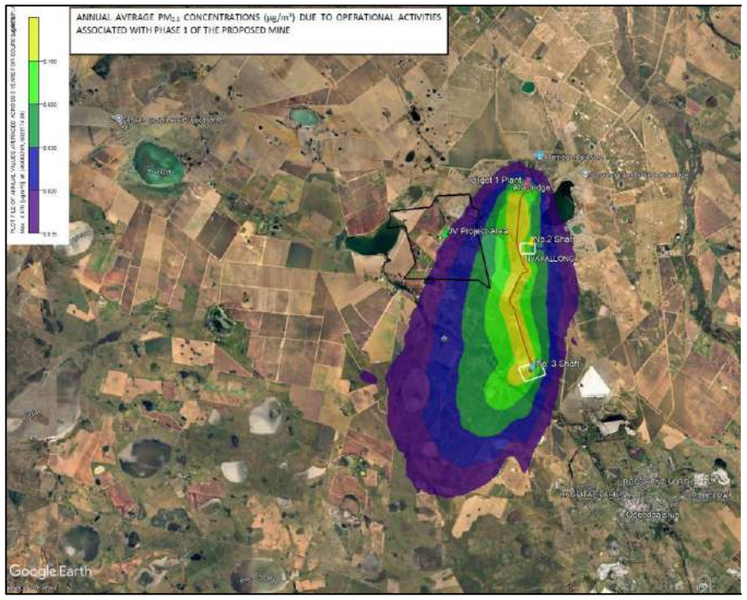


Figure 7-70: Predicted Annual Average PM2.5 Concentrations for the Proposed Mine – Operational Phase 1.

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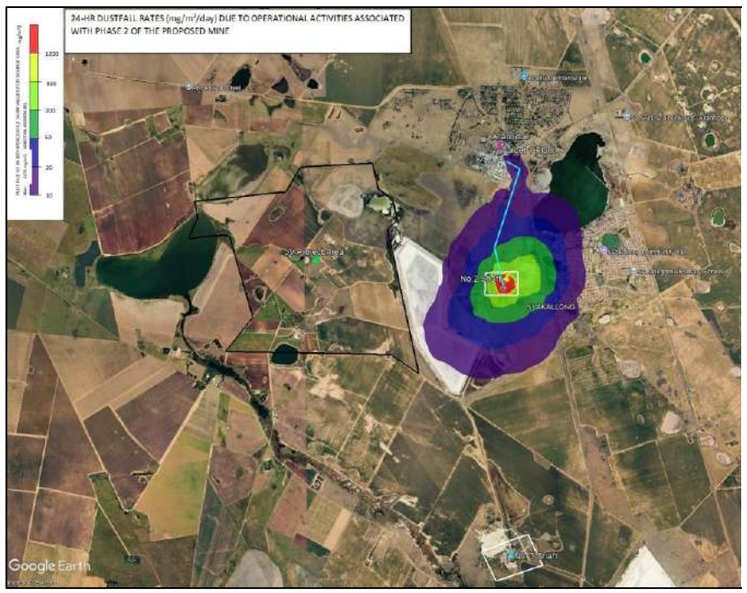


Figure 7-71: Predicted Dustfall Rates for the Proposed Mine – Operational Phase 2.

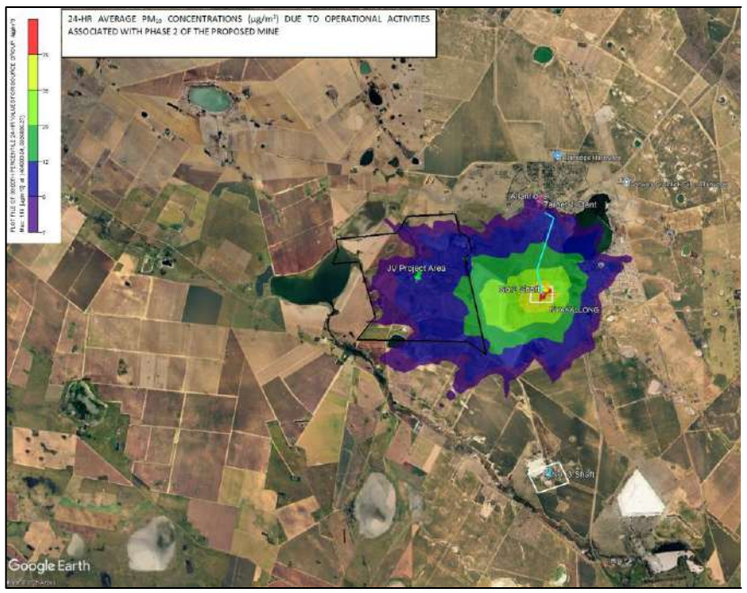


Figure 7-72: Predicted Daily Average PM10 Concentrations for Proposed Mine – Operational Phase 2.

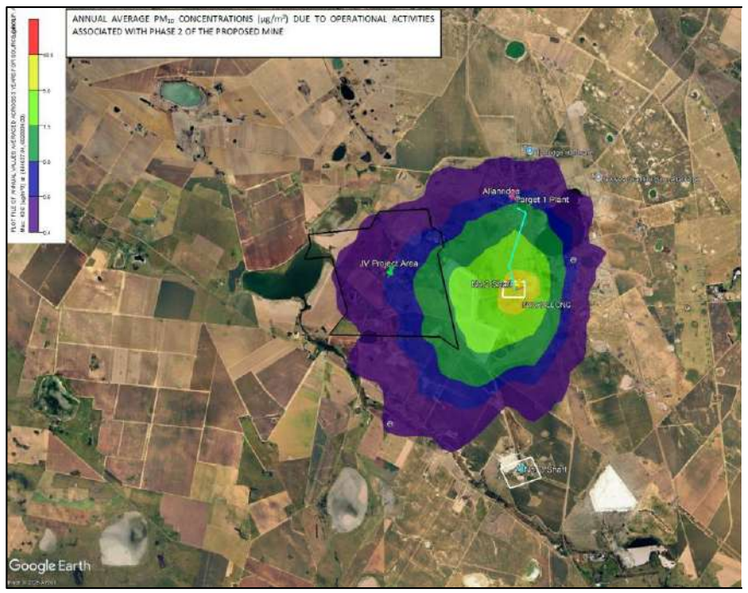


Figure 7-73: Predicted Annual Average PM10 Concentrations for the Proposed Mine – Operational Phase 2.

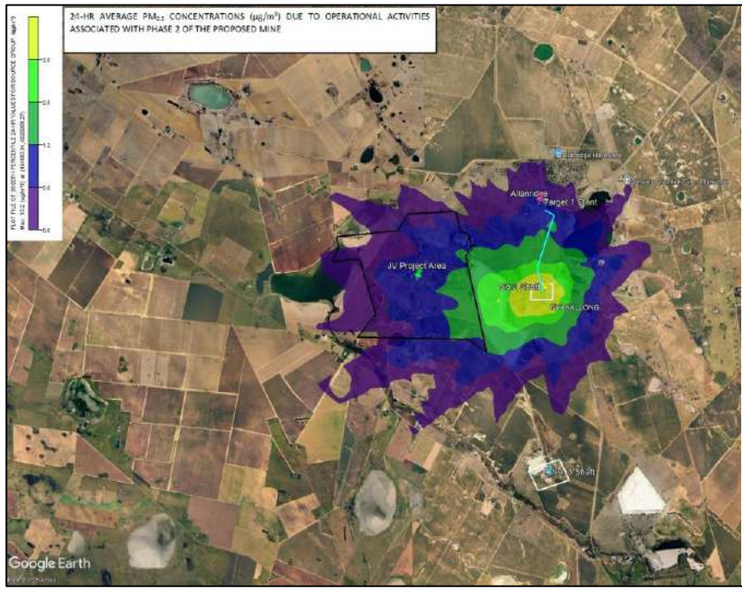


Figure 7-74: Predicted Daily Average PM2.5 Concentrations for the Proposed Mine – Operational Phase 2.

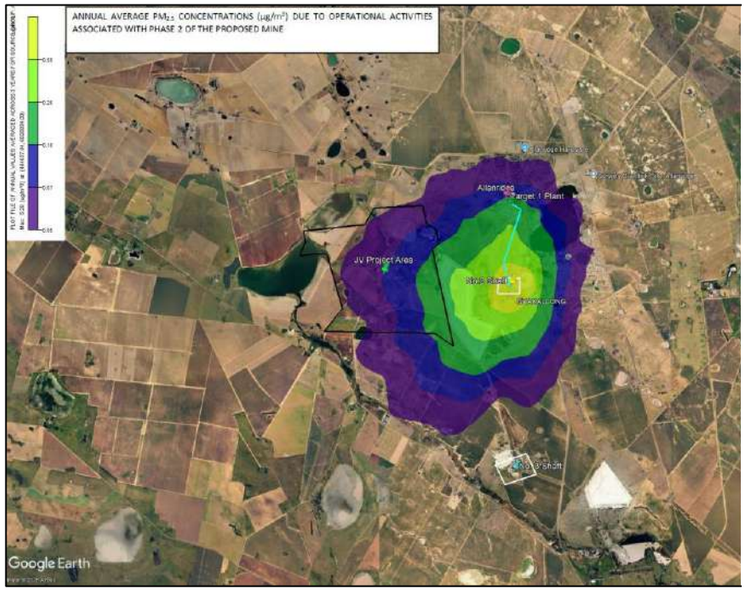


Figure 7-75: Predicted Annual Average PM2.5 Concentrations for the Proposed Mine – Operational Phase 2.

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7.10.6 Maximum Predicted Incremental Concentrations

A spatial representation of the identified discrete receptors is shown below in Figure 7-76. The receptors were identified during a desktop study (please refer to Section 2.4 of the AQIA Report.

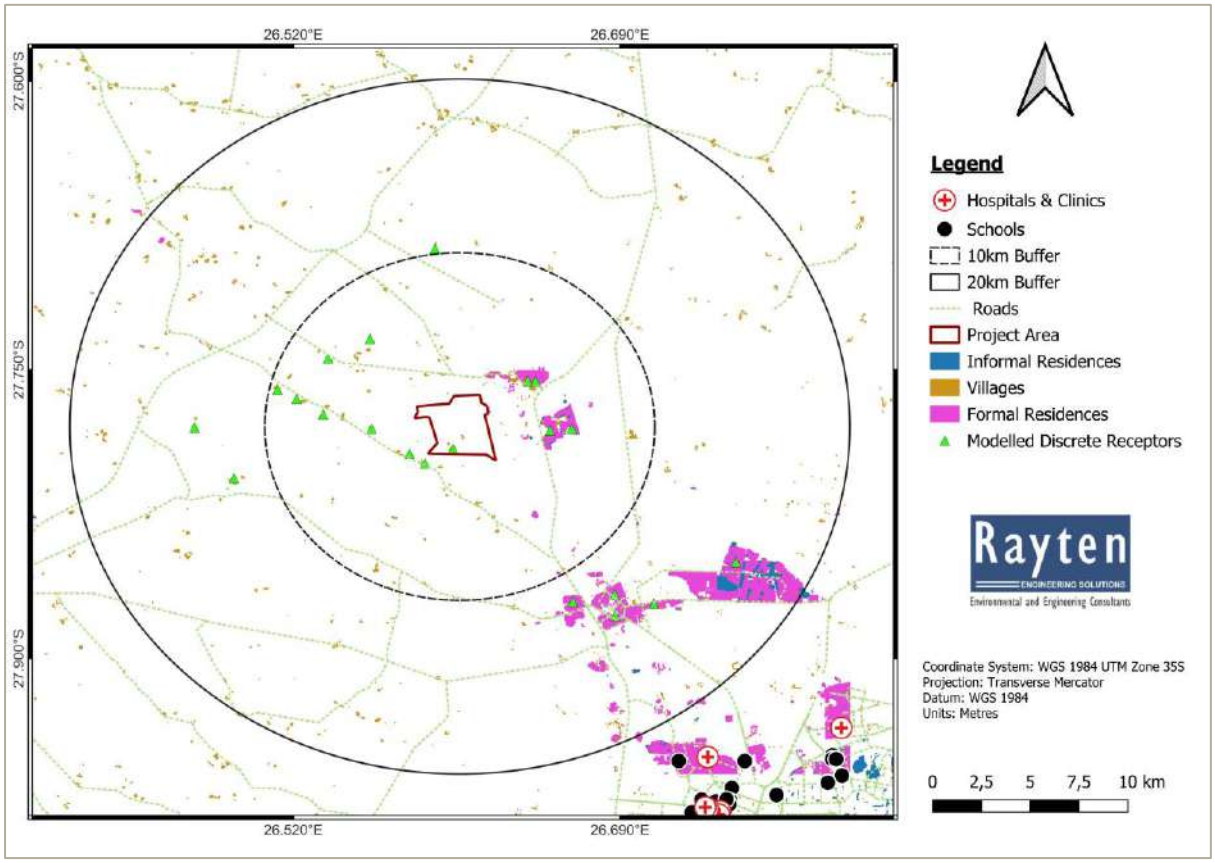


Figure 7-76: Spatial representation of discrete receptors included in dispersion model (<20km from project site).

7.11 Noise

Natural sounds are a part of the environmental noise surrounding humans. Ambient sound levels are significantly affected by the area where the sound measurement location is situated. When the sound measurement location is situated within an urban area, close to industrial plants or areas with a constant sound source (ocean, rivers, etc.), seasons and even increased wind speeds have an insignificant to massive impact on ambient sound levels.

The Proposed Project site is located within an area characterised by mixed land-use, where different human activities contribute to the prevailing noise environment. The major noise sources in the vicinity include mining activities, vehicular traffic on public roads and various agricultural-related operations.

Noise can be defined as "unwanted sound", and an audible acoustic energy that adversely affects the physiological and/or psychological well-being of people, or which disturbs or impairs the convenience or peace of any person. Figure 7-77 illustrates the acceptable zone sound levels as set out by SANS.

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1	2	3	4	5	6	7
Type of district	Equivalent continuous rating level ($L_{Req,T}$) for noise dBA					
	Outdoors			Indoors, with open windows		
	Day/night $L_{R,dn}$ [a]	Daytime $L_{Req,d}$ [b]	Night-time $L_{Req,n}$ [b]	Day/night $L_{R,dn}$ [a]	Daytime $L_{Req,d}$ [b]	Night-time $L_{Req,n}$ [b]
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

Figure 7-77: Acceptable zone sound levels for noise in districts (from SANS 10103:2008).

7.12 Traffic

The Proposed Project is located within an area served by an established road network. Public routes in close proximity to the site include existing roads currently used for Harmony Target Mine operations as well as gravel roads used by the local farmers. Only the development of gravel access tracks to facilitate the monitoring of potential mining-induced seismicity and boundary interactions is anticipated at the project site.

Vehicle access to the shaft site is via the R30 public road (Figure 7-78), connecting to the existing mine access road, which will continue to be used for Proposed Project's related traffic. No major upgrades to these roads are anticipated. The existing internal mine roads and farm roads will be utilised for the duration of the Proposed Project.

Road Classification

The Road Classification and Access Management (RCAM) guideline 2010 provides for roads classification into the following six class systems:

- Class 1 Principal arterial
- Class 2 Major arterial
- Class 3 Minor arterial
- Class 4 Collector
- Class 5 Local Street
- Class 6 Walkway

The first three classes (the arterials) are mobility roads, while the second three classes are activity/access streets. In relation to the Proposed Project, the mobility roads will encompass R30, connecting to the existing mine access road.

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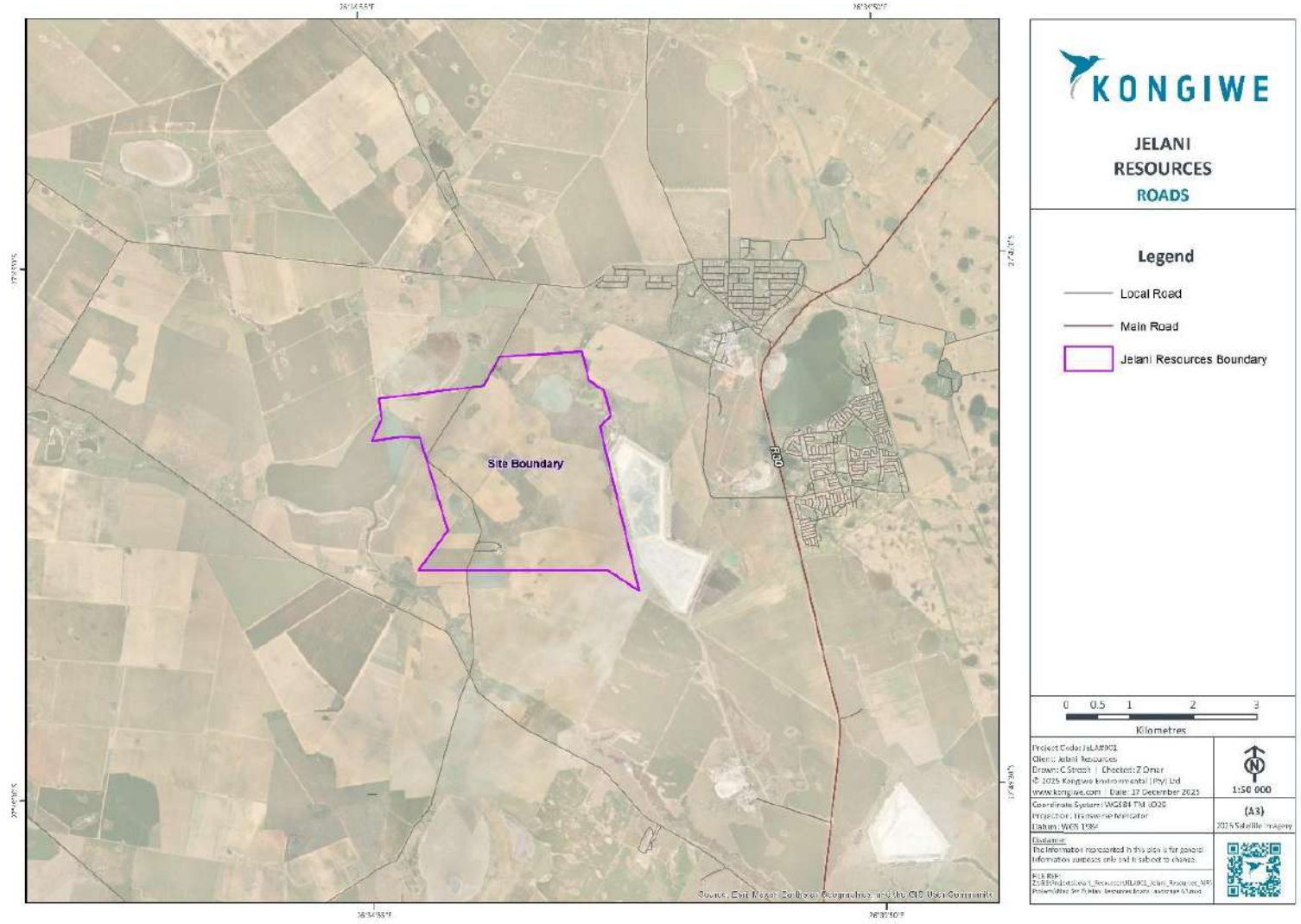


Figure 7-78: Road map for the Proposed Project.

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7.13 Socio-Economic

Refer to Specialist Study: Appendix D12 – Social Impact Assessment

The following socio-economic baseline outlines various aspects of the socio-economic profile of various administrative levels relevant to the Project, including the Provincial level, the MLM level, and the Ward Level.

There are three wards that are relevant to the Project. The Project is in Ward 36, which comprises 413 km2. The main town in the ward is Allanridge, which adjoins the Harmony Target Operation to the west. The smaller town of Odendaalrus is located in the southern-most section of Ward 36.

Comprising the urban settlement of Nyakallong located to the south of Allanridge, Ward 19 is only 2.4 km2. Ward 35 adjoins the southern boundary of the Project site and covers an area of 229 km2.

As the population of the MLM makes up approximately 65% of the LDM population, the large overlap justified the exclusion of the LDM from the analysis.

This baseline assessment investigates trends of the socio-economic profile at the three administrative levels, specifically concerning population, number of households, number of informal households, gender, ethnicity, youth population, language, education, unemployment, household income, key industries and access to services (including piped water, electricity, sanitation facilities and refuse disposal).

Unless otherwise specified, data were derived from Statistics South Africa (StatsSA) in relation to their 2011 Census and 2022 Census.

Ward data following the 2011 Census is very limited. The only data available subsequent to 2011 was some 2022 Census data for population, age distribution and ethnicity.

7.13.1 Population

Table 7-44 presents available data regarding population, from 2011 to 2022. Ward 19 was the most populous of the three local wards, with 14,138 people (compared to 10,888 and 10,366 people in Wards 35 and 36 respectively). With an area of only 2.4 km2, population density in Ward 19 was extremely high (5,890 people per km2). Ward 35 and Ward 36 had much lower population densities of 48 and 25 persons/km2 respectively, which were reflective of the predominantly rural profiles of these wards.

Between 2011 and 2022, the Free State, MLM and Ward 36 had very similar annual population growth rate (0.69-0.70%). In contrast, Ward 19 has experienced a slight decline in its population – with an annual population growth rate of -0.08%. This may be attributed to population out-migration, as people leave the to impoverished ward in search of better opportunities elsewhere.

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Table 7-44: Population

	Population (2011)	Population (2022)	Average Population Growth Rate (%) between 2011 and 2022
Free State	2,745,590	2,964,412	0.70
Matjhabeng	407,020	439,034	0.69
Ward 19	14,259	14,138	-0.08
Ward 36	9,605	10,366	0.69

7.13.2 Number of Households

Table 7-45 summarises the number of households, from 2011 to 2022. At the MLM level, the number of households decreased marginally from 2011 to 2022, despite an increase in the total population.

Household size is an indicator of the level of wealth among households. A higher numbers of members per household indicate increased levels of poverty, due to a strain on housing resources within a community. In In 2011, Wards 19 and 35 recorded that the number of household members per household was 3.6 and 4.0 persons, compared to 2.8 members per household in Ward 36.

Table 7-45: Number of Households

	Number of Households (2011)	Number of Households (2022)
Free State	838,877	845,250
Matjhabeng	127,547	126,068
Ward 19	3,961	Not available
Ward 35	2,980	Not available
Ward 36	3,371	Not available

7.13.3 Informal Households

Table 7-46 shows that the proportion of households that lived in informal dwellings (shacks) was 7% in Ward 19 and 5% in Ward 36. Only 1% of households in Ward 35% were informal. The extent of informal dwellings among households at the MLM level was much higher, increasing marginally from 19% in 2011 to 20% in 2022.

Table 7-46: Proportion of Households Residing in Informal Dwellings

	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	15.4	9.7
Matjhabeng	19.1	19.9
Ward 19	6.6	Not available
Ward 35	0.8	Not available
Ward 36	4.8	Not available

7.13.4 Gender Ratio

Gender ratio is the proportional relationship between the number of males and females in a population. A ratio greater than 1.0 indicates that the population has more males than females. A gender ratio of well over 1.0 can

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be indicative of population in-migration (influx), as unskilled job seekers moving into an area tend to be male. As Table 7-47 indicates, there is little indication of population influx at all administrative levels, in 2022. Gender ratios have decreased since 2011, indicating a trend of males migrating to other parts of South Africa, most likely in search of job opportunities for their families remaining in the local area.

Ward 35 had a gender ratio of 1.6 in 2011, which is indicative of population influx. However, significant population out-migration has occurred within this Ward since 2011.

Table 7-47: Gender Ratio

	Gender Ratio (2011)	Gender Ratio (2022)
Free State	0.94	0.90
Matjhabeng	0.98	092
Ward 19	0.95	0.91
Ward 35	1.62	0.97
Ward 36	1.03	0.94

7.13.5 Age Distribution

Table 7-48 and Figure 7-79 shows the age distribution (by 10-year categories) for each of the three wards nearest the Project, in 2022. The proportion of the population in Ward 19 that is aged below 40 years of age is much higher in Ward 19 (71%), compared to Wards 35 and 36 (62-65%).

Table 7-48: Age Distribution per Ward in 2022

Ward	Age (Years)									
	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 & Over	Total
19	2,468	2,636	2,480	2,443	1,568	1,165	914	346	117	14,137
35	1,733	1,833	1,566	1,933	1,487	1,222	735	315	64	10,888
36	1,509	1,680	1,502	1,698	1,299	1,072	954	495	156	10,365

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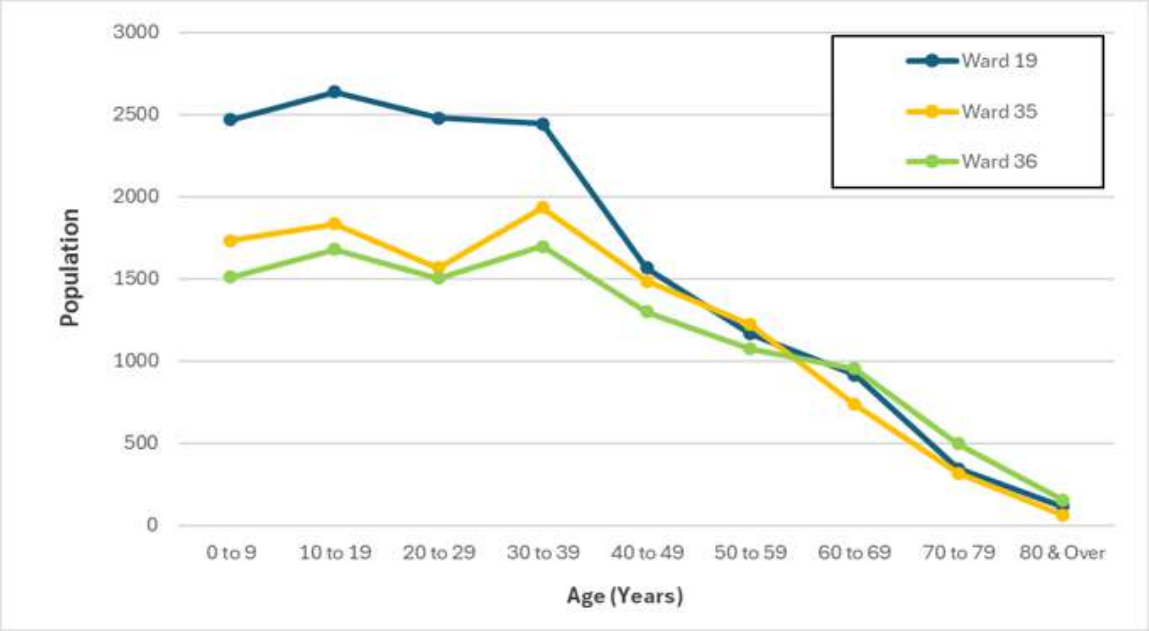


Figure 7-79: Age Distribution at Ward Level

Table 7-49 summaries the proportion of youth (aged 19 years or less) within each administrative level.

The proportion of youth in the population was highest in Ward 19, although decreasing from 44% in 2011 to 36% in 2022. At Ward 35, the proportion of youth in the population has increased significantly in recent years, from 22% in 2011 to 33% in 2022. In comparison, the proportion of youth in the population of Ward 36 decreased marginally, from 32% in 2011 to 31% in 2022.

At the MLM level, the proportion of youth increased from 33% in in 2011 to 35% in 2022.

Table 7-49: Proportion of Youth (Aged 19 Years or Less)

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	34.7	35.4
MLM	32.7	35.2
Ward 19	43.9	36.1
Ward 35	22.3	32.8
Ward 36	31.7	30.7

7.13.6 Ethnicity

Table 7-50 summaries the proportion of the population of Black African ethnicity, for each administrative level. In 2022, almost the entire population in Ward 19 was Black African. The proportion of Black Africans in Wards 35 and 36 was 76 and 72% respectively. At the MLM and Provincial levels, Black Africans constituted about 88% of their respective populations in 2022. Among the Black African populations in each Ward, most were Sesotho (74-86%) or IsiXhosa (8-12%).

As Table 7-51 shows, the proportion of the White population at the MLM level had declined marginally, from 9.6% in 2011 to 9.0% in 2022. The proportion of the White population at the Provincial level declined from 8.7%

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in 2011 to 8.0% in 2022. In 2022, the proportion of the White population in Wards 35 and 36 was 22 and 27% respectively, whereas there were only 10 White persons in Ward 19. Most (86-88%) of the White population at Wards 35 and 36 were Afrikaans.

The proportion of the Coloured and Indian population in each ward was negligible, comprising approximately 1% at Wards 35 and 36 respectively – and almost none in Ward 19.

Table 7-50: Proportion of the Population of Black African Ethnicity

	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	87.6	88.1
MLM	87.7	88.7
Ward 19	99.9	99.5
Ward 35	81.3	76.4
Ward 36	64.1	71.8

Table 7-51: Proportion of the Population of White Ethnicity

	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	8.7	8.0
Matjhabeng	9.6	9.0
Ward 19	0.0	0.1
Ward 35	17.4	22.1
Ward 36	35.2	26.7

7.13.7 Language

The most predominant languages spoken at each administrative level was Sesotho. Table 7-52 summarises the proportion of the population that speaks Sesotho, at each administrative level. In 2011, Sesotho was spoken by 76 and 61% of the populations in Wards 19 and 35 respectively. For Ward 36, 45% of the population spoke Sesotho. The proportion of the MLM and Provincial populations speaking Sesotho has increased from 62-63% in 2011 to 70-72% in 2022.

Another major language in the local area is Afrikaans. Table 7-53 summaries of the proportion of the population that speak Afrikaans, at each administrative level. Approximately 25-34% of the population in Wards 35 and 36 spoke Afrikaans in 2011, compared to just 1% in Ward 19. The proportion of the MLM and Provincial populations speaking Afrikaans have been declining, from approximately 12% in 2011 to 10% in 2022.

Another popular language at the Ward level was IsiXhosa. This language was spoken by 11% in Ward 19, and 6-7% at Wards 35 and 36.

Table 7-52: Proportion of Population Speaking Sesotho

	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	62.6	72.1
Matjhabeng	62.2	69.7
Ward 19	76.4	Not available
Ward 35	60.7	Not available
Ward 36	45.1	Not available

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Table 7-53: Proportion of Population Speaking Afrikaans

	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	12.4	10.0
Matjhabeng	11.9	9.7
Ward 19	1.2	Not available
Ward 35	25.3	Not available
Ward 36	34.4	Not available

7.13.8 Education

As Table 7-54 shows, only 11% of the population (aged 20 years and above) in Ward 19 had a Matric qualification or higher, compared to 25% in Ward 36. There was a steady improvement in the proportion of the population having a matric qualification or higher at the MLM and Provincial levels.

Table 7-54: Proportion of Population (Aged 20 years and above) Attaining a Matric Qualification or Higher

	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	21.3	24.4
Matjhabeng	20.0	28.8
Ward 19	10.5	Not available
Ward 35	Not available	Not available
Ward 36	24.7	Not available

7.13.9 Household Income

In 2011, the average monthly household income in the Ward 19 was R 2500, almost half of that of Ward 36 (R 4775). In 2022, the average monthly household income in the MLM was R 6725, which was marginally higher compared to that at the Provincial level of R 6441 (Quantec, 2022).

7.13.10 Industry Sectors

Table 7-55 summarises the contribution to Gross Value Added (GVA) of various industry sectors to the MLM's Gross Domestic Product (GDP), between 2010 and 2020. Although being the largest contributor to the MLM's GVA, the mining sector's contribution to total GVA decreased from 36% in 2010 to 30% in 2020. The mining sector was the only sector that decreased its level of contribution to the MLM's GVA over the 10-year period. The manufacturing sector contributed 17% of the MLM's GVA in 2020. The finance and trade sectors were also major contributors to the MLM's GVA (13 and 11% respectively). The agricultural sector only contributed 2.3% of the MLM's GVA in 2020.

Table 7-55: Contribution to GVA by Industry Sector in the MLM, between 2010 and 2020

	Proportion (%) of Contribution to GVA (2010)	Proportion (%) of Contribution to GVA (2020)
Mining	35.6	30.1
Manufacturing	16.2	17.2
Government and Community Services	12.6	14.3
Finance and business	10.8	12.8

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Trade	10.7	11.1
Transport and communication	6.2	6.6
Construction	3.1	3.0
Electricity and Water	2.6	2.6
Agriculture	2.2	2.3
Total	100.0	100.0

Source: Standardised regional data, Quantec (2022)

7.13.11 Employment

StatsSA only has reliable employment data dating back to 2011. According to StatsSA, there were 2166 and 2850 people employed in Wards 19 and 36, in 2011. This translates to 25 and 42% of the population aged 20 years or more in Wards 19 and 36 respectively.

Unemployment rates were not available at the Ward level. The unemployment rate is the proportion of the labour force that is unemployed, and includes only the unemployed who are actively searching for work, thus excluding the discouraged. In 2020, the unemployment rate in the MLM was 27.2%, which was slightly higher than that at the Provincial level of 26.7% (Quantec, 2022). Note that data from StatsSA, in their Quarterly Labour Force Survey reports, indicated a much higher unemployment rate of 33.4% in Free State, in 2020. The StatsSA reports also calculated that the expanded unemployment rate (which includes the unemployed who are actively searching for work and those who are not actively searching) was 39.9% in Free State, which has since increased to 43.8% in 2025. This implies that the unemployment rates calculated by Quantec are likely to be undestimating the extent of unemployment at the MLM level.

As shown in Table 7-56, standardised regional data by Quantec (2022) indicates that mining is the largest employer in the MLM, but the its contribution to employment has decreased from 32% in 2010 to 23% in 2020. In contrast, all other sectors have had an increasing proportion of contribution to employment in the MLM, since 2010.

Table 7-56: Contribution to Employment by Industry Sector in the MLM, between 2010 and 2020

	Proportion (%) of Contribution to Employment (2010)	Proportion (%) of Contribution to Employment (2020)
Mining	32.2	22.8
Government and Community Services	25.7	27.4
Trade	17.3	19.6
Finance and business	9.7	11.8
Manufacturing	5.4	6.4
Agriculture	3.4	4.3
Construction	3.0	4.0
Transport and communication	3.0	3.4
Electricity and Water	0.3	0.4
Total	100.0	100.0

Source: Standardised regional data, Quantec (2022)

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7.13.12 Access to Water

Table 7-57 shows that the proportion of households with access to tap water was highest in Ward 19 (99%), compared to 92% at both Ward 35 and Ward 36. The general downward trend in the level of access to tap water at the MLM and Provincial level, since 2011, is indicative of the decline of this service across Free State. The decline of water services and associated aging infrastructure are of particular concern in the MLM, as reported by the Select Committee on Cooperative Governance and Public Administration (Traditional Affairs, Human Settlements and Water and Sanitation) in March 2025[52].

In January 2025, *E. coli* contamination was confirmed in Allanridge's main water reservoir, constituting a severe health risk to local residents. As of August 2025, residents continue to rely on unsafe water sources[53].

Table 7-57: Proportion of Population with Access to Tap Water

	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	89.4	86.1
Matjhabeng	94.6	85.8
Ward 19	98.7	Not available
	91.7	Not available
Ward 36	91.7	Not available

7.13.13 Access to Sanitation Facilities

Table 7-58 shows that, in 2011, the proportion of households with access to flush or chemical toilets was highest in Ward 19 (98%), compared to Wards 35 and 36 (92-93%). At the MLM level, the proportion of the population with access to flush/ chemical toilets is only 82%.

Since 2011, access to flush or chemical toilets has remained static at the MLM and Provincial levels. However, recent media reports indicate severely deteriorated sanitation infrastructure in Allanridge and Nyakallong[3].

Table 7-58: Proportion of Population with Access to Flush or Chemical Toilets

	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	67.2	69.5
Matjhabeng	81.7	79.7
Ward 19	97.8	Not available
Ward 35	92.4	Not available
Ward 36	93.4	Not available

7.13.14 Access to Refuse Disposal Services

Table 7-59 shows that, in 2011, the proportion of households having access to refuse disposal services was highest at Wards 19 and 35 (93-95%)., compared to 87% at Ward 36. The downward trends in the level of access

[52] https://www.parliament.gov.za/press-releases/media-statement-non-revenue-water-losses-completely-undermine-matjhabengs-financial-recovery-plan-and-demands-urgent-attention.
[53] https://www.ofm.co.za/article/centralsa/338129/actionsa-calls-for-forensic-audit-into-r2-2-billion-infrastructure-budget-in-matjhabeng-

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to refuse disposal services at the MLM and Provincial level, since 2011, are indicative of the decline of this service across Free State.

Table 7-59: Proportion of Population with Access to Refuse Disposal Services

	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	70.7	57.4
Matjhabeng	87,1	56.3
Ward 19	95.3	Not available
Ward 35	93.1	Not available
Ward 36	87.1	Not available

The abovementioned issues have a bearing on how the Proposed Project may bring about social change within the affected local area.

7.14 Ground Vibration

Refer to Specialist Study: Appendix D11 - Blasting and Vibration Report

This section provides an evaluation of the effects of ground vibration from the proposed underground mining operations and presents information related to blasting activities for the project.

7.14.1 Sensitivity of the Project

A review of the project and the surrounding areas is done before any specific analysis is undertaken, and sensitivity mapping is done based on typical areas and distance from the proposed mining area. The sensitivity map uses distances within which possible influences may normally occur and where influence is expected to be very low or none. Only one area was identified in this regard:

- A highly sensitive area from within the proposed mining area up to 100 m horizontally around the mining area. Levels of ground vibration are expected to be higher in this area, as well as at the closest expected distance from the surface to the mining area.
- An area greater than 100 m horizontally is considered a low-sensitivity area. In this area, it is relatively certain that influences will be low, with a low possibility of damage and limited possibility to upset people.

Figure 7-80 shows the sensitivity mapping with the identified points of interest (POI) in the surrounding areas for the proposed JV Project area. A surface view of the area was considered.

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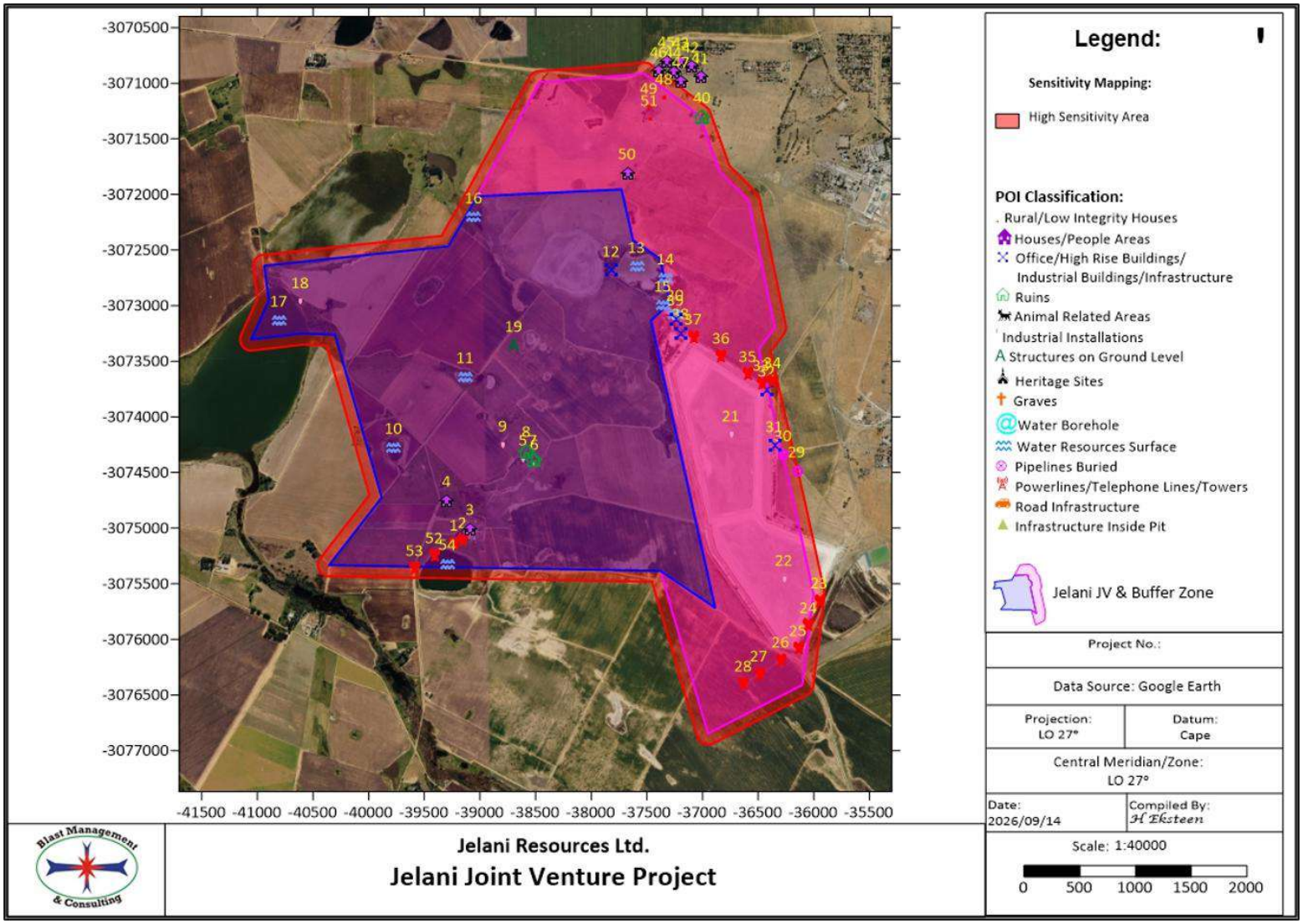


Figure 7-80: Identified Sensitive Areas for the JV Project Area

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7.14.2 Baseline Influence

The project is evaluated as a new area next to existing mining operations that are currently operational. The existing underground infrastructure and shafts will be used for the JV Project area, with no new infrastructure required.

7.14.3 Structure Profile

As part of the baseline, all possible structures in a possible influence area are identified. The site was reviewed using Google Earth imagery. Information sought during the review was to identify surface structures present in a 100 m radius horizontally from the proposed underground mining area, which will require consideration during modelling of blasting operations, e.g. houses, general structures, power lines, pipelines, reservoirs, mining activity, roads, shops, schools, gathering places, possible historical sites, Hydrocensus boreholes, etc. A list was prepared of all structures in the vicinity of the underground area. The list includes POI's within the 100 m boundary – see Table 7-60 below.

Table 7-60: List of Points of Interest Identified (Cape – LO 27°)

Tag	Description	Classification	Y	X
1	Power Lines/Pylons	13	39230.907	3075131.78
2	Power Lines/Pylons	13	39152.809	3075108.13
3	Farmstead	2	39083.376	3075004.04
4	Farmhouses	2	39295.769	3074753.67
5	Cement Dam	6	38608.11	3074380.7
6	Cement Dam	6	38507.785	3074420.95
7	Ruins	4	38519.524	3074383.06
8	Ruins	4	38578.705	3074305.83
9	Cement Dam	6	38790.702	3074255.54
10	Dam	11	39772.858	3074274.75
11	Dam	11	39129.773	3073639.4
12	Pump House	3	37818.809	3072683.34
13	Dam	11	37588.371	3072649.15
14	Dam	11	37329.667	3072753.52
15	Dam	11	37354.434	3072999
16	Dam	11	39052.322	3072206.61
17	Dam	11	40804.351	3073131.27
18	Cement Dam	6	40612.427	3072968.39
19	Cultivated Fields	7	38692.038	3073360.97
20	Dam	11	37242.246	3073075.71
21	Tailings Dam	6	36741.588	3074164.45
22	Tailings Dam	6	36265.489	3075461.52
23	Power Lines/Pylons	13	35945.732	3075650.34
24	Power Lines/Pylons	13	36045.357	3075871.07
25	Power Lines/Pylons	13	36137.854	3076078.81
26	Power Lines/Pylons	13	36293.916	3076181.04

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Tag	Description	Classification	Y	X
27	Power Lines/Pylons	13	36489.173	3076306.9
28	Power Lines/Pylons	13	36629.885	3076397.6
29	Pipeline	12	36149.591	3074487.46
30	Pipeline	12	36273.452	3074343.3
31	Mine Building/Structure	3	36350.547	3074260.35
32	Mine Building/Structure	3	36418.595	3073762.16
33	Power Lines/Pylons	13	36467.397	3073693.67
34	Power Lines/Pylons	13	36364.982	3073669.95
35	Power Lines/Pylons	13	36587.29	3073613.24
36	Power Lines/Pylons	13	36829.317	3073450.19
37	Power Lines/Pylons	13	37080.9	3073277.43
38	Mine Building/Structure	3	37193.522	3073245.37
39	Mine Building/Structure	3	37239.896	3073124.62
40	Ruins	4	36999.331	3071302.29
41	Houses	2	37015.969	3070946.64
42	Houses	2	37101.364	3070850
43	Houses	2	37190.276	3070808.32
44	Houses	2	37259.215	3070898.12
45	Houses	2	37318.434	3070801.1
46	Houses	2	37391.449	3070893.51
47	Structure	2	37188.854	3070985.08
48	Informal Housing	1	37342.942	3071134.91
49	Informal Housing	1	37477.482	3071219.65
50	Structure	2	37672.756	3071807.82
51	Informal Housing	1	37473.499	3071328.09
52	Power Lines/Pylons	13	39407.802	3075245.42
53	Power Lines/Pylons	13	39582.495	3075358.13
54	Dam	11	39287.909	3075321.15

7.14.4 Blast Design Data

The typical blast designs for development end blasting and decline development were replicated and simulated using JKSimBlast, with the relevant blast data extracted to determine the maximum charge mass per delay for each blasting scenario. Stope blasting charges were assumed from the data given and as per industry practices. The maximum charge mass per delay for each scenario was then used to determine the cumulative charge mass per delay for the assumed simultaneous blasting of one stope panel, one development end panel, and one decline development panel. Table 7-61 and Table 7-62 below shows the technical data from the blast designs, and Figure 7-81to Figure 7-86 shows the blast layout with blast hole depth, as well as the maximum charge mass per delay and number of blast holes detonating per delay.

Table 7-61: Development End Blast Data Summary

Blast Design Name:	Jelani_DevEnd3
Current Drive	

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Name:	Drive #1
Geology:	Waste
Circumference (M):	13.01
Area (M²):	11.15
Rock SG:	3
Approx. Powder Factor (Kg/T):	1.668
Holes	
Number Of Holes:	75
Total Length Of All Holes (M):	240
Minimum Hole Length (M):	3.2
Maximum Hole Length (M):	3.2
Charge Decks	
Number Of Charge Decks:	74
Length Of All Charges (M):	131.18
Mass Of All Charges (Kg):	178.53

Table 7-62: Decline Development Blast Data Summary

Blast Design Name:	**Jelani_Declinedev2**
Current Drive	
Name:	Drive #1
Geology:	
Circumference (M):	24.19
Area (M²):	36.81
Rock SG:	3
Approx. Powder Factor (Kg/T):	1.133
Holes	
Number Of Holes:	91
Total Length Of All Holes (M):	391.3
Minimum Hole Length (M):	4.3
Maximum Hole Length (M):	4.3
Charge Decks	
Number Of Charge Decks:	90
Length Of All Charges (M):	271.2
Mass Of All Charges (Kg):	538.11

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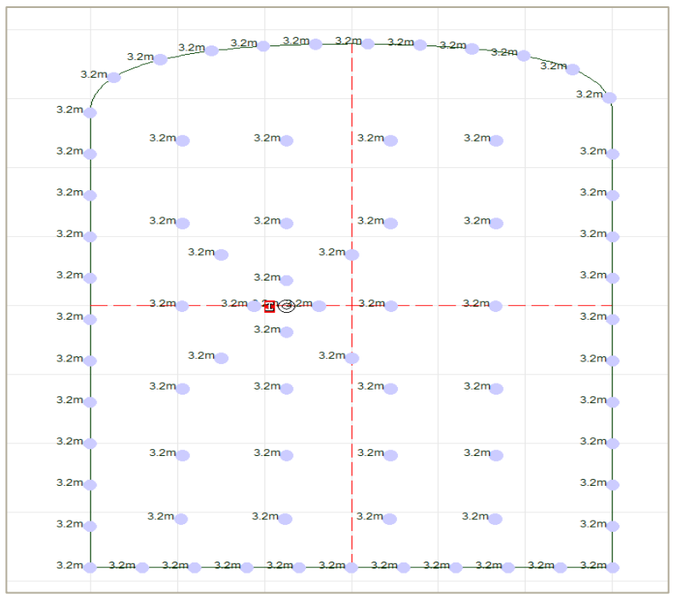


Figure 7-81: Design Layout with Blasthole Depth – Development End

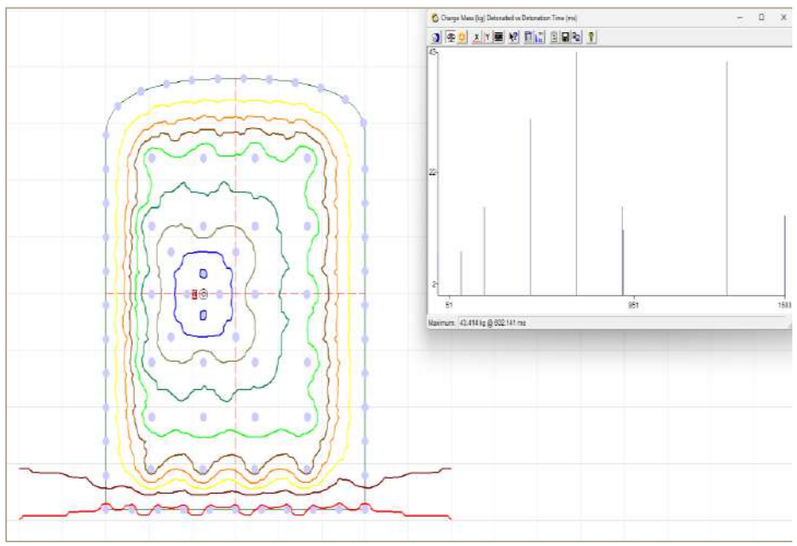


Figure 7-82: Blast Simulation showing Maximum Charge per Delay – Development End

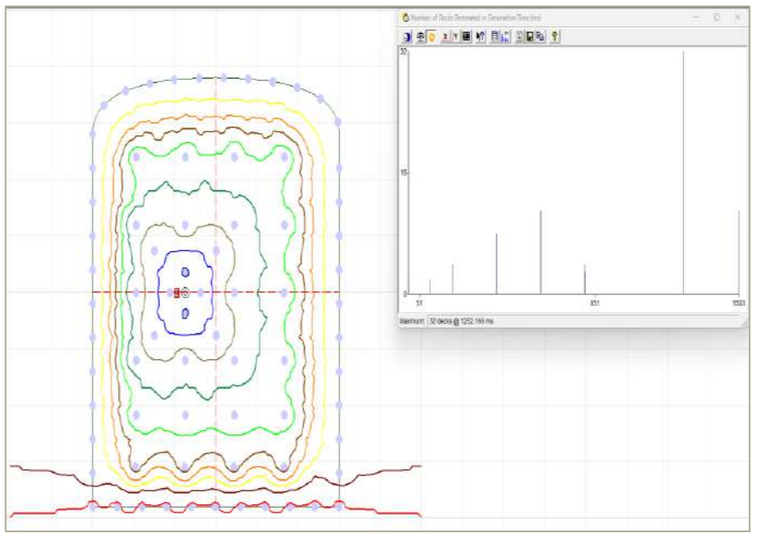


Figure 7-83: Blast Simulation showing Maximum Blastholes per Delay – Development End

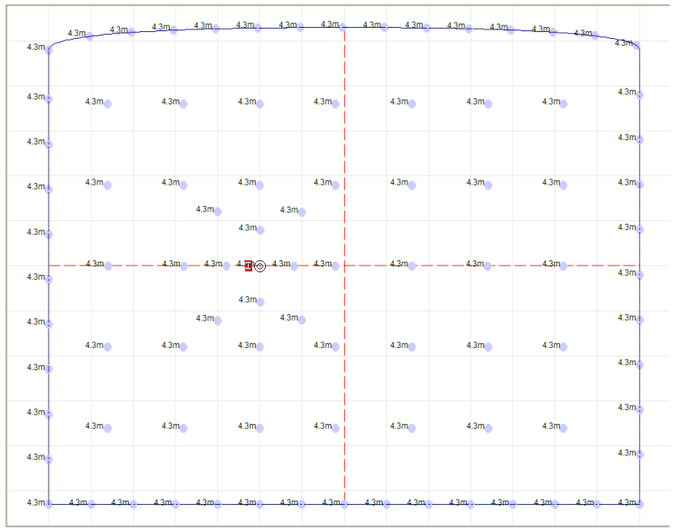


Figure 7-84: Design Layout with Blasthole Depth – Decline Development

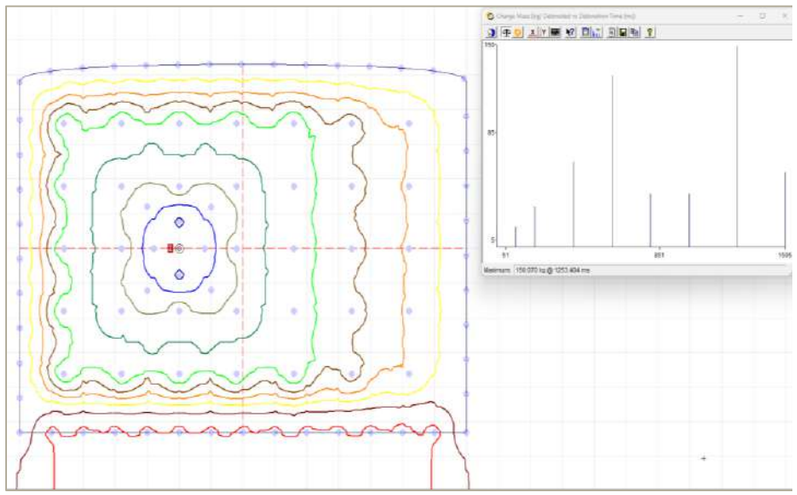


Figure 7-85: Blast Simulation showing Maximum Charge per Delay – Decline Development

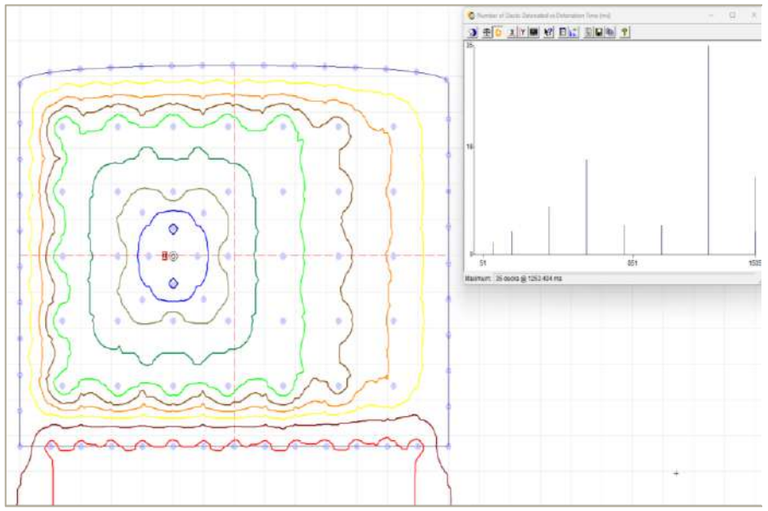


Figure 7-86: Blast Simulation showing Maximum Blastholes per Delay – Decline Development

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7.14.5 Expected Ground Vibration

The area surrounding the proposed JV Project and buffer mining areas were reviewed for structures, traffic, roads, human interface, animals' interface, industrial structures, etc. Various installations and structures were observed. These are listed in Table 7-60. Ground vibration on the surface is the only expected impact associated with the underground operations. This section concentrates on the outcome of modelling the possible effects of ground vibration on these points of interest or possible interfaces. In the evaluation, the charge mass scenario selected as indicated in section 7.14.4 is considered regarding ground vibration.

Underground blasting will produce mainly ground vibration on the surface. The effects of air blast and fly rock are contained underground. The actual blast may be heard depending on the depth below the surface. Analysis of impacts from blasting is based on the distance from the POI to the roof elevation of the mining area. Thus, the assessment is based on a distance of 1250 m from surface, representing the closest point at which mining will occur relative to surface. As explained previously, reference is only made to selected structures, as these are considered representative of the extent of all structures surrounding the mining area.

Tables are provided for the maximum charge model concerning:

- "Tag" No. is the number corresponding to the POI figures.
- "Description" indicates the type of the structure.
- "Distance" is the distance between the structure and the roof elevation of the mining area.
- "Specific Limit" is the maximum limit for ground vibration at the specific structure or installation.
- "Predicted PPV (mm/s)" is the calculated ground vibration at the structure.
- The "Structure Response @ 10Hz and Human Tolerance @ 30Hz" indicates the possible concern and if there is any concern for structural damage or potential negative human perception, respectively. Indicators used are "perceptible"," unpleasant", "intolerable", which stem from the human perception of information given and indicators such as "high" or "low" are given for the possibility of damage to a structure. Levels below 0.76 mm/s could be considered to have a negligible possibility of influence.

The simulations for the underground workings on expected ground vibration levels from maximum charge mass are presented in Figure 7-87 and Figure 7-88 below. The charge mass applied is according to blast design discussed in section 7.14.4. These levels are then plotted and overlaid with the proposed mining area to observe possible influences at structures identified. Structures or POI's for consideration are also plotted in this model. Ground vibration predictions were done considering a distance of 1250 m from the mining area to surface.

The simulation provided shows ground vibration contours only for a limited number of levels. The levels shown are from the calculated minimum and maximum ground vibration predictions. This enables immediate review of possible impacts that may be applicable to any of the privately or publicly owned structures, social gathering areas or sensitive installations.

Data is provided as follows: Vibration contours; a table with predicted ground vibration values and evaluation for each POI. Additional colour codes used in the tables are as follows:

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Table 7-63: Colour coding assessment

Structure Evaluations:
Vibration levels higher than the proposed limit applicable to Structures / Installations is coloured "Red"
People's Perception Evaluation:
Vibration levels indicated as Intolerable on the human perception scale is coloured "Red"
Vibration levels indicated as Unpleasant on the human perception scale is coloured "Mustard"
Vibration levels indicated as Perceptible on the human perception scale is coloured "Light Green"
POI's that are found inside the shaft area are coloured "Olive Green"

Simulations for expected ground vibration levels from maximum charge mass are presented below.

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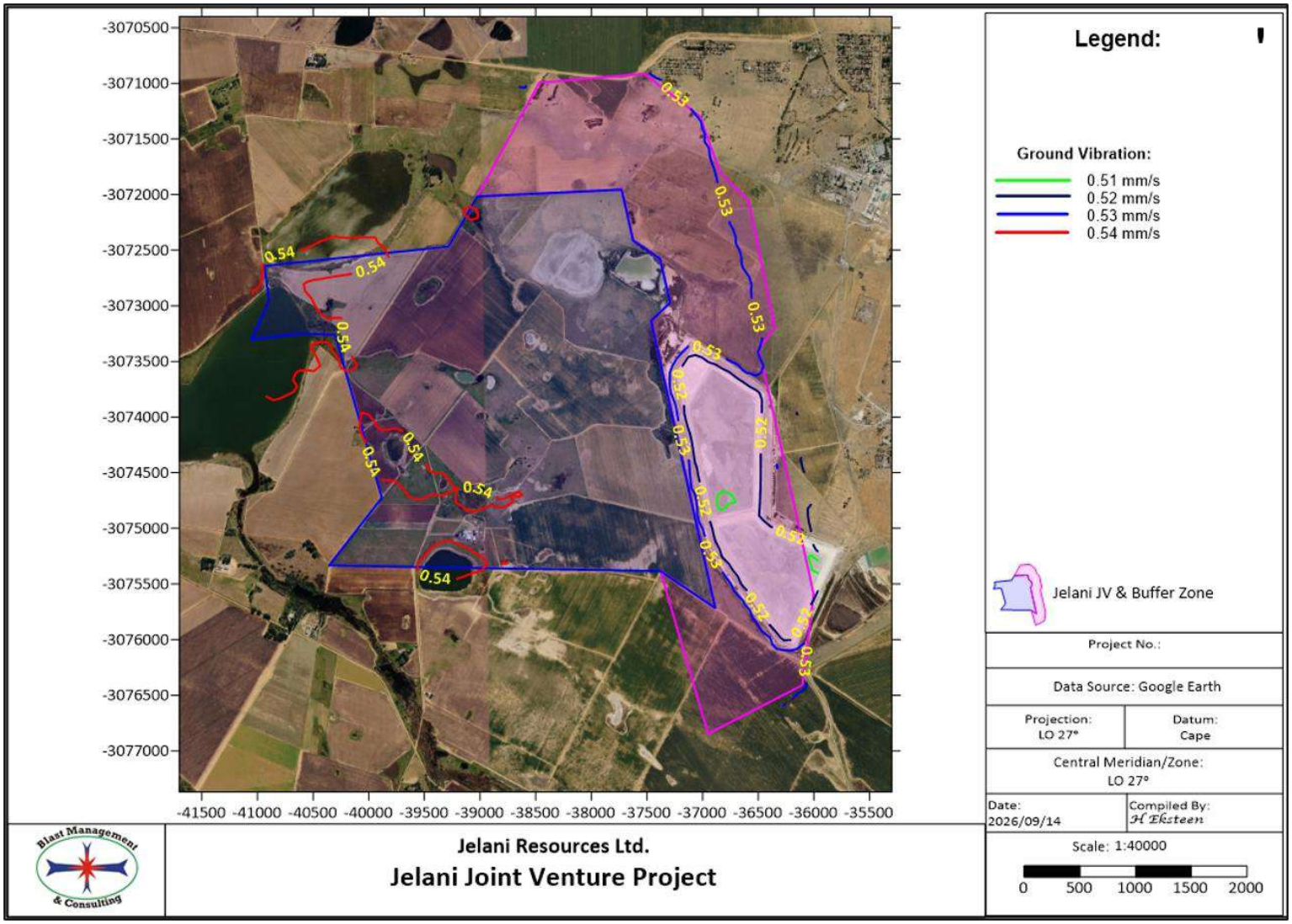


Figure 7-87: Ground Vibration Influence from Maximum Charge per Delay – Contours

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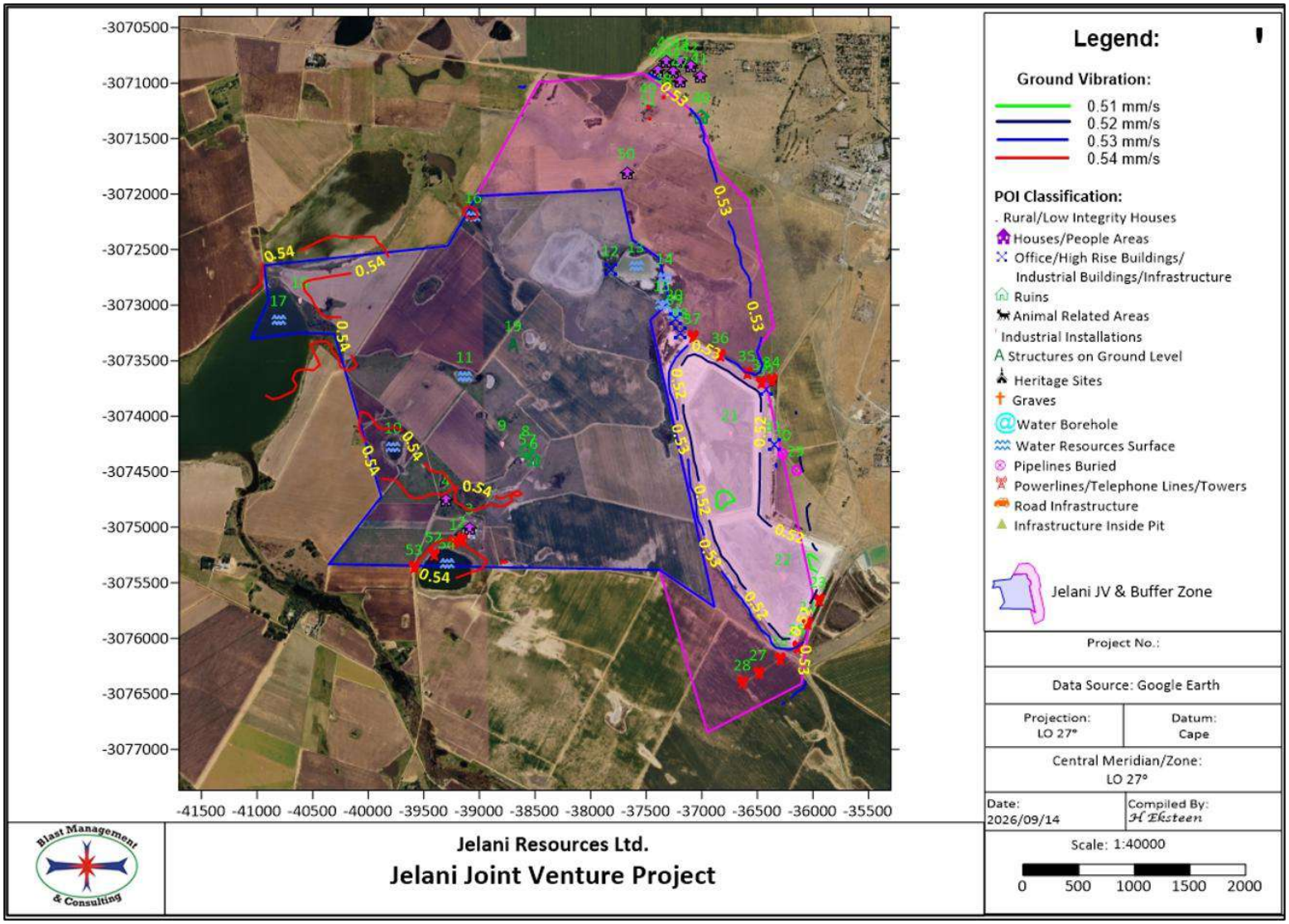


Figure 7-88: Ground Vibration Influence from Maximum Charge per Delay – Contours with POI's

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Table 7-64: Ground Vibration Evaluation for Maximum Charge – 343 Kg

Tag	Description	Ground Vibration Limit (mm/s)	Distance (m)	Total Mass/Delay (kg)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
1	Power Lines/Pylons	75	1262	343	0.54	Acceptable	N/A
2	Power Lines/Pylons	75	1263	343	0.54	Acceptable	N/A
3	Farmstead	12.5	1263	343	0.54	Acceptable	Too Low
4	Farmhouses	12.5	1262	343	0.54	Acceptable	Too Low
5	Cement Dam	50	1267	343	0.54	Acceptable	N/A
6	Cement Dam	50	1265	343	0.54	Acceptable	N/A
7	Ruins	6	1266	343	0.54	Acceptable	N/A
8	Ruins	6	1266	343	0.54	Acceptable	N/A
9	Cement Dam	50	1266	343	0.54	Acceptable	N/A
10	Dam	50	1258	343	0.54	Acceptable	N/A
11	Dam	50	1263	343	0.54	Acceptable	N/A
12	Pump House	50	1266	343	0.54	Acceptable	Too Low
13	Dam	50	1267	343	0.54	Acceptable	N/A
14	Dam	50	1267	343	0.54	Acceptable	N/A
15	Dam	50	1269	343	0.53	Acceptable	N/A
16	Dam	50	1261	343	0.54	Acceptable	N/A
17	Dam	50	1250	343	0.55	Acceptable	N/A
18	Cement Dam	50	1257	343	0.54	Acceptable	N/A
19	Cultivated Fields	200	1266	343	0.54	Acceptable	N/A
20	Dam	50	1269	343	0.53	Acceptable	N/A
21	Tailings Dam	12.5	1304	343	0.51	Acceptable	N/A
22	Tailings Dam	12.5	1303	343	0.51	Acceptable	N/A
23	Power Lines/Pylons	75	1280	343	0.53	Acceptable	N/A
24	Power Lines/Pylons	75	1278	343	0.53	Acceptable	N/A

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Tag	Description	Ground Vibration Limit (mm/s)	Distance (m)	Total Mass/Delay (kg)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
25	Power Lines/Pylons	75	1275	343	0.53	Acceptable	N/A
26	Power Lines/Pylons	75	1273	343	0.53	Acceptable	N/A
27	Power Lines/Pylons	75	1272	343	0.53	Acceptable	N/A
28	Power Lines/Pylons	75	1271	343	0.53	Acceptable	N/A
29	Pipeline	50	1282	343	0.53	Acceptable	N/A
30	Pipeline	50	1277	343	0.53	Acceptable	N/A
31	Mine Building/Structure	25	1276	343	0.53	Acceptable	Too Low
32	Mine Building/Structure	25	1281	343	0.53	Acceptable	Too Low
33	Power Lines/Pylons	75	1276	343	0.53	Acceptable	N/A
34	Power Lines/Pylons	75	1278	343	0.53	Acceptable	N/A
35	Power Lines/Pylons	75	1275	343	0.53	Acceptable	N/A
36	Power Lines/Pylons	75	1275	343	0.53	Acceptable	N/A
37	Power Lines/Pylons	75	1270	343	0.53	Acceptable	N/A
38	Mine Building/Structure	25	1270	343	0.53	Acceptable	Too Low
39	Mine Building/Structure	25	1269	343	0.53	Acceptable	Too Low
40	Ruins	6	1276	343	0.53	Acceptable	N/A
41	Houses	12.5	1309	343	0.51	Acceptable	Too Low
42	Houses	12.5	1317	343	0.50	Acceptable	Too Low
43	Houses	12.5	1312	343	0.51	Acceptable	Too Low
44	Houses	12.5	1289	343	0.52	Acceptable	Too Low
45	Houses	12.5	1295	343	0.52	Acceptable	Too Low
46	Houses	12.5	1279	343	0.53	Acceptable	Too Low
47	Structure	12.5	1286	343	0.52	Acceptable	Too Low
48	Informal Housing	6	1274	343	0.53	Acceptable	Too Low
49	Informal Housing	6	1274	343	0.53	Acceptable	Too Low
50	Structure	12.5	1271	343	0.53	Acceptable	Too Low

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Tag	Description	Ground Vibration Limit (mm/s)	Distance (m)	Total Mass/Delay (kg)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
51	Informal Housing	6	1274	343	0.53	Acceptable	Too Low
52	Power Lines/Pylons	75	1257	343	0.54	Acceptable	N/A
53	Power Lines/Pylons	75	1262	343	0.54	Acceptable	N/A
54	Dam	50	1255	343	0.54	Acceptable	N/A

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7.14.5.1 Summary of Ground Vibration Levels

The mining area was evaluated for expected levels of ground vibration from future blasting operations. A review of the site and the surrounding installations, houses and buildings showed that the distances between the structures and the minimum mining area elevation do not vary significantly. The influences will also vary with distance from the area. The model used for evaluation indicates minor levels. It will, however, be imperative to ensure that a monitoring program is conducted to confirm levels of ground vibration induced and to ensure that ground vibration limits are not exceeded.

The evaluation mainly considered a distance up to 100 m horizontally from the surface area of the JV Project and Buffer mining areas. The closest structures to the mining area observed are Power lines, Buildings/Structures, Houses, Industrial buildings, gravel roads, Tailings Storage Facility, Dams, farmlands, etc. The distances between structures and the roof elevation of the mining area are a contributing factor to the levels of ground vibration expected and the subsequent possible influences. The ground vibration levels predicted for all POI's evaluated ranged between 0.50 mm/s and 0.55 mm/s for structures surrounding the mining area. The nearest structure is located 1250 m (POI17 - Dam) from the roof of the mining area. All structures/POIs are located such that the levels of ground vibration predicted from the charge will be acceptable regarding structure response.

7.14.5.2 Ground Vibration and human perception

Ground vibration is expected to be perceivable at a level of 0.9 mm/s at 30 Hz. The calculations and predictions show the maximum level of ground vibration at the POIs to be 0.55 mm/s, which is lower than the perceivable level and is shown in Table 7-64 as "Too Low". It can therefore be assumed that ground vibration generated from a maximum instantaneous charge mass of 343 kg at a minimum distance of 1250 m from the surface would not be perceivable by people.

7.14.5.3 Potential that Vibration will Impact Adjacent Communities

Current predictions show that the expected ground vibration levels from the underground mining areas are below the perceivable level for humans. However, the importance of good public relations cannot be overemphasised. People may react negatively when experiencing the effects of blasting, such as ground vibration. Even at low levels, where damage to structures is not expected, it may still cause concern or upset among neighbouring communities. Proper and appropriate communication with neighbours regarding blasting, monitoring, and the actions taken to ensure proper control will therefore be required.

7.14.5.4 Cracking of houses

The structures found in the areas of concern range from poorly to properly built brick-and-mortar structures, as well as industrial buildings and structures. There are various buildings found within the 100 m horizontal range from the mining area. Building style, materials, and soil conditions will certainly contribute to additional cracking apart from influences such as blasting operations.

The proposed limits as applied in this document, i.e. 6 mm/s, 12.5 mm/s and 25 mm/s, are considered sufficient to ensure that additional damage is not introduced to the different categories of structures. It is expected that, should levels of ground vibration be maintained within these limits, the possibility of inducing damage is limited.

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7.15 Radioactivity

Information sourced from the 2024 Free State Radiological Public Safety Assessment: System Description, undertaken by AquiSim Consulting (Pty) Ltd for Harmony Gold Mining Company Limited - Free State Operations.

Note: Harmony Gold Mining Company Limited, a joint venture partner in Jelani Resources, holds a Radiological Public Safety Assessment for its Free State operations, as well as a valid Certificate of Registration (CoR 10) issued by the National Nuclear Regulator (NNR) for its Target Mine operation located adjacent to the Proposed Jelani Project area.

The Geological investigation show that the Proposed Project area lies within the same geological formation as Harmony Target Mine (refer to section 7.3.2 for local geology). The radiological characteristics of the Proposed Project area are expected to be consistent with those already assessed for the adjacent mining operations.

The proposed underground mining project will involve the extraction of gold, together with silver, uranium, and other associated mineral resources within the Free State Goldfield, situated on the south-western margin of the Witwatersrand Basin underlying the Proposed Project area.

Access to and egress from the underground workings will be undertaken through the existing Harmony Target shafts, and the ore will be processed using the existing Harmony Target operational mining infrastructure. These shafts, operational systems and geological formations have already been assessed and approved by the NNR.

Naturally occurring radionuclides associated with the uranium, thorium and actinium decay series are associated with the gold-bearing reefs of the Witwatersrand Basin. These naturally occurring radionuclides are present in ore brought to the surface for processing and consequently will be carried through to the mining and mineral processing residues. Materials and residues that contain naturally occurring radionuclides are generally referred to as Naturally Occurring Radioactive Materials (NORM) (IAEA, 2007).

Due to the presence of naturally occurring radionuclides, NORM has the potential to impact negatively the health of humans who are exposed to these materials (Marsh et al., 2010). In addition to the natural background radiation, practices that exploit the earth's resources may enhance the potential for human exposure to naturally occurring radionuclides by way of their products, by-products, residues and wastes. Industries such as mining and mineral processing operations and associated facilities and activities have the potential to alter the natural background radiation, and potentially increase radiation exposure, by:

- Moving naturally occurring radionuclides from inaccessible locations to locations where humans are present and can be exposed;
- Concentrating radionuclides in the accessible environment; or
- Changing the chemical or physical environment, so that immobile radionuclides become more mobile in the natural environment (e.g., more soluble in water, or more transportable by the wind).

7.15.1 Regulatory Context

In South Africa, the protection of human health and the environment from adverse effects associated with exposure to ionising radiation is regulated in terms of the National Nuclear Regulator Act (NNRA) (Act 47 of 1999)

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and the Nuclear Energy Act (NEA) (Act No. 46 of 1999). The NNRA established the National Nuclear Regulator (NNR) as the statutory body responsible for regulating the nuclear industry, as well as regulating NORM associated with the mining and mineral processing industry. The legal limit for material to be classified as radioactive in terms of national standards (published in terms of the NNRA) is 0.5 Bq.g-1 or 500 Bq.kg-1 (radionuclide specific). Section 22 (1) of the NNRA states:

"Any person wishing to engage in any action which is capable of causing nuclear damage (Section 2(1)(c)) may apply in the prescribed format to the chief executive officer for a Certificate of Registration (CoR) and must furnish such information as the board requires"

Harmony holds nine Certificates of Registrations (CoRs) issued by the NNR to Harmony for their Free State Operations. These CoRs include the following:

One of the key submissions as part of an initial CoR application is a Radiological Public Safety Assessment (RPSA). Internationally it is accepted as good radiation protection and management practice to revise and update these assessments regularly, typically every 3 to 5 years.

The most recent Radiological Public Safety Assessment for the Free State Operations was performed in 2024 (AquiSim, 2024) (hereafter referred to as the 2024 Free State Operations Radiological Public Safety Assessment) and was undertaken in accordance with the provisions, requirements, and guidelines issued by the NNR.

7.15.2 Scope and Structure of the 2024 Free State Radiological Public Safety Assessment

The objective of the assessment is to confidently demonstrate to the NNR and other stakeholders that nearby members of the public are not exposed to levels of ionizing radiation induced by the Free State Operations above the regulatory compliance criteria set for public exposure.

Consistent with the Assessment Context report (AquiSim, 2024) and regulatory guidance provided by the NNR (NNR, 2013), the focus of the assessment is on the operational period of the Free State Operations. Viewed from this perspective, the purpose of the 2022 Free State Operations Radiological Public Safety Assessment was defined in the Assessment Context report as follows (AquiSim, 2024):

- To assess the radiological safety of members of the public from conditions induced by the Free State Operations in a comprehensive, systematic, and transparent manner that is consistent with the NNRA and NEA, as well as with NNR requirements and regulations in general.

The methodology used for this purpose is based on a general framework developed in the international community to conduct post-closure radiological safety assessments of near-surface radioactive waste disposal facilities (IAEA, 2004). As illustrated in Figure 7-89, the definition of the assessment context and system description is the first step in the process and provides the basis for the definition and justification of scenarios and public exposure conditions as subsequent steps. The latter is documented in AquiSim (2024).

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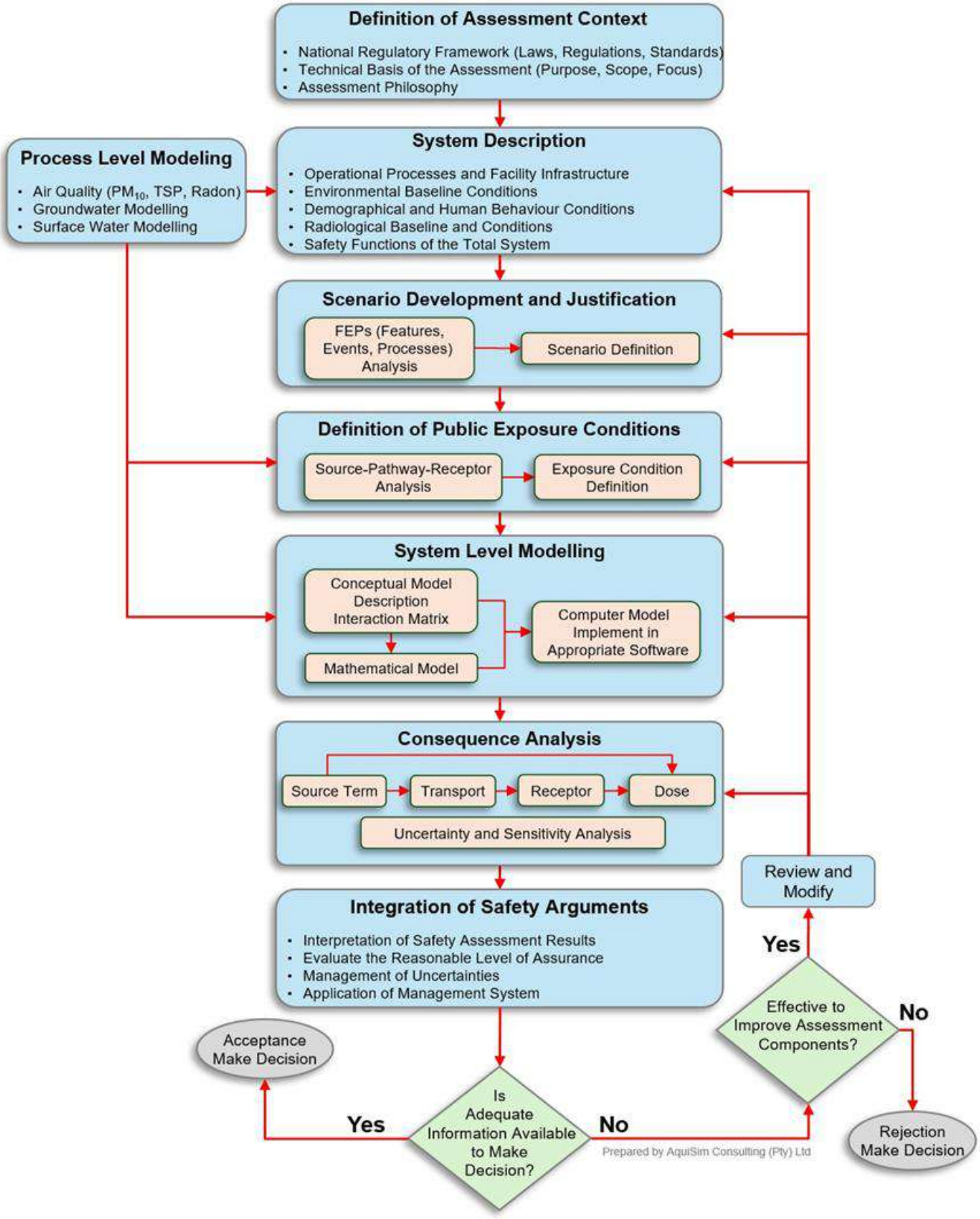


Figure 7-89: Schematic illustration of the safety assessment framework, within which the 2022 Free State Operations RPSA is performed (AquiSim, 2024b).

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The nature of mining and mineral processing operations is such that some of the associated facilities and activities may serve as potential sources of radiation exposure from the time they are commissioned. Others will cease to serve as sources following decommissioning, while facilities such as tailings storage facilities that remain at the surface may continue to serve as a potential source of radiation exposure long after operations cease.

Incidents or accidents outside normal operational conditions (e.g., spillages or controlled or uncontrolled releases of water or tailings) may serve as additional sources of radiation exposure to members of the public. It is thus important that the system description reflect this time-varying aspect to the extent possible.

The 2024 Free State Radiological Public Safety Assessment is structured as follows:

- Section 2 provides a summary description of the mining and mineral processing surface infrastructure associated with the Free State Operations, as well as conditions as it is perceived to be during the post operational period;
- Section 3 provides a summary description of the environmental baseline conditions as observed in the vicinity of the Free State Operations;
- Section 4 describes the land use and human behavioural conditions in the vicinity of the Free State Operations; and
- Section 5 summarises the radiological properties and conditions associated with the Free State Operations, including baseline environmental radiological conditions as observed in the area.

7.15.3 Description of the Free State Operations

The Free State Operations consists of several operating underground mines as well as surface operations that are divided into nine separate entities. The different operational areas that make up each entity are grouped according to a CoR number, as issued by the NNR, as follows:

- CoR-5, held by FREEGOLD (HARMONY) PROPRIETARY LIMITED previously known as ARMGOLD / HARMONY FREEGOLD JOINT VENTURE (PTY) LIMITED for the Tshepong Mine, Phakisa Mine, Nyala Mine Eland Mine, Harmony 1 Gold Plant Bambanani East Mine, Bambanani West Mine And IMS (collectively referred to as the Freegold Operations);
- CoR-6, held by FREEGOLD (HARMONY) PROPRIETARY LIMITED previously known as ARMGOLD / HARMONY FREEGOLD JOINT VENTURE (PTY) LIMITED for the Joel Operations;
- CoR-7, held by AFRICAN RAINBOW MINERALS GOLD LIMITED for the African Rainbow Minerals (ARM) Operations;
- **CoR-10, held by AVGOLD LIMITED for the Target Operations;**
- CoR-37, held by HARMONY GOLD MINING COMPANY LIMITED for the Merriespruit, Virginia and Harmony Mines, the Unisel Mine, the Saaiplaas and Masimong Mines, as well as the Brand 1, Brand 3, and Brand 5 mines (collectively referred to as the Virginia Operations);
- CoR-40, held by FREEGOLD (HARMONY) PROPRIETARY LIMITED previously known as ARMGOLD / HARMONY FREEGOLD JOINT VENTURE (PTY) LIMITED for the St Helena Operations;
- CoR-116, held by TSWELOPELE BENEFICIATION OPERATION (PTY) LIMITED previously known as BUSINESS VENTURE INVESTMENTS NO 1692 (PTY) LIMITED for the reclamation of several historical TSFs at the Saaiplaas Plant;
- CoR-252, held by HARMONY GOLD MINING COMPANY LIMITED for the President Steyn South Operations; and
- CoR-253, held by AVGOLD LIMITED for the President Steyn North Operations.

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As noted above, Harmony already holds a Radiological Public Safety Assessment for its Free State operations, as well as a valid Certificate of Registration (CoR 10) issued by the National Nuclear Regulator (NNR) for its Target Mine operation located adjacent to the Proposed Project area. The operational systems and geological formations associated with the Target Mine have previously been assessed and approved by the NNR.

7.12.2.1. Target Operations (CoR-10)

Table 7-65 summarises the features and entities included in the scope of CoR-10, while Figure 7-90 presents the lateral extent of the Target Operations. Table 7-65 and Figure 7-90 show that the surface infrastructure associated with the Target Operations is limited, with most facilities and entities still operational. These include the Target Plant, the Backfill Plant, the Target No. 1 Shaft, the Target No. 2 Vent Shaft, as well as the Target TSF and associated water management facilities. The latter include the Return Water Dam and Evaporation Ponds (see Figure 7-90). Target No. 2 Shaft is also operational, mainly as a standby shaft for Target No. 1 Shaft.

Table 7-65: Summary of the features and entities associated with the Target Operations (CoR-10).

Category	Description	Status	Notes
Metallurgical	Target Plant	Operational	None
Backfill Plant	Backfill Plant	Operational	None
Downcast Shaft	Target No. 1 Shaft	Operational	Operational until 2026
	Target No. 2 Shaft	Operational	Standby shaft for Target No. 1 Shaft (see Figure 7-91)
Ventilation Shaft	Target No. 2 Vent Shaft	Operational	None
Tailings Storage Facility	Target TSF	Operational	Deposition site for Target Plant
Waste Rock Dump	Target 1 West WRD	Non-operational	Only the footprint is left. The area was surveyed in January 2017 and meets NNR clearance criteria (see Figure 7-92)
	Target 1 East WRD	Non-operational	Dormant - survey conducted in August 2011 confirmed that some activities exceed clearance levels (see Figure 7-93).
	Target No. 2 Shaft WRD	Operational	Reclaimed for processing at Target Plant. Material cleared for public release COR10A0250; COR10B0186) (see Figure 7-94).
	Target No. 2 Vent Shaft WRD	Non-operational	Dormant. Material cleared for public release COR10A0250; COR10B0186) (see Figure 7-95)
Water Management	Evaporation Ponds	Operational	None
	Return Water Dam	Operational	None

Three WRDs associated with CoR-10 are non-operational (dormant), while the Target 1 West WRD is decommissioned with only the footprint left that meets NNR clearance criteria. Target 1 East WRD exceeds NNR clearance criteria in some areas and further clean-up is required. The Target No. 2 Vent Shaft WRD is cleared for public release (COR10A0250; COR10B0186). The Target No. 2 Shaft WRD is reprocessed at the Target Plant. Voël pan is not included in the scope of CoR-10 but was surveyed in 2013 when the pan was mostly dry (see Figure 7-96). The survey recorded a maximum uranium activity of 0.88 Bq.g-1. The average and 90% values recorded were 0.12 and 0.20 Bq.g-1, respectively. The pan has since been filled with water again.

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Figure 7-90: Lateral extent and scope of the features associated with the Target Operations (CoR-10).

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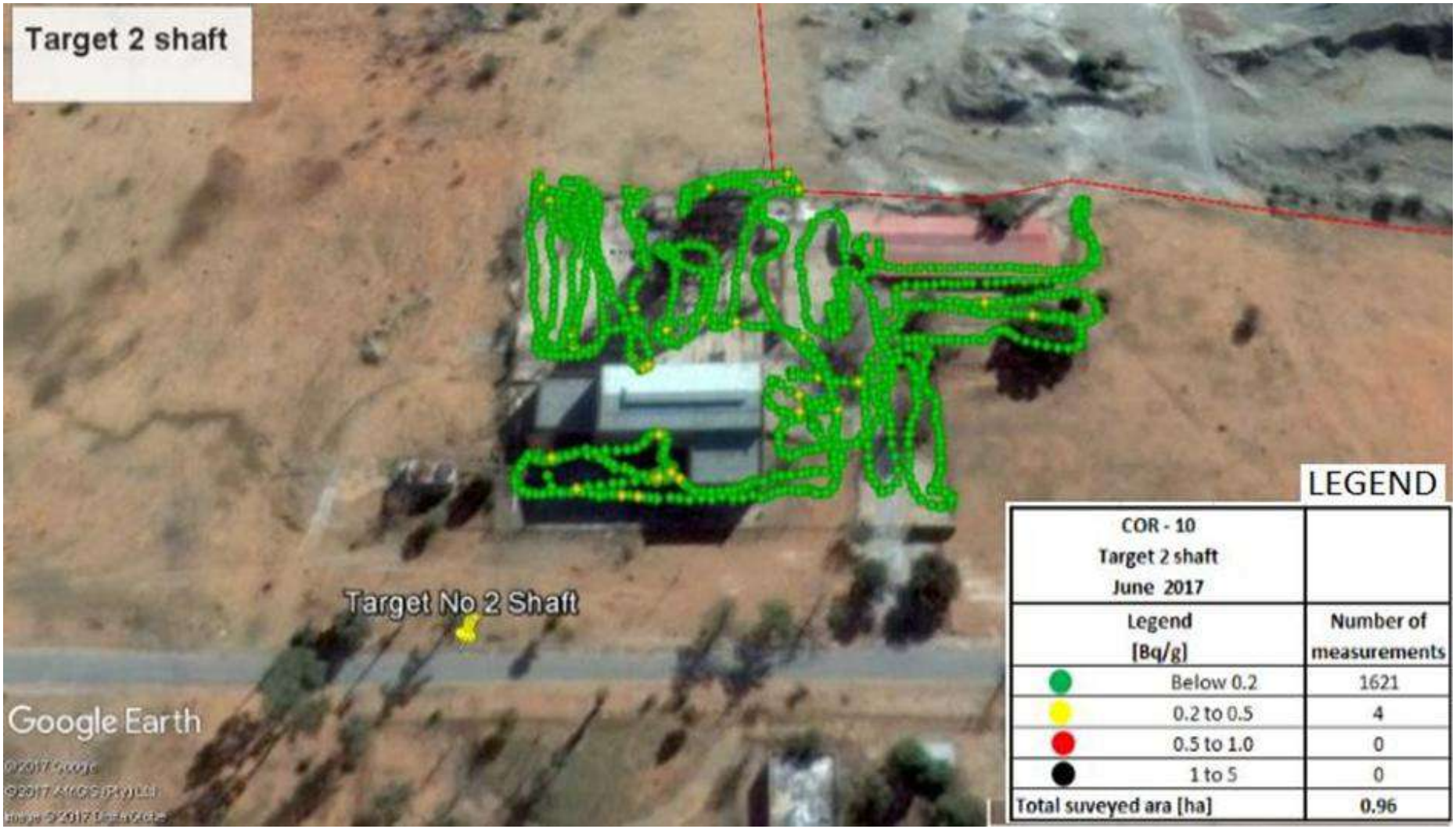


Figure 7-91: Gamma survey results of the Target No. 2 Shaft area (June 2017).

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Figure 7-92: Gamma survey results of the Target 1 West waste rock dump (January 2017).

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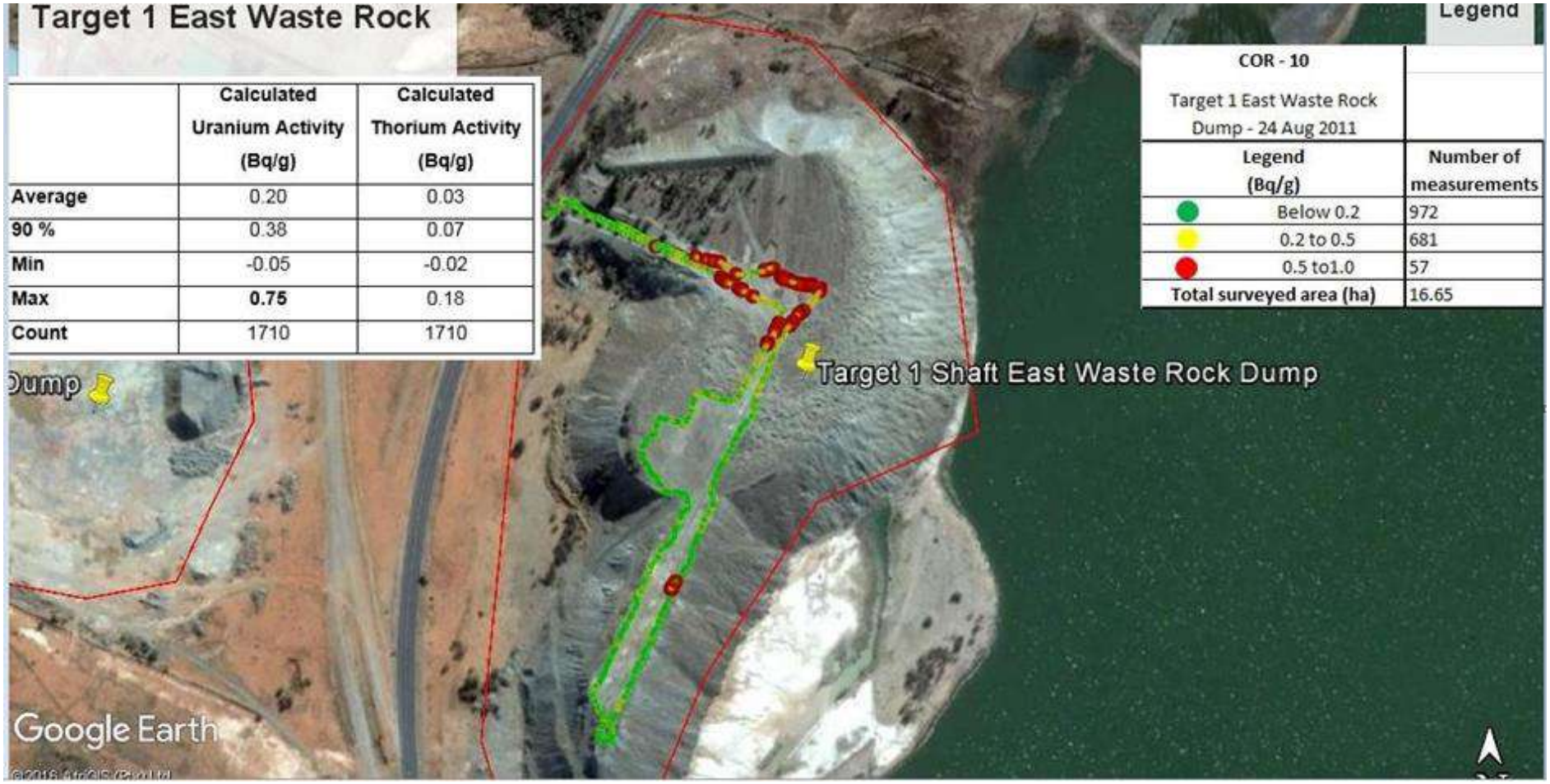
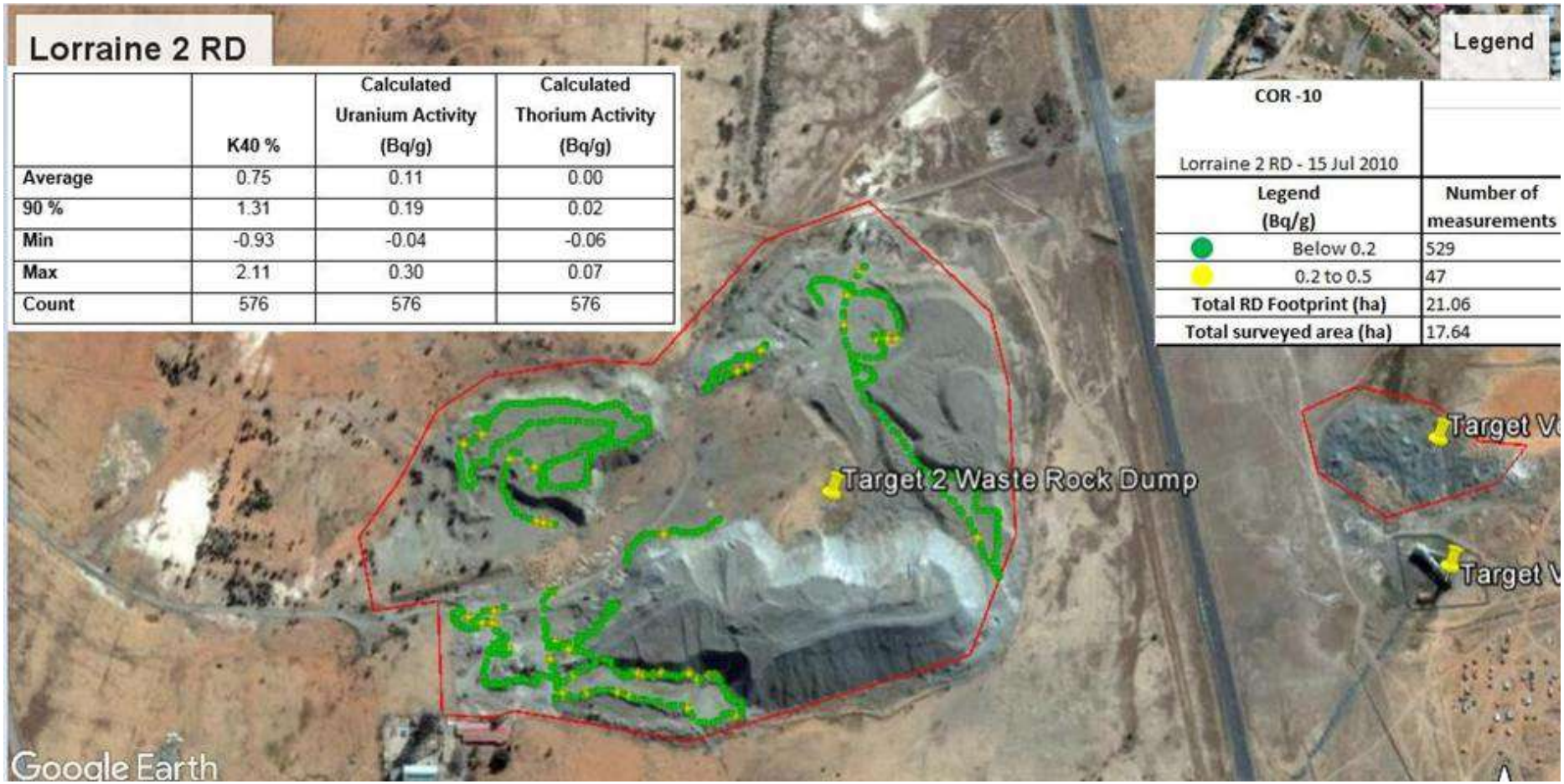


Figure 7-93: Gamma survey results of the dormant Target 1 East waste rock dump (August 2011).

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	K40 %	Calculated Uranium Activity (Bq/g)	Calculated Thorium Activity (Bq/g)
Average	0.75	0.11	0.00
90 %	1.31	0.19	0.02
Min	-0.93	-0.04	-0.06
Max	2.11	0.30	0.07
Count	576	576	576

Legend (Bq/g)	Number of measurements
Below 0.2	529
0.2 to 0.5	47
Total RD Footprint (ha)	21.06
Total surveyed area (ha)	17.64

Figure 7-94: Gamma survey results of the dormant Target No. 2 Shaft (Loraine) waste rock dump (July 2010).

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Figure 7-95: Gamma survey results of the dormant Target No. 2 Vent Shaft (Loraine) waste rock dump.

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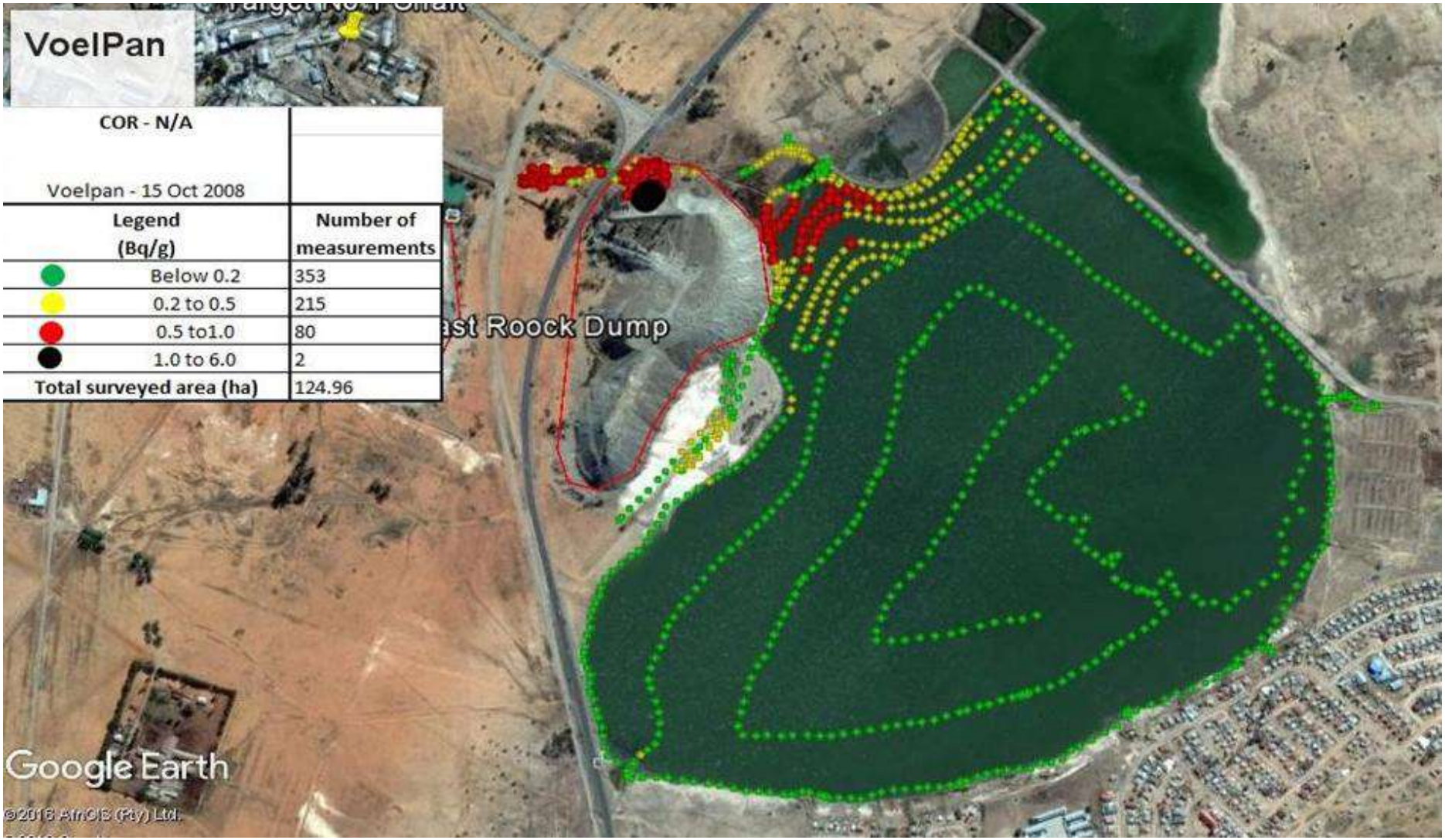


Figure 7-96: Gamma survey results of Voelpan when the pan was mostly dry (2013).

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7.15.4 Radioactivity Associated with the Free State Operations

The radiological conditions associated with the Free State Operations are of importance since they help to quantify the release of radioactivity into the environment as a function of time and space, generally referred to as the source term release rate. The source term release rate provides input into the environmental pathway modelling, notably the atmospheric, surface water and groundwater pathways.

Table 7-66: Summary of full spectrum analysis results (in Bq.kg-1) for tailings samples collected from metallurgical plants in the Free State Operations of Harmony.

Necsa Report No.	RS2014-0713					RS2015-1366
Sample Point	Harmony 1 Plant Composite	Saaiplaas Plant Composite	Joel Plant Composite	Central Plan Composite	Target Plant Composite	Joel Plant Composite
Nuclide	Activity Concentration (Bq.kg-1)					
U-238	1100	543	1 430	267	**478**	975
U-234	-	-	-	-	**-**	983
Ra-226	1010	1370	1210	585	**444**	952
Pb-210	1350	1660	1570	762	**638**	1370
U-235	50.8	25	65.9	12.3	**22**	44.9
Th-232	38	50.3	61.3	27.5	**25.2**	43.8
Ra-228	< 110	47	94.1	< 110	**51.3**	50
Th-228	<160	37	< 170	< 150	**29**	47
K-40	< 410	< 530	< 440	330	**< 410**	210
Gross α	10800	11900	9200	3810	**4820**	10000
Gross β	6300	4920	5350	2040	**2220**	4400

8. Impact Assessment

8.1 Methodology for determining the Significance of Environmental Impacts

This part of the document focuses on the identification of the major potential impacts the activities, processes and actions may have on the surrounding environment. The criteria and rating parameters used to assess the significance of these impacts are presented in Table 8-1, which reflects compliance with the EIA Regulations of 2014 for evaluating direct, indirect, cumulative and residual impacts.

Potential environmental impacts (physical, biological, social and economic) associated with the Proposed Project will be presented as per Table 8-1. The significance of these impacts will be systematically assessed and rated using the assessment mythology described in this section. The EIA will include a full risk assessment of the associated environmental impacts. The EIA/EMPr Report will set out mitigation measures to be implemented in accordance with NEMA requirements.

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Table 8-1: Impact Assessment Criteria Used to Determine the Significance of Environmental Impacts

Nature of The Impact: ***Describe the Impact in Respect to The Activity to be Undertaken***		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (*positive or negative*)		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		
Calculated Significance Rating (Low, Medium, High)		
Reversibility: (Reversible or Irreversible)		
Irreplaceable loss of resources: (Yes or No)		
Residual impacts • (List these below)		
Cumulative Impacts • (List these below)		
Mitigation measures • (List these below)		

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impact significance rating system is presented in Table 8-2, Table 8-3, as well as Table 8-4 and it involves three parts:

- **Part A:** Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration.
- **Part B:** Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A.
- **Part C:** Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

8.1.1 Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequence in Part B, as showcased below in Table 8-2.

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Table 8-2: Consequence Rating Definitions

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

8.1.2 Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration, as showcased in Table 8-3.

Table 8-3: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
MAGNITUDE					
Minor	**Duration**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**Duration**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**Duration**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

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8.1.3 Part C: Determining Significance Rating

Rate significance based on consequence and probability, as showcased in Table 8-4.

Table 8-4: Significance Rating Methodology

Probability (of Exposure to Impacts)	Consequence Negative			Consequence Positive		
	Low	Medium	High	Low	Medium	High
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

8.2 Impacts and Cumulative Impacts Identified

This Subchapter serves to provide insight on the major positive, negative and cumulative impacts associated with the Proposed Project. The potential impacts are discussed per environmental feature/aspect. For more detail, please refer to the specialist study contained in the appendices.

8.2.1 Construction Phase

8.2.1.1 Hydrological

During the construction phase the earth berm/open bypass channel to carry "clean" water to Swartpan will be constructed by Harmony. This will involve the removal of all vegetation from the existing open channel and then forming the channel to its correct dimensions before lining the channel with concrete. The activities and impacts that are likely to occur during the construction phase are summarised in Table 8-5.

Table 8-5: Summary of activities and impacts for the construction phase

Activity	Impact Description
Removal of vegetation and alteration to the local topography	**Impact 1**: Erosion and wash off of exposed soils leading to siltation in nearby surface water runoff areas and/or Swartpan.
Site preparation and land rehabilitation before forming and construction of lining to bypass channel	**Impact 2**: Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality.
Use of construction equipment	**Impact 3:** Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.
Forming of bypass channel and construction of concrete lining to bypass channel	**Impact 4**: Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of concrete lining to bypass channel
Forming of earth berm connecting existing earth berm to bypass channel	**Impact 5**: Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of earth berm

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Major storm event during forming and construction of bypass channel	**Impact 6**: Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.

The ratings and proposed mitigation measures for the construction phase are provided in Table 8-6 to Table 8-11.

Table 8-6: Significance rating of construction impact 1

NATURE OF IMPACT 1: Erosion and wash off of exposed soils leading to siltation in nearby surface water runoff areas and/or Swartpan.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • Siltation of Swartpan		
Cumulative impacts • Siltation of Swartpan		
Mitigation measures • Clearance of vegetation for the new earth berms/open bypass channel must be limited as far as possible. • Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. • The SWMP must be implemented as a first step during the construction phase. • Water quality monitoring must be implemented upstream and downstream of construction sites.		

Table 8-7: Significance rating of construction impact 2

NATURE OF IMPACT 2: Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local

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NATURE OF IMPACT 2: Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality.		
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen		
Cumulative impacts • None foreseen		
Mitigation measures • Waste piles to be bermed off to prevent stormwater erosion. • The SWMP must be implemented as a first step during the construction phase. • Rehabilitation plan to be implemented accurately and monitored closely.		

Table 8-8: Significance rating of construction impact 3

NATURE OF IMPACT 3: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Moderate	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		

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NATURE OF IMPACT 3: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.
Mitigation measures • Water quality monitoring must be implemented upstream and downstream of construction sites. • Maintain all construction equipment. • Maintenance of construction equipment should be prohibited at or near the watercourse. • Train staff in spill response and deploy spill kits at active zones. • Drip trays shall be placed beneath leaking sections of construction equipment.

Table 8-9: Significance rating of construction impact 4

NATURE OF IMPACT 4: Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of concrete lining to bypass channel.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • SWMP must be implemented as a first step during the construction phase. • Phase construction to minimise exposed areas		

Table 8-10: Significance rating of construction impact 5

NATURE OF IMPACT 5: Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of earth berm.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Negative**

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Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • The SWMP must be implemented as a first step during the construction phase. • Monitor runoff during and after construction. • Water quality monitoring must be implemented upstream and downstream of construction sites.		

Table 8-11: Significance rating of construction impact 6

NATURE OF IMPACT 6: Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. • The SWMP must be implemented as a first step during the construction phase.		

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NATURE OF IMPACT 6: Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.
• Water quality monitoring must be implemented upstream and downstream of construction sites.

8.2.1.2 Hydrogeological

During the construction phase the Shaft 2 and 3 areas will be rehabilitated and refurbished to be used as access to the Jelani mining area. This may include clearance of vegetation and grading of some areas and movement of construction vehicles for site preparation and movement and placement of required equipment. The activities and impacts that are likely to occur during the construction phase are summarised in Table 8-12.

Table 8-12: Summary of Activities and Impacts for the Construction Phase

Activity	Impact Description
Site preparation for refurbishment of the Shaft 2 and 3 areas	Impact1: Release of pollutants during site preparation could pose a risk to groundwater quality.
Use of construction equipment for the refurbishment of the Shaft 2 and 3 areas	Impact 2: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the groundwater.

Table 8-13: Significance Rating of Construction Impact 1

NATURE OF IMPACT 1: Release of pollutants during site preparation could pose a risk to groundwater quality.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Short term	Short term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Possible, Unlikely)	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	Low	Low
Reversibility: (Reversible or Irreversible)	Reversable	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Increased recharge in cleared areas		
Cumulative impacts • None expected		
Mitigation measures • Contain clearance activities to required areas as much as practically possible; • Prevent ponding in cleared areas through (temporary) stormwater management; • Prevent erosion within the cleared areas and downgradient areas • Any incidents that could release pollutants to groundwater should be reported and mitigated immediately.		

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Table 8-14: Significance rating of Construction Impact 2

NATURE OF IMPACT 2: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the groundwater.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Short term	Short term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Possible, Unlikely)	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	Low	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Increased recharge in cleared areas		
Cumulative impacts • None expected		
Mitigation measures • Regular service of vehicles in designated repair bays; • Refuelling of vehicles only in designated areas; • Restrict movement of vehicles to a minimum; • All vehicles to be provided with a spill kit; • Any incidents that could release hydrocarbons to groundwater should be reported and mitigated immediately.		

8.2.1.3 Air Quality

Dustfall, PM10 and PM2.5 are key pollutants of concern associated with the proposed mining activities, and are emitted from the following activities:

- Refurbishment and/or construction at Target No. 2 and No.3 Shafts;
- Materials handling operations (truck loading/offloading operations during Phase 1);
- Wind erosion from exposed areas: waste rock dumps;
- Vehicle dust entrainment on unpaved roads; and
- Conveyor transfer points (rock hoisting and run-of mine ore transport).

To investigate the potential impact of the Proposed Project on local ambient air quality, the following air pollutants were chosen in the quantification of emissions for the construction and operational phases of the project:

- Dustfall; and
- Particulate matter (PM10 and PM2.5).

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This project focused on dust emissions as this is a key pollutant associated with the Proposed Project.

In the AQIA, two scenarios were modelled:

(1) The construction phase scenario, where emissions associated with construction and refurbishment activity due to the development and/or upgrade of infrastructure at Target No 2 Shaft were modelled.
    a. Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.

(2) The operational phase scenario, where emissions associated with surface activities at the proposed mine were modelled. This scenario represents the potential impacts if the proposed mine were emitting under normal operating conditions and comprises two different operational configurations, representing Phase 1 and Phase 2, respectively.

Processing operations at the Target 1 Plant fall outside the scope of the AQIA, as they are undertaken as part of Harmony's operations and are not included in the proposed JV project.

The level of impact of operational activities associated with the proposed activities, is assessed based on consequence/inherent risk and likelihood, using the methodology in the AQIA (Appendix D2), which provide the residual risk/overall impact significance ratings during construction and operational phases 1 and 2.

Overall, low negative impact significance ratings (i.e., low residual risk) for air quality are predicted at the sensitive receptor locations for the proposed activities (Table 8-15), while moderate impact significance ratings are predicted at the shaft boundaries (Table 8-16).

Predicted pollutant concentrations decrease with increasing distance from the emission sources. Consequently, the highest cumulative impacts are expected in areas located near the operational areas, with lower impacts anticipated at increasing distances from these sources. At the sensitive receptor areas, cumulative impacts are generally expected to be low to negligible. At the Nyakallong residential area (DR6), however, elevated cumulative dustfall impacts may occur due to the relatively high maximum background dustfall recorded at this location. The residential area dustfall limit of 600 mg/m²/day was exceeded on one occasion during the July 2024 – June 2025 monitoring period, with a dustfall rate of 1 570 mg/m²/day recorded in March 2025. Therefore, even relatively low incremental dustfall from the proposed activities could result in elevated cumulative dustfall at DR6.

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Table 8-15: Residual risk matrix combining likelihood and consequence at the sensitive receptors (for dust fallout, PM10 and PM2.5) – Construction and Operational Phases 1 and 2.

Discrete Receptor ID			Residual Risk				
DR1 - DR21	Consequence	High	Moderate	High	High	Fatally Flawed	
		Moderate-high	Low	Moderate	High	High	High
		Moderate	Low	Moderate	Moderate	Moderate	Moderate
		Moderate-low	Low	Low	Low	Low	Moderate
		Low	Low	Low	Low	Low	Low
			Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
			Likelihood				

Table 8-16: Residual risk matrix combining likelihood and consequence at the shaft boundaries (for dustfall, PM10 and PM2.5) – Construction and Operational Phases 1 and 2.

			Residual Risk				
At Shaft Boundaries	Consequence	High	Moderate	High	High	Fatally Flawed	
		Moderate-high	Low	Moderate	High	High	High
		Moderate	Low	Moderate	Moderate	Moderate	Moderate
		Moderate-low	Low	Low	Low	Low	Moderate
		Low	Low	Low	Low	Low	Low
			Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
			Likelihood				

8.2.1.3.1 Mitigation Measures for Construction Phase

Pollutants emitted during the construction phase of the proposed mine will mainly comprise of dustfall and particulate matter emissions but will be short-term (up to 45 months) and intermittent. These emissions can be easily managed and mitigated with the implementation of dust control measures summarised in Table 8-17, where possible.

In addition to the mitigation measures recommended in Table 8-17, the following measures should be considered for implementation, where feasible:

- Using water trucks for dust suppression, particularly during the dry and windy periods,
- Implementation of vehicle speed restrictions, i.e., set strict speed limits and ensure speed reduction for all onsite construction vehicles, and
- Ensure full compliance with any further mitigation measures specified in the EMPr.

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Table 8-17: Dust control measures for construction (Department of Environment and Conservation, 2011).

Dust Control Measure	Description
Limit Cleared Areas	Before the commencement of any site works and during the operation, as much vegetation as possible should be retained, including patches and strips to minimise dust. Dust emissions can be controlled using the following procedures: • Before any site works commence, plan and locate the vegetation cover that needs to be retained; • Protect this vegetation by fencing or blocking off from the rest of the site operations; • In other areas, maintain the original vegetation cover for as long as possible; • Avoid clearing the entire site at once, instead clear areas as required in stages of the operation. Retaining the original trees, shrubs and grasses is one of the most efficient and effective ways of minimising dust emissions. Even low or sparse vegetation can be very effective at dissipating wind velocity at the ground surface, where dust lift off occurs.
Vegetative Stabilisation	Vegetation is a very effective form of reducing dust emissions. The following procedures should be considered in minimising dust emissions: • Retain as much existing vegetation as possible; • If an area needs to be cleared, transplant established plants that must be disturbed to areas that need vegetation; • If existing vegetation must be removed and cannot be immediately transplanted elsewhere, remove and maintain them for replanting at project completion. If trees and plants must be removed and it is not possible for them to be replanted, consider chipping and using the material as mulch – the advantage is that reseeding of original vegetation can occur. Where possible, restore vegetation that is native to the area to maximise plant success and improve environmental conditions.
Timing of Development	Activities with high dust-causing potential, such as topsoil stripping, should not be carried out in sensitive areas during adverse wind conditions. When necessary, topsoil should be stripped in discrete sections, allowing buffer strips (windbreaks) between clearings.

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Wind Barriers	Having appropriate wind barriers can be an effective measure for the control of dust over short distances. Wind barriers provide protection against the movement and impact of dust on nearby land uses. Wind barriers can be placed on site before commencement of works and when it is apparent that one is required during the phase of the operation. Consider the following options when placing barriers to prevent dust emissions: • Wind barriers are most effective when placed perpendicular to the direction of the prevailing wind, but will have little or no effect when the wind direction is parallel to the fence; • When choosing wind barriers, it has been observed that solid barriers provide significant reductions in wind velocity for relatively short leeward distances, whereas porous barriers provide smaller reductions in velocity for more extended distances; • Wind barriers should be at least 2 meters high; • The screening material should have a porosity of 50% or less.
Earth Moving Management	Earth-moving works have the potential to generate large amounts of dust. Planning earth-moving works particularly at the start of an operation can reduce dust emissions by limiting the time the site is exposed. Options for dust control can include the following: • Plan earth-moving works so that they are completed just prior to the time they are needed; • Observe weather conditions and do not commence or continue earth moving works if conditions are unsuitable e.g., under conditions of strong winds; • Reduce off-site hauling via balanced cut and fill operations; • Pre-water areas to be disturbed.

8.2.1.3.2 Mitigation Measures for Operation Phase

General recommended control measures and their efficiency for reduced dust emissions are given in Table 8-18, for the operational phase. Furthermore, a summary of recommendations and monitoring requirements for the proposed operations is given in Table 8-19. It is further recommended that a Dust Monitoring Plan be compiled prior to commencement of operations and strictly implemented during the operational phase, to comply with the 2026 NDCR. Monthly dustfall monitoring is also recommended to meet various objectives, including compliance monitoring and tracking progress made by control measures.

Table 8-18: Common dust control measures for mining activity and associated control efficiencies (%) (taken from NPI, 2012).

Source	Recommended Control Measures	Control Efficiency (%)
Offloading trucks	Water sprays	70
Loading stockpiles	Variable height stacker	25
	Water sprays	50

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	Telescopic chute with sprays	75
	Total enclosure	99
Unloading from stockpiles	Water Sprays	50
	Wind breaks	30
Loading to trains/rail wagons	Enclosure	70
	Enclosure and use of fabric filters	99
Miscellaneous transfer and conveying	Water sprays with chemicals	90
	Enclosure	70
	Enclosure and use of fabric filters	99
Hauling	Level 1 watering (2 litres/m^2/hr)	50
	Level 2 watering (>2 litres/m^2/hr)	75
	Sealed or salt encrusted roads	100
Wind erosion from stockpiles	Water sprays	50
	Wind breaks	30
	Total enclosure	99
	Rock armour and/or topsoil applied	30
Wind erosion	Primary rehabilitation	30
	Secondary rehabilitation	60
	Vegetation	40
	Re-vegetation	90
	Fully rehabilitated	100

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Table 8-19: Summary of recommendations and monitoring requirements.

Pollutant	Activities	Mitigation Measure	Monitoring Program			
			MONITORING	TIMEFRAME (✓ = Yes) (X = No)		
				Pre - Operation	During - Operation	Post - Operation
Fugitive Dust – TSP, PM_{10} & $PM_{2.5}$	Material handling operations; conveyor belts and conveyor transfer points; exposed areas (WRDs); and truck loading/offloading operations.	The following dust mitigation measures can be considered at the operational areas to reduce dust emissions associated with proposed surface mining activities: • Reduce height of material transfer at the conveyor transfer points. • Partial or full enclosure of conveyors and conveyor transfer points. • Maintain the drop height to a minimum during truck loading/offloading operations. • Water sprays for material handling operations (e.g., wet material before loading trucks or conveying). • Water spraying or wind breaks at exposed material storage areas such as the WRDs. • Use vegetation, topsoil and/or rock armour on large stockpiles and WRDs that are prone to wind erosion. • Regular maintenance of operational equipment, including dust suppression equipment such as water sprays, to ensure the equipment is operating properly.	Dustfall monitoring and reporting as per the 2026 NDCR is recommended.	✓ For dustfall	✓ – For dustfall	X (not required if mining areas are fully rehabilitated)

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		• Immediate clean-up of any material (i.e., ore and waste rock spillages. • Conduct regular site inspections to ensure the dust mitigation measures are being implemented. Regular visual site inspections are recommended to assess whether further mitigation is required for any of the dust emission sources. A DMP will need to be developed for onsite activities, to comply with the requirements of the 2026 NDCR. • Dust control measures need to be assessed in detail and incorporated into the plan. • The plan should include a dustfall monitoring programme and appropriate mitigation measures for all key dust emission sources. • The plan can be compiled internally by the mine and used for internal management purposes.				
Fugitive Dust – TSP, PM_{10} & $PM_{2.5}$ & Gases	Vehicle dust entrainment, truck exhaust emissions and any other mining vehicle/equipment exhaust emissions	• Have clearly defined hauling routes/vehicle access areas. These areas should be treated for dust suppression. • All main hauling roads should be treated for dust suppression. A combination of a fixed irrigation system and use of water trucks is recommended. A fixed irrigation system can reduce operational costs associated with dust mitigation of haul roads.	Dustfall monitoring and reporting as per the 2026 NDCR is recommended.	✓ For dustfall	✓ – For dustfall	X (not required if mining areas are fully rehabilitated)

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		• Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust, if applicable. • Conduct regular maintenance and checks for haul road surfaces. • Immediate clean-up of any spillages. • Trucks transporting ore should be appropriately covered or otherwise secured (where possible) to minimise wind-blown dust and material spillage during transportation, particularly when travelling on public roads. • Control the number of trucks on the road, weight of trucks and the travelling speed. Implement strict vehicle speed limits (e.g., 20-40 km/h). • Switch off engines whilst not in use; • Establish a maintenance schedule to ensure proper maintenance of the trucks & mobile equipment; • Conduct regular maintenance and quality checks (engines/tyres) for all heavy mobile equipment/trucks.				

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8.2.1.3.3 Recommendations for Dustfall Monitoring

The following recommendations are made:

- It is recommended that any dust buckets installed should have windshields attached, in accordance with the specifications provided;
- Where possible and practical, dust buckets should not be installed within 20m of structures higher than 1m;
- The stand for the container should hold the top of the container at a height of 2m above ground.
- In terms of the monitoring network, emphasis should be placed on locations to the south-west of the shaft areas, representing the predominant downwind direction, locations near sensitive receptor areas, as well as locations within the predicted areas of elevated pollutant concentrations to the north of the shaft areas and along the proposed haul route and conveyor alignment towards Target 1 Plant.
- In Phase 1, the impact footprint is strongly elongated in the north-south direction, with the highest dustfall rates centred around the No. 3 Shaft and extending northwards through the No. 2 Shaft towards Target 1 Plant. This suggests that the north/south directions are particularly important. Therefore, it is recommended that (Figure 8-1):
    - One bucket be placed north of the No. 2 Shaft, particularly given the haul route and nearby receptors within the Allanridge residential area (DB1 Phase 1).
    - One bucket be placed south/south-west of the No. 3 Shaft to account for this downwind direction (DB4).
    - One bucket be placed east/north-east of the No. 3 Shaft to account for this wind direction (DB5).
- During construction and Phase 2 operations, the highest impacts are concentrated around the No. 2 Shaft, with a relatively compact footprint extending primarily around the shaft. There is an additional clearly defined northward impact corridor along the overland conveyor towards Target 1 Plant in Phase 2. Therefore, it is recommended that:
    - One bucket be placed north of the No. 2 Shaft, particularly along the conveyor/Target 1 Plant direction (DB1 Phase 2).
    - One bucket be placed east/north-east of the No. 2 Shaft, given the nearby residential/sensitive receptors within the Nyakallong residential area (DB3).
    - One bucket be placed south/south-west of the No. 2 Shaft, to account for this downwind direction (DB2).
- The location of the northern dustfall monitoring station may be adjusted according to the operational phase of the project.
- A combined monitoring network is recommended rather than separate networks for Phase 1 and Phase 2.
- Where practical, the JV project's dustfall monitoring network could be coordinated with or complement the existing Harmony Gold monitoring network.

A spatial representation of the proposed dustfall monitoring network can be seen in Figure 8-1.

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Figure 8-1: Map of proposed dustfall monitoring network at the project site.

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8.2.1.4 Social

This section outlines the social impacts associated with the Proposed Project. Potential negative impacts include the following:

- Dust emissions;
- Noise emissions;
- Light spill;
- Increased traffic;
- Population influx; and
- Retrenchments at decommissioning.

A potential positive impact of the Proposed Project relates to local community development.

The following outlines the significance ratings of identified Project risks, at pre- and post-mitigation. For each identified risk, recommended management/ monitoring measures are also specified, for relevant phases of the Project.

8.2.1.4.1 Dust Generation

Dust can be more than simply a nuisance for the local community. Inhalation of dust particles can result in respiratory issues, particularly for vulnerable populations such as children and the elderly.

For the brief construction phase, dust generation will occur owing to increased traffic volumes on existing gravel roads and disturbance of land within the Project footprint. Sensitive receptors include Allanridge and Nyakallong, as well as adjoining farmland.

The dust impact assessment is summarised in Table 8-20, Table 8-21 and Table 8-22 for the construction, operational and decommissioning phases respectively. The significance rating of the impact of dust is moderate during the operational phase at pre-mitigation, owing to the long-term duration of the operational phase – and the moderate magnitude of the impact. Mitigation measures will assist in reducing the magnitude and probability of the impact, which will reduce the significance impact rating to a low level.

Owing to the short-term phase duration, the significance rating of dust is low during the construction phase and the decommissioning phase, for both pre- and post- mitigation. Therefore, the Project's Air Quality Management Plan must provides detailed measures to mitigate air quality impacts, including dust generation. Key mitigation measures include the following:

- Maintain roads and surfaces regularly to reduce dust from vehicle traffic and winds.
- Implement dust suppression systems, such as water sprays or chemical dust suppressants on exposed surfaces.
- Regulate vehicle speeds on the access roads to no more than 40 km/h (heavy vehicles) and 60 km/h (light vehicles).
- Keep activities to the approved footprint area; and
- Ensure that the local community is aware of (and has access to) a Project-specific Grievance Management Procedure (GMP).

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Monitoring measures include the following:

- Undertake regular air quality monitoring to enable identification of impacts, and implement corrective actions if impacts are identified; and
- Resolve community grievances relating to dust generation.

Table 8-20: Dust Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

Table 8-21: Dust Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Medium	Low

Table 8-22: Dust Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

8.2.1.4.2 Increased Noise

Various sources of noise associated with the construction and operational phase have the potential to be audible to nearby sensitive receptors, such as places of residence (i.e., Allanridge). Noise sources include vehicles and drilling/ mining infrastructure at the mine surface level.

The noise impact assessment is summarised in Table 8-23, Table 8-24 and Table 8-25 for the construction, operational and decommissioning phases respectively. As the site is not near sensitive receptors, the significance rating of noise is low for all phases, for both pre- and post- mitigation.

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Regardless of the low significance ratings for noise, the magnitude of the impact can be mitigated by the following measures:

- Schedule noisy activities during times when they will have the least impact (i.e., daytime).
- Provide training for vehicle drivers to reducing noise levels during the operation of their vehicles (e.g. vehicles to be switched off when not in use).
- Machinery, equipment, and vehicles are to be serviced/maintained as per the Original Equipment Manufacturer (OEM) requirements to limit noise emissions.
- Regulate vehicle speeds on access roads to no more than 40 km/h for heavy vehicles and 60 km/h for light vehicles; and
- Ensure that the local community is aware of (and has access to) a Project-specific GMP.

Monitoring measures include the following:

- Monitor the effectiveness of the above mitigation measures and maintain records to demonstrate compliance. Adjust measures, as necessary; and
- Resolve community grievances relating to noise exceedances.

Monitoring should be undertaken on a fortnightly basis during the construction phase - and a quarterly basis thereafter.

Table 8-23: Noise Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

Table 8-24: Noise Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Unlikely	Unlikely
Significance	Low	Low

Table 8-25: Noise Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term

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Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

8.2.1.4.3 Light Spill

Residents in the local area might be impacted by light spill from Project infrastructure, particularly at night.

The light spill impact assessment is summarised in Table 8-26, Table ***8-27*** and Table 8-28 for the construction, operational and decommissioning phases respectively.

The significance rating of the impact of noise is moderate during the operational phase at pre-mitigation, owing to the long-term duration of the operational phase – and the higher probability of the impact occurring without mitigation measures. Mitigation measures will assist in reducing the probability of the impact, which will reduce the significance impact rating to a low level.

Owing to the short-term phase duration, the significance rating of light spill is low during the construction phase and the decommissioning phase, for both pre- and post- mitigation. The following mitigation measures will assist in reducing the probability of the impact:

- Only illuminate work areas, access routes and security zones that require lighting.
- Install shielding or directional lighting.
- Conduct regular maintenance to ensure lighting fixtures are operating efficiently and effectively.
- Use timers or motion sensors to control lighting and reduce unnecessary illumination; and
- Ensure that the local community is aware of (and has access to) a Project-specific GMP.

Monitoring measures include the following:

- Monitor the effectiveness of the above mitigation measures and maintain records to demonstrate compliance. Adjust measures, as necessary; and
- Resolve community grievances relating to light spill exceedances.

Monitoring should be undertaken on a fortnightly basis during the construction phase - and a quarterly basis thereafter.

Table 8-26: Light Spill Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

Table 8-27: Light Spill Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

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Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Medium	Low

Table 8-28: Light Spill Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

8.2.1.4.4 Increased Traffic

An increase in traffic volumes on the existing gravel roads constitutes a safety hazard for the local community. The traffic impact assessment is summarised in Table 8-29, Table 8-30 and Table 8-31 for the construction, operational and decommissioning phases respectively.

The significance rating of the impact of traffic is moderate for each phase at pre-mitigation. Mitigation measures will assist in reducing the magnitude and probability of the impact and thereby reducing the significance impact rating to a low level. Key mitigation measures include the following:

- Keep site access roads in a good condition.
- Install visible speed limit signs along site access roads.
- Ensure that employees and contractors adhere to speed limits.
- Avoid transporting abnormal load vehicles during peak periods, where practical; and
- Prior to the construction phase, ensure that the local community is aware of (and has access to) a Project-specific GMP.

Monitoring measures include the following:

- Monitor the effectiveness of the above mitigation measures and maintain records to demonstrate compliance. Adjust measures, as necessary; and
- Resolve community grievances relating to traffic speed exceedances.

Monitoring should be undertaken on a fortnightly basis during the construction phase - and a quarterly basis thereafter.

Table 8-29: Traffic Impact Assessment During the Construction Phase, Pre- and Post-mitigation

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Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

Table 8-30: Traffic Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Medium	Low

Table 8-31: Traffic Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Medium	Low
Probability	Possible	Unlikely
Significance	Medium	Low

8.2.1.4.5 Population Influx

Any mine has the potential to attract large numbers of job seekers into the local area. Population influx can lead to various social challenges, including conflicts with existing community members and further strain on public infrastructure. However, as the operation will only contract employees from the Target Operation, there will be no incentive for job seekers to move into the area.

The risk of influx is most applicable to the construction phase and, to a much lesser extent, during the operational phase. The impact is not relevant to the decommissioning phase. The influx impact assessment is summarised in

Table 8-32 and Table 8-33 for the construction and operational phases respectively.

As the Project will only source labour from the Harmony Target Operation, the significance rating of influx is low for all phases, for both pre- and post- mitigation. The following mitigation measures will assist in further reducing the magnitude of the impact:

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- Continue to publicise to the local community that the Project will only contract employees from Harmony. Harmony workers will be sourced from Target Operation. If this mine cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area;
- If employment opportunities arise, implement a policy requiring that recruitment activities occur off-site to avoid loitering of job seekers. No recruitment to take place at or near the Project premises; and
- Prior to the construction phase, ensure that the local community is aware of (and has access to) a Project-specific GMP. Communicate the availability of the GMP to the community on an annual basis.

Table 8-32: Influx Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

Table 8-33: Influx Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Unlikely	Unlikely
Significance	Low	Low

8.2.1.4.6 Local Community Development

Although the labour force will be sourced from the Harmony Target Operation, the Project's Social and Labour Plan (SLP) will facilitate skills development opportunities for employees and the local community. The Local Economic Development (LED) project for the initial SLP cycle will also provide benefits to the community, through local procurement and improved facilities. This positive impact is applicable throughout the life of the Project.

The assessment of this positive impact during the construction phase is summarised in Table 8-34. The impact assessment during the operational and decommissioning phases is shown in Table 8-35.

Through the implementation of the SLP, the significance rating of the positive impact can be increased though improvements to impact's magnitude and probability. Enhancement measures include the following:

- Implement the SLP's Human Resource Development (HRD) Programme; and
- Implement the SLP's LED Programme.

Monitoring measures to track the effectiveness of the programmes are outlined in the SLP.

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Table 8-34: Local Community Development Impact Assessment During the Construction Phase, at Pre- and Post-SLP Implementation

Impact Attribute	Pre-enhancement Rating	Post-enhancement Rating
Nature	Positive	Positive
Magnitude	Minor	Moderate
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Definite
Significance	Low	Medium

Table 8-35: Local Community Development Impact Assessment During the Operational and Decommissioning Phases, at Pre- and Post-SLP Implementation

Impact Attribute	Pre-enhancement Rating	Post-enhancement Rating
Nature	Positive	Positive
Magnitude	Minor	Major
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	High
Probability	Unlikely	Definite
Significance	Low	High

8.2.1.4.7 Retrenchments at Closure

There is an inherent risk that decommissioning of an operation can result in retrenchment of employees. The SLP provides a framework for reducing the impact of mine closure by providing opportunities for workers to progress their careers and diversify their skills, thereby increasing the likelihood of employment in the mining sector or other sectors.

The impact assessment is summarised in Table 8-36. Through implementation of the SLP regarding management and monitoring of downscaling and retrenchment, the magnitude and probability of the impact can be significantly reduced. Redeployment planning and skill diversification will be crucial aspects in addressing retrenchments at closure.

Table 8-36: Retrenchment Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Major	Minor
Duration	Long term	Short term
Scale	Local	Local
Consequence	High	Low
Probability	Possible	Unlikely
Significance	High	Low

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8.2.1.5 Heritage

The quantitative evaluation of the impacts associated with the Proposed Project is presented in Table 8-37 below

Table 8-37: Impact Table – Palaeontology

Palaeontological								
Nature	**Loss of fossil heritage by destruction, movement or sealing in of fossil heritage in or below the earths structure**							
Development phase	**Development impact**			**Impact Rating**		**Recommended Mitigation**	**Is Impact Acceptable**	
	Criteria	**BM**	**AM**				**BM**	**AM**
Construction phase	Extent	1	1	Negative Medium Impact	Negative Low Impact	None	No	Yes
	Probability	1	1					
	Reversibility	4	4					
	Irreplaceability	4	4					
	Duration	4	4					
	Cumulative Effect	1	1					
	Magnitude	2	1					
	Impact Significance	34	16					

8.2.1.6 Ground Vibration

There will be no construction phase as existing Harmony Shafts will be utilised for access to the JV project and buffer mining areas. The existing infrastructure associated with the Harmony Shafts, such as ventilation shafts, transportation routes, stockpile areas and concentrators, will be used for the mining of the JV Project.

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8.2.1.7 Climate

Table 8-38: Summary of Impacts.

No.	Activity	Impact Description	BEFORE MITIGATION						CI	Mitigation measures / Recommendations	AFTER MITIGATION					
			M	D	SS	C	P	S			M	D	SS	C	P	S
Construction phase																
1	Construction and refurbishment of surface infrastructure, shaft upgrades, and associated vehicle and equipment use	Generation of greenhouse gas emissions from diesel-powered construction equipment, vehicles, and materials transport, contributing to anthropogenic climate change.	Moderate -	Short Term < 18 months	National/ International	High	Definite	High	Yes	Optimise construction scheduling and logistics to reduce unnecessary vehicle movements; ensure well-maintained equipment; prioritise local sourcing of materials where feasible; implement a construction-phase emissions tracking system.	Minor -	Short Term < 18 months	National/ International	Medium	Definite	Medium

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8.2.2 Operational Phase

8.2.2.1 Biodiversity

The following potential impacts were considered on biodiversity (fauna and flora) during operational phase:

8.2.2.1.1 Flora

This section focuses on the risks and mitigation with regards to underground mining associated with the study area. The floral impact assessment considered the potential indirect and precautionary surface-related impacts associated with underground mining activities, specifically those that could arise from unlikely subsidence events. As no operational mining infrastructure is proposed within the project area, no direct floral impacts are anticipated.

Table 8-39: Habitat loss and fragmentation as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of floral communities and fragmentation of intact natural areas. Such fragmentation isolates plant populations and reduces pollination, seed dispersal, and resilience.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	Negative	Negative
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	High	Low
Reversibility: (Reversible or Irreversible)	Reversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape Plan and Rehabilitation plan developed by qualified specialists) to restore any impact to habitat integrity and condition.	
Irreplaceable loss of resources:	Yes	
Can impacts be enhanced:	Yes. Subsidence-related habitat loss and fragmentation are inherently negative, but early planning and well-designed mitigation can enhance ecological outcomes by improving connectivity, restoring or creating habitats, and strengthening ecosystem resilience.	

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Residual impacts In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include: • Localised but irreversible loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs. • Elevated management requirements post-closure. • Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations). • Loss of provincially protected floral species (FSNCO).
Mitigation measures • Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • Planning and mine design: Adequate safety precautions and monitoring protocols be developed to lower the potential of subsidence and effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) to allow for immediate management of potential subsidence events. • In areas where subsidence is anticipated a walkdown should take place to observe and mark any floral SCC for the possibility of loss in an event of subsidence. Should any SCC be anticipated to be lost a permit has to be obtained from the authorising governmental body. Where possible these species need to be relocated to a suitable area.

Table 8-40: Soil disruption and degradation as a potential impact from subsidence.

NATURE OF THE IMPACT: Soil disruption and degradation. Soil compaction and loss of topsoil, reduced soil fertility, and altered moisture regimes (e.g. surface cracking increases evaporation and changes in topography can lead to waterlogging in newly formed depressions). These changes can influence plant assemblages and reduce suitable habitat within the study area for native grassland species.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Moderately reversible with concurrent rehabilitation and a soil erosion plan to mitigate impacts.	
Irreplaceable loss of resources:	No	

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Can impacts be enhanced:	No
Residual impacts • Reduced nutrient cycling and soil water retention. • Loss of topsoil, influencing establishment of plants. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs.	
Mitigation measures • Bare areas are more susceptible to erosion, and these areas should be monitored closed to indicate any initial signs of subsidence. • Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • Concurrent rehabilitation should be implemented. At the first signs of soil erosion the surface should be covered promptly with native plant species to prevent further loss of soil (where applicable) from wind and water erosion. Use erosion and sediment controls (e.g. contouring, mulching, silt barriers) in areas affected by surface cracking or deformation.	

Table 8-41: Increased incidence and proliferation of AIPs (due to habitat degradation associated with subsidence).

NATURE OF THE IMPACT: Increased incidence and proliferation of AIPs. Disturbed ground from subsidence (i.e., disruption in soil surface) provides disturbed areas in which AIPs can establish. Invasives plants often outcompete indigenous flora and become abundant in disturbed areas.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Short term
Magnitude	Minor	Minor
Probability	Possible	Possible
Calculated Significance Rating	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible with active AIP management.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Use the project as an opportunity to implement broader AIP control programs beyond the directly affected subsidence footprint. Since AIPs associated with the mining right area can invade nearby natural habitat (especially sensitive habitat within the study area - Vaal Vet Sandy Grassland and Freshwater ecosystems). Monitor post-subsidence vegetation composition and invasion trends.	

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Residual impacts • Lowered habitat integrity and floral diversity as a result of unmanaged AIP proliferation.
Mitigation measures • Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • Concurrent rehabilitation should be implemented. At the first signs of AIP proliferation and establishment within monitoring areas or operation areas AIP management must commence. Following an AIP Management and Control Plan associated with the mine. Any current or existing AIP control plans should be updated to include all additional proposed activities and be updated annually to incorporate any new information.

Table 8-42: Loss of significant biodiversity features as a potential impact associated with subsidence.

NATURE OF THE IMPACT: Loss of significant biodiversity features. Important biodiversity areas such as CBA 1, ESA 1, ESA 2 and loss of threatened vegetation type (EN Vaal Vet Sandy Grassland) associated with subsidence.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Regional	Local
Duration	Long term	Short term
Magnitude	Major	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: (Reversible or Irreversible)	Yes	
Irreplaceable loss of resources:	Yes. Should subsidence affect important biodiversity areas restoring ecosystem structure and function (species composition, soil profiles, hydrology) rather than simple revegetation should be prioritised. Enhance and rehabilitate ecological corridors connecting CBAs and ESAs to reduce fragmentation caused by subsidence.	
Can impacts be enhanced:	Yes	
Residual impacts • Reduced representation of threatened vegetation types. • Disruption of ecological corridors identified in provincial biodiversity plans (e.g. CBA and ESA). • Reduced ecological integrity at a regional scale. Challenges in meeting national biodiversity targets. • Loss of habitat contributing to ecological services and functioning (i.e., watercourses and intact grasslands).		

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Mitigation measures

- Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence.
- Offset strategies will need to be considered (and discussed with local authorities) should a significant subsidence event result in the loss of threatened vegetation types (EN Vaal Vet Sandy Grassland), CBA 1 and ESA 1&2.

8.2.2.1.2 Fauna

The faunal impact assessment focused on evaluating the potential for indirect and precautionary surface-related impacts associated with underground mining activities, specifically those that could arise from unlikely subsidence events. As no operational mining infrastructure is proposed with the project area, no direct faunal impacts are anticipated.

Table 8-43: Faunal Habitat and Diversity loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Loss of significant biodiversity features. Important biodiversity areas such as CBA 1, ESA 1, ESA 2 and loss of threatened vegetation type (EN Vaal Vet Sandy Grassland) associated with subsidence.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape Plan and Rehabilitation plan developed by qualified specialists) to restore any impact to habitat integrity and condition.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Subsidence-related habitat loss and fragmentation are inherently negative, but early planning and well-designed mitigation can enhance ecological outcomes by improving connectivity, restoring or creating habitats, and strengthening ecosystem resilience.	
Residual impacts In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur.		

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Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include: • Localised loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs. • Elevated management requirements post-closure. • Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations). • Loss of faunal diversity. • Disruption of ecological corridors. • Altered flow patterns and hydrological cycles impacting water-dependent faunal species. • Spillage/leakage of chemicals, fuel and oils from equipment leading to hydrocarbon ingress into the soils affecting plant growth (faunal habitat and food resources) and soil organisms.
Mitigation measures • Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • Planning and Mine Design: Adequate safety precautions and monitoring protocols must be developed to lower the potential of subsidence. Effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) allows for immediate management of potential subsidence events. • At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase). • All infrastructure is to be regularly inspected for erosion or environmental risks.

Table 8-44: Faunal SCC loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Major	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	High	**Low**
Reversibility: (Reversible or Irreversible)	Reversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape Plan and Rehabilitation	

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	plan developed by qualified specialists) to restore any impact to habitat integrity and condition.
Irreplaceable loss of resources:	Yes
Can impacts be enhanced:	Yes. Subsidence-related habitat loss and fragmentation are inherently negative, but early planning and well-designed mitigation can enhance ecological outcomes by improving connectivity, restoring or creating habitats, and strengthening ecosystem resilience.

Residual impacts

In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include:

- Localised loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation.
- Disturbed and fragmented habitats remain susceptible to invasion by AIPs.
- Elevated management requirements post-closure.
- Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations).
- Loss of faunal diversity.
- Disruption of ecological corridors.
- Altered flow patterns and hydrological cycles impacting water-dependent faunal species.
- Spillage/leakage of chemicals, fuel and oils from equipment leading to hydrocarbon ingress into the soils affecting plant growth (faunal habitat and food resources) and soil organisms.

Mitigation measures

- Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence.
- Planning and Mine Design: Adequate safety precautions and monitoring protocols must be developed to lower the potential of subsidence. Effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) allows for immediate management of potential subsidence events.
- At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase).
- All infrastructure is to be regularly inspected for erosion or environmental risks.

Table 8-45: Faunal displacement and disturbance as a potential impact from underground mining.

NATURE OF THE IMPACT: Displacement of species or disruption of natural processes. Noises can be heard and vibrations felt by highly sensory acute species. These anthropogenic disturbances could startle species, displacing them from the area, or interfere with their communication or ability to perceive natural threats.		
	Impact Rating without	Impact Rating with

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	Mitigation	Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Short term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible: Once the disturbance has been perceived by the receiving environment it cannot be reversed.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	No. Anthropogenic disturbances, such as noise, are not beneficial to the environment or will not encourage faunal species to establish in the study area.	
Residual impacts • Increased ambient noise from operational activities and facilities may drown out calls / communication of faunal species nearby. Increased ambient noise may lead to decreased breeding success or failure to hear nearby predators. • Elevated management requirements post-closure. • Loss of faunal diversity and abundance. • Noise produced through mining activities and equipment will impact fauna by displacing them into surrounding habitats away from the study area.		
Mitigation measures • At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase). • External noise should be kept to a minimum to limit the impacts on faunal species surrounding the mine, and • Mining activities, such as blasting, should aim to be done deep enough as to minimise disturbance to surface faunal species.		

8.2.2.2 Freshwater and Aquatic

This section presents the significance of potential impacts on the freshwater ecology of the wetlands located within the study area associated with the proposed underground mining operation.

Table 8-46: Potential changes to hydrological functioning and water quality should subsidence occur.

NATURE OF THE IMPACT: Changes to hydrological functioning and water quality.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Local	Site

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Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Definite	Possible
Calculated Significance Rating	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape and Rehabilitation plan developed by qualified specialists) to restore any impact to wetland habitat integrity and ecological functionality.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes, with rehabilitation measures.	
Potential Residual impacts • Localised but irreversible loss of wetland habitat, particularly where subsidence causes sinkholes or persistent ground deformation. • Altered runoff patterns within the local catchment of the freshwater ecosystems, potentially leading to increased erosion and sedimentation of the receiving freshwater environment. • Potential impacts on the water quality of surface water runoff (when present) which may potentially enter the downgradient freshwater ecosystems and contamination of soils.		
Mitigation measures • Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. • Planning and mine design: Adequate safety precautions and monitoring protocols be developed to lower the potential of subsidence and effective monitoring (especially of freshwater ecosystems) to allow for immediate management of potential subsidence events. • In areas where subsidence is anticipated a walkdown should take place to observe and mark any signs of erosion and any changes to hydraulic pattern in the landscape.		

Table 8-47: Potential changes to geomorphological processes should subsidence occur .

NATURE OF THE IMPACT: Changes to the geomorphological processes (sediment balance, erosion and sedimentation).		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Unlikely	Unlikely

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Calculated Significance Rating	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes, with rehabilitation measures.	
Potential Residual impacts • Reduced nutrient cycling and soil water retention. • Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the impacted freshwater ecosystems. • Impact of increased sedimentation, potentially leading to smothering of biota and potentially altering surface water quality (if present). • Soil compaction altering run-off patterns. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs.		
Mitigation measures • Bare areas are more susceptible to erosion, and these areas should be monitored to indicate any initial signs of subsidence. • Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. • Concurrent rehabilitation should be implemented. At the first signs of soil erosion the surface should be covered with native plant species to prevent further loss of soil (where applicable).		

Table 8-48: Potential increased proliferation of AIPs and potential habitat loss.

NATURE OF THE IMPACT: Increased proliferation of AIPs and potential habitat loss.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Short term
Magnitude	Minor	Minor
Probability	Possible	Possible
Calculated Significance Rating	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible with proactive AIP management.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes, with rehabilitation measures.	
Potential Residual impacts • Decreased habitat integrity and diversity of biota as a result of unmanaged AIP proliferation. • Potential inadequate AIP control methods, in turn altering freshwater habitat and runoff patterns, or		

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contamination of surface water (if present) with herbicides. • Potential inadequate re-vegetation methods, leading to failure of vegetation establishment, resulting in bare soil • with increased risk of erosion and AIP proliferation.
Mitigation measures • Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. • Concurrent rehabilitation should be implemented. At the first signs of AIP proliferation and establishment within monitoring areas or operation areas AIP management must commence. Following an AIP Management and Control Plan associated with the mine. Any current or existing AIP control plans should be updated to include all additional proposed activities and be updated annually to incorporate any new information.

8.2.2.2.1 Risk Assessment Discussion of Anticipated Ecological Impacts

There are four key ecological impacts on the freshwater ecosystems that are anticipated to occur namely:

- Loss of wetland habitat and ecological structure;
- Changes to the sociocultural and ecological service provision;
- Impacts on the hydrology and sediment balance of the wetlands; and
- Impacts on water quality.

Various activities and development aspects may lead to these impacts, however, provided that the mitigation hierarchy is followed, some impacts can be avoided or adequately minimised where avoidance is not feasible. The mitigation measures provided in this report have been developed with the mitigation hierarchy in mind, and the implementation and strict adherence to these measures will assist in minimising the significance of impacts on the receiving environment.

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Table 8-49: Summary of the results of the DWS Risk Assessment matrix applied to the freshwater ecosystems associated with the proposed underground mining operation

Phase	No.	Activity	Impact	Potentially affected watercourses			Severity	Consequence	Likelihood	Significance	Risk Rating	Mitigation Measures to be implemented
				Name/s	PES	Overall Watercourse Importance						
Operational	1	Operation of the underground	Potential creation of a cone of depression, which may drain water from the wetlands, thus resulting in desiccation of the systems.	Seeps	C	Moderate	10	30	40%	12	L	• Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; • The management and mitigation measures recommended by a suitably qualified geohydrologist must be implemented to mitigate the potential impacts arising from the formation of a cone of depression and pollution plume, from the mine into the receiving environment; and • Water levels need to be strictly managed to ensure they are kept below any decant level while ensuring that a significant cone of depression impact does not take place.
				Depressions	D	Moderate	10	30	40%	12	L	
	2		Potential destabilisation of	Seeps	C	Moderate	11	33	60%	19.8	L	• Mitigation measures as stipulated in the specialist studies to mitigate against subsidence

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		mining area related to the undermining of the freshwater ecosystems.	the surrounding environment through the extraction of ore and subsequent potential subsidence of the land.	Depressions	D	Moderate	11	33	60%	19.8	L	must be implemented; • As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided; and • It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.

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8.2.2.3 Hydrogeological

The activities and impacts that are likely to occur during the operational phase are summarised in Table 8-50.

Table 8-50: Summary of Activities and Impacts for the Operational Phase

Activity	Impact Description
Groundwater abstraction from the deep Witwatersrand aquifer	Impact 1: Abstraction from the deep aquifer may impact the availability of the shallow groundwater resource.
Groundwater abstraction from the deep Witwatersrand aquifer	Impact 2: Abstraction from the deep aquifer may impact on groundwater levels in the shallow Karoo aquifer.
Mine water and waste containment in existing mine infrastructure	Impact 3: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use

The ratings and proposed mitigation measures for the operational phase are provided in Table 8-51 to Table 8-53.

8.2.2.3.1 Groundwater Abstraction

During the operational phase groundwater abstraction will take place to maintain dry, safe working conditions in the Jelani mine voids. This water will need to be discharged at surface at a quality that adheres to discharge standards.

The Jelani Mine will utilise the existing Target No. 2 and No. 3 shafts and will primarily extend within an already dewatered and operational underground mining environment to only approximately 140 m below the current Target No. 2 Mine workings. Therefore, while groundwater inflows may locally increase where previously not dewatered geological structures are intersected, no substantial increase in regional groundwater abstraction is expected compared to the current active mining operations, and projected pumping requirements for the Jelani project are considered to be consistent with that for the Target Mine operation.

Therefore, groundwater volumes to be abstracted for the proposed Jelani Mine are expected to be in line with the volumes currently managed at the Target Mine. Previous hydrogeological investigations, including (Groundwater Square, 2016), indicate that the Target Mine presently pumps approximately 5–6 Ml/day of groundwater to surface, with average pumping rates of 5.96 ML/day (as recorded during October and November 2015) and long-term pumping from Target No. 1 Shaft averaging at approximately 4.7 Ml/day.

The estimated total groundwater inflow for the Jelani operation is expected to be approximately 5.4 Ml/day, comprising:

- An estimated 3.4 Ml/day groundwater make for the Jelani Mine; and
- Approximately 2 Ml/day of inter-mine flow from Freddies No. 9 Shaft

As this volume will be abstracted from the deep Witwatersrand aquifer and this abstraction is not expected to have a significant impact on the groundwater resource in the shallow aquifer, the impact significance is expected to be medium.

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Table 8-51: Significance Rating of Operational Impact 1

NATURE OF IMPACT 1: Abstraction from the deep aquifer may impact the availability of the shallow groundwater resource.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Possible, Unlikely)	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	Medium	Medium
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Abstraction of all mining activities in the Witwatersrand aquifer		
Mitigation measures • Mining should progress as swiftly as possible to reduce the period of active dewatering; • Dewatering of the underground mine should stop as soon as mining activities cease. • Abstraction volumes should be monitored regularly and where these deviate from expected volumes, this should be reported immediately.		

8.2.2.3.2 Groundwater Drawdown

Farms in proximity of the proposed Jelani and existing Target mining operations are underlain by the shallow Karoo aquifer, which is the main source of groundwater for individual landowner borehole sources.

Previous hydrogeological reports indicated that the shallow Karoo aquifer is not hydraulically connected to the deep Witwatersrand mine workings. This has been shown by groundwater level data for shallow boreholes in the entire Harmony mining area which vary between 0 and 33 mbgl, show an average depth to groundwater of 5.3 mbgl and are mostly between 0-4 mbgl.

For the Study Area specifically, static groundwater levels measured in hydrocensus boreholes in December 2025 were observed to be between 0.6 and 5.3 mbgl. Where boreholes were pumped while visiting, dynamic groundwater levels of 12.5 and 44.9 mbgl were observed, indicating drawdown effects due to active borehole abstraction.

This shows natural groundwater levels in the shallow Karoo aquifer are close to surface with no indication of impacts by ongoing mining activities, and as such no regional radius of influence or drawdown effects are currently present in the shallow Karoo aquifer despite decades of mining at the Target 2 and 3 operations. Currently no evidence exists that mining has reduced regional shallow groundwater availability or has had a significant impact on shallow groundwater levels.

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The existing mining has been ongoing for decades and has not led to widespread significant dewatering of the shallow aquifer, which is the main source of water for surrounding farms or other third-party groundwater users.

The addition of the proposed Jelani mining activities within the already impacted Witwatersrand aquifer is not expected to result in significant additional groundwater impacts beyond those already associated with the long-established mining complexes. As such the significance of this impact is expected to be medium.

Table 8-52: Significance Rating of Operational Impact 2

NATURE OF IMPACT 2: Abstraction from the deep aquifer may impact on groundwater levels in the shallow Karoo aquifer.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Possible, Unlikely)	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	Medium	Medium
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Abstraction of all mining activities in the Witwatersrand aquifer		
Mitigation measures • Groundwater levels in the shallow Karoo aquifer should be monitored on a regular basis throughout the LoM to verify no impacts on shallow groundwater levels. • Where it is proven that third-party boreholes have reduced yields due to mining activities, an alternative supply needs to be provided.		

8.2.2.3.3 Contaminant Plume Migration

Waste rock and ore will be brought to surface using the shafts, with ore processed at the Target processing plant and waste rock deposited on the existing waste rock dumps at the Target Shaft 2 and 3 areas. Partial use of the existing Target surface infrastructure, including RWDs, will be used for containment of process/dirty water. As these facilities are not lined, seepage from these dams into the underlying Karoo aquifer is expected to continue up to the end of LoM. As such, forward plume migration was simulated to predict plume migration for the operational phase to the end of Life of Mine (LoM).

If the RWDs, emergency overflow dam and evaporation dam are all used until 2041, and the Target TSF remains unchanged (no rehabilitation), contamination will migrate downgradient from existing infrastructures. As the migration will follow groundwater gradients, the migration mainly occurs in a westerly direction.

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Figure 8-2 shows that two third-party boreholes (B38N and B8) are located in the plume extending from the RWDs, emergency overflow dam and Swartpan and groundwater quality in these boreholes may be impacted during the LoM. These boreholes should be included in the monitoring programme for the Jelani operations and compared to model results as well as SANS 241 drinking water standards.

As some downgradient groundwater users are likely to be impacted, the significance of this impact is expected to be medium.

Table 8-53: Significance Rating of Operational Impact 3

NATURE OF IMPACT 3: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Moderate	Moderate
Probability (Definite, Possible, Unlikely)	Definite	Possible
Calculated Significance Rating (Low, Medium, High)	Medium	Medium
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Impact on groundwater quality by cumulative impact from the Target TSF and RWDs		
Mitigation measures • Diversion of clean water to Swartpan and prevention of dirty water from the emergency overflow dam; • Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling; • Continuous monitoring of process water in dams, pans and tailings ponds; • Continuous monitoring of groundwater quality in downgradient monitoring boreholes and third-party boreholes; • Yearly reporting of groundwater quality monitoring and comparison to groundwater model results; • Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.		

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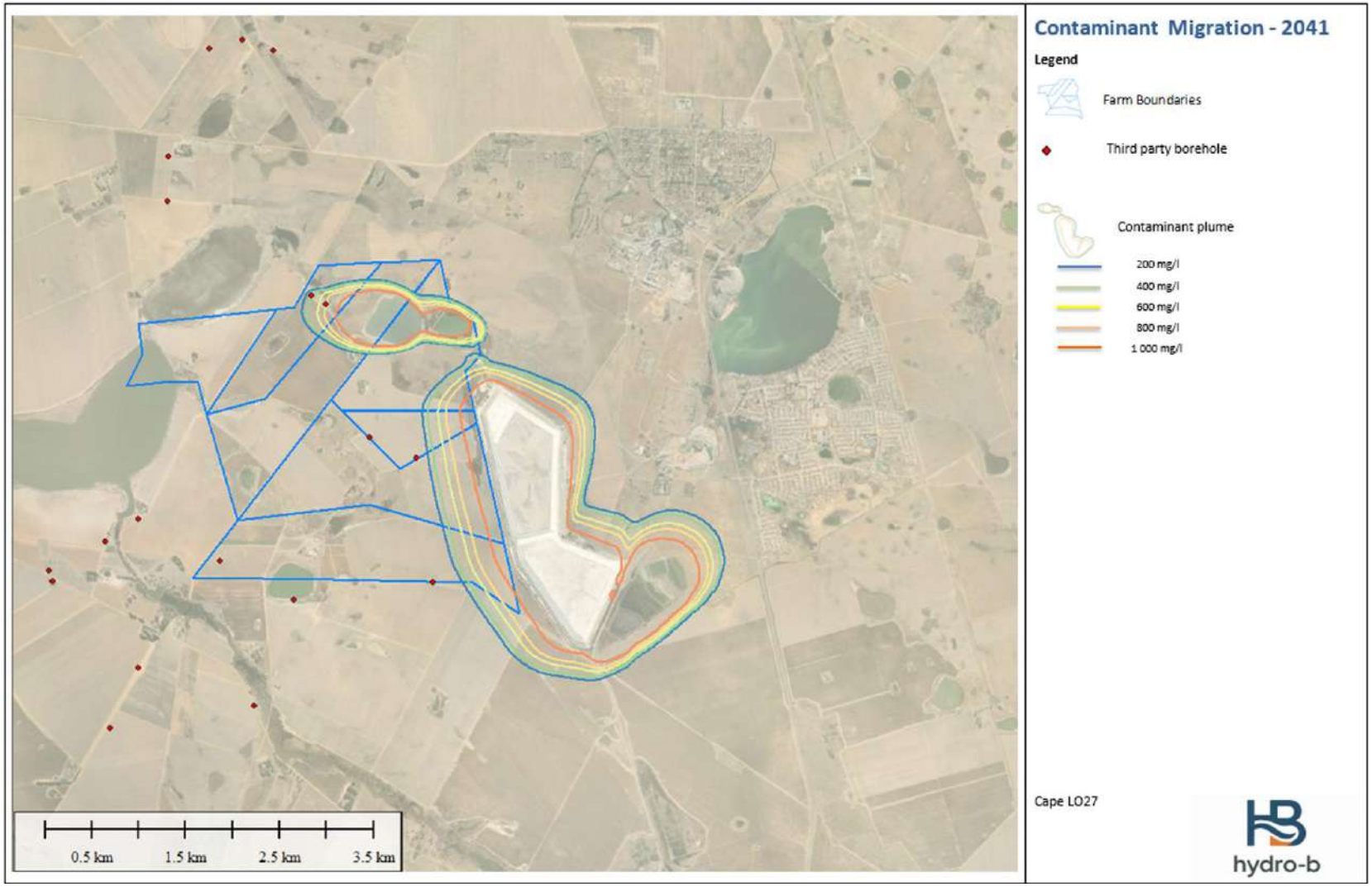


Figure 8-2: Contaminant Plume – 2041 Situation (end of LoM)

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8.2.2.4 Hydrological

During the operational phase, the proposed "dirty" water and "clean" water system will operate for the LoM of both the Jelani Project and the Target Operation. It is of utmost importance that the "dirty" water system (Emergency Overflow Dam, Blue RWD, and North-west RWD) are operated at the designed "operational" level allowing capacity in the system to accommodate the 1:50 year storm. All stormwater infrastructure must be regularly monitored and maintained.

The activities and impacts that could potentially occur during the operational phase are summarised in Table 8-54.

Table 8-54: Summary of activities and impacts for the operational phase

Activity	Impact Description
Maintenance of stormwater infrastructure, including berms and channels.	**Impact 1:** Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality.
"Dirty" water infrastructure (Emergency Overflow Dam, Blue RWD and North-west RWD) not operated at optimum level, resulting in insufficient capacity to retain the 1:50 year storm runoff.	**Impact 2:** "Dirty" water infrastructure will overflow during extreme rainfall and contaminate Swartpan and the natural watercourse downstream of Swartpan.

The ratings and proposed mitigation measures for the operational phase are indicated in Table 8-55 to Table 8-56.

Table 8-55: Significance rating of operational impact 1

NATURE OF IMPACT 1: Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	Negative	Positive
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Moderate	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if maintenance is done correctly.		

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NATURE OF IMPACT 1: Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality.
Cumulative impacts • None foreseen, as the impact will cease if maintenance is done correctly.
Mitigation measures • Implementation of the proposed SWMP. It must be ensured that stormwater measures (e.g. Berms) are designed, constructed, operated and maintained, to ensure that stormwater does not spill more than once in 50 years, to be compliant with GN R704 regulations. • Undertake regular inspections and maintenance on the bypass channel and earth berms.

Table 8-56: Significance rating of operational impact 2

NATURE OF IMPACT 2: "Dirty" water infrastructure will overflow during extreme rainfall and contaminate Swartpan and the natural watercourse downstream of Swartpan.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status *(positive or negative)*	**Negative**	**Positive**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if the "dirty" water infrastructure is operated correctly.		
Cumulative impacts • None foreseen, as the impact will cease if "dirty" water infrastructure is operated correctly.		
Mitigation measures • Regular inspections and maintenance of "dirty" water infrastructure. • Harmony to operate the infrastructure at the designed operating level.		

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8.2.2.5 Soil, Land Use and Agricultural

This section presents the significance of potential impacts on the soil resources within the study area based on the nature of the proposed development and related activities while considering that no new operation mining infrastructure is proposed within the study area.

Table 8-57: Identification and classification of significance on loss of agricultural land capability.

Nature of The Impact: ***Loss of Agricultural Land Capability***		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: (*positive or negative*)	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Long	Medium
Magnitude *(Major, Moderate, Minor)*	Major	Moderate
Probability *(Definite, Possible, Unlikely)*	Unlikely	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Residual impacts • Land instability and possible fragmentation; • Loss of growth medium (soil); • Erosion; • Contamination; and • Uneven land or sinkholes increase injury risk to livestock and reduce pasture usability.		
Mitigation measures • It must be ensured that areas of active cultivation are protected from subsidence; • The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities; • Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs.		

Table 8-58: Identification and classification of significance on loss of agricultural land capability.

Nature of The Impact: ***Soil Erosion & Contamination***		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: (*positive or negative*)	**Negative**	**Negative**

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Nature of The Impact: *Soil Erosion & Contamination*		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Medium	Short
Magnitude *(Major, Moderate, Minor)*	Moderate	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**High**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Residual impacts • Loss of arable land quality; • Reduced crop yields; • higher cultivation costs; • Reduced water availability for irrigation and livestock, or increased salinity and contamination risks; and • Reduced land value and farm viability over time.		
Mitigation measures • It must be ensured that areas of active cultivation are protected from subsidence; • The rock engineers must confirm that the risk of subsidence is low before commencement of any underground • activities; • Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs.		

8.2.2.6 Air Quality

See Section 8.2.1.3 for the air quality impacts identified during the construction and the operational phase of the Proposed Project.

8.2.2.7 Social

See Section 8.2.1.4 for the social impacts identified during the construction and the operational phase of the Proposed Project.

8.2.2.8 Heritage

The quantitative evaluation of the impacts associated with the Proposed Project is presented in below

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Table 8-59: Impact Table – Palaeontology

Palaeontological								
Nature	**Loss of fossil heritage by destruction, movement or sealing in of fossil heritage in or below the earths structure**							
Development phase	**Development impact**			**Impact Rating**		**Recommended Mitigation**	**Is Impact Acceptable**	
	Criteria	**BM**	**AM**				**BM**	**AM**
Operational Phase	Extent	1	1	Positive Low Impact	Positive Low Impact	None	Yes	Yes
	Probability	1	1					
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					

8.2.2.9 Ground Vibration

The assessment done was based on evaluating the points of interest and the expected levels predicted. This is, however, based on the worst-case scenario where blasting is done at the shortest distance from the mining area to the point of interest. Consideration was also given to the fact that blasting will not be constantly at the short distance, and the period of time that the influence may be present is significantly reduced because only limited areas or blocks will be blasted at a time.

Table 8-60: Impact Assessment Criteria Used to Determine the Significance of Environmental Impacts

Nature of The Impact: ***Ground vibration generated by underground blasting may propagate through the surrounding rock mass to surface and potentially impact neighbouring structures, infrastructure and communities.***		
	Impact Rating Without Mitigation	***Impact Rating with Mitigation***
Impact Status: (*positive or negative*)	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long Term	Long Term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Unlikely	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Residual impacts		

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Nature of The Impact: ***Ground vibration generated by underground blasting may propagate through the surrounding rock mass to surface and potentially impact neighbouring structures, infrastructure and communities.***		
	Impact Rating Without Mitigation	***Impact Rating with Mitigation***
• No significant residual impacts are anticipated. Ground vibration levels are expected to remain below the perceivable level for humans and are not expected to damage surrounding structures.		
Cumulative Impacts • No significant cumulative impacts associated with ground vibration are anticipated. Although blasting will occur repeatedly during the mining process, the predicted ground vibration levels at surface are low. They are not expected to result in a significant cumulative impact on surrounding structures or neighbouring communities. As mining progresses deeper, the distance between the blasting activities and surface will increase, and the ground vibration levels experienced at surface are expected to reduce further.		
Mitigation measures • No specific mitigation measures are considered necessary at this stage based on the predicted ground vibration levels. Blasting activities should, however, be monitored during the mining process, with appropriate action taken should actual ground vibration levels differ significantly from the predicted levels.		

8.2.2.9.1 Monitoring

A continuous monitoring programme for recording blasting operations is recommended. The following elements should be part of such a monitoring program:

- Ground vibration results;
- Comprehensive blast information;

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8.2.2.10 Climate

Table 8-61: Summary of Impacts.

No.	Activity	Impact Description	BEFORE MITIGATION						CI	Mitigation measures / Recommendations	AFTER MITIGATION					
			M	D	SS	C	P	S			M	D	SS	C	P	S
Operation																
2	Underground mining operations, ore hoisting, ventilation, pumping, and surface support activities	Ongoing generation of Scope 1 (diesel combustion in mobile equipment and standby generators) and Scope 2 (electricity consumption from the national grid) greenhouse gas emissions over the life of mine, contributing to global climate change.	Major -	Long Term > 5 years	National/ International	High	Definite	High	Yes	Implement energy efficiency measures (optimised ventilation-on-demand, efficient motors and pumps, LED lighting); explore opportunities for renewable energy or wheeling; prioritise fuel-efficient mobile equipment; maintain accurate GHG monitoring and reporting in line with the Carbon Tax Act and future carbon budget requirements; develop a progressive emissions reduction plan.	Moderate -	Long Term > 5 years	National/ International	High	Definite	High
3	Mineral processing at the existing Target plant and associated materials handling	Indirect greenhouse gas emissions associated with electricity use and any process-related energy consumption at the metallurgical plant, contributing to the project's overall carbon footprint.	Moderate -	Long Term > 5 years	National/ International	High	Definite	High	Yes	Support energy efficiency initiatives at the processing plant; investigate opportunities to increase the renewable energy component of the electricity supply; maintain transparent GHG accounting for Scope 2 emissions.	Minor -	Long Term > 5 years	National/ International	High	Definite	High

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8.2.3 Closure/Rehabilitation and Decommissioning Phase

8.2.3.1 Biodiversity

8.2.3.1.1 Flora

Following the completion of the proposed mining activities, the decommissioning, closure, and rehabilitation activities for the proposed project will be limited to the removal of underground infrastructure.

Table 8-62: Habitat loss and fragmentation from potential subsidence post mine closure.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of floral communities and fragmentation of intact natural areas. Such fragmentation isolates plant populations and reduces pollination, seed dispersal, and resilience.		
	Impact Rating Without Mitigation	Impact Rating With Mitigation
Impact Status:	Negative	Negative
Extent	Regional	Local
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	High	Low
Reversibility:	Reversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Should subsidence become evident after mine closure ecological management intervention through active rehabilitation should to be implemented.	

Residual impacts

- Localised but irreversible loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation.
- Disturbed and fragmented habitats remain susceptible to invasion by AIPs.
- Elevated management requirements post-closure.
- Lower habitat resilience (i.e., capacity of ecosystems to recover from drought, fire, or extreme weather events) as a result of affected genetic variability within populations).

Mitigation measures

- Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Safety protocols should be adhered to during decommission phase (to reduce the risk of surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence.
- A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts.
- Monitoring post mine closure and decommission should take place for at least 5-year post closure to ensure no delayed subsidence has occurred.

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8.2.3.1.2 Fauna

Table 8-63: Faunal Habitat and Diversity loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating Without Mitigation	Impact Rating With Mitigation
Impact Status:	Negative	Negative
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	High	Low
Reversibility:	Reversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Should subsidence become evident after mine closure ecological management intervention through active rehabilitation should to be implemented.	
Residual impacts In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include: • Localised loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs. • Elevated management requirements post-closure. • Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations). • Permanent loss of faunal habitat and faunal diversity due to loss of favourable habitat. Inability to reinstate faunal species assemblages similar to that of pre-mining conditions. • Failure to break down and remove all mining structures and rehabilitating the footprints to a pre-mining state leading to long term and potentially permanent habitat degradation and species diversity loss.		
Mitigation measures • Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts.		

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- Implement all recommendations as per the mine closure plan.
- Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.

Table 8-64: Faunal SCC loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating Without Mitigation	Impact Rating With Mitigation
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Major	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	High	Low
Reversibility:	Reversible.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Should subsidence become evident after mine closure ecological management intervention through active rehabilitation should to be implemented. .	

Residual impacts

In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include:

- Localised but irreversible loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation.
- Disturbed and fragmented habitats remain susceptible to invasion by AIPs.
- Elevated management requirements post-closure.
- Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations).
- Permanent loss of faunal SCC due to loss of favourable habitat. Inability to reinstate faunal species assemblages similar to that of pre-mining conditions
- Failure to break down and remove all mining structures and rehabilitating the footprints to a pre-mining state leading to long term and potentially permanent habitat degradation and faunal SCC loss.

Mitigation measures

- Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure)

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and (iv) Monitoring for spalling, scaling, and convergence.

- A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts.
- Implement all recommendations as per the mine closure plan.
- Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area

8.2.3.2 Hydrogeological

The activities and impacts that are likely to occur during the post-closure phase are summarised in Table 8-65

Table 8-65: Summary of Activities and Impacts for the Post-Closure Phase

Activity	Impact Description
Cessation of groundwater abstraction from the deep Witwatersrand aquifer	Impact 1: Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers.
Mine water and waste containment in existing mine infrastructure	Impact 2: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use

The ratings and proposed mitigation measures for the post-closure phase are provided in Table 8-66 and Table 8-67.

8.2.3.2.1 Groundwater Recovery and Decant Potential

After mining activities at target as well as Jelani have ceased, the mine voids are allowed to flood, causing groundwater levels in the surrounding deep aquifer to recover. Cessation of groundwater abstraction may result in recovery of deep groundwater levels, potentially increasing hydraulic connectivity between the deep and shallow aquifers

Based on available information, groundwater levels in the Witwatersrand aquifer are not expected to fully recover and remain approximately 400–500 m below the groundwater levels in the Karoo aquifer. In addition, it was concluded that the Karoo aquifer is a perched aquifer with shallow groundwater levels and has limited interaction with the underlying confined Witwatersrand aquifer. Therefore, the significance of the impact of decant of poor quality mine water into the shallow Karoo aquifer or onto surface through shafts is expected to be low.

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Table 8-66: Significance Rating of Post-Closure Impact 1

NATURE OF IMPACT 1: Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Possible, Unlikely)	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	Low	Low
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Cessation of all mine water abstraction activities in the Witwatersrand aquifer		
Mitigation measures • Groundwater levels in the deep Witwatersrand aquifer should continue to be monitored on a regular basis. • Water level recovery in mine voids should continue to be monitored on a regular basis.		

8.2.3.2.2 Contaminant Plume Migration

A previous hydrogeological model that includes groundwater pathways and contaminant plume migration for the Study Area was completed (AquiSim Consulting, 2025). As part of this assessment, the main sources of contamination in terms of size and contaminant load were determined to be the Target No. 1 and 2 Tailings Storage Facilities, the RWDs, the Evaporation Dam, the Emergency Overflow dam and the Swartpan.

After closure of the Jelani operations the RWDs, emergency overflow dam and evaporation dam will be rehabilitated, no storage of process water will continue and natural recharge will be allowed to infiltrate into these areas. However, for the Target TSF it was assumed that source concentrations and infiltration rates remain constant as a conservative assumption.

Scenario modelling for 50 and 100 years post-closure (base case scenario - porosity 4% for the weathered zone and 2% for the fractured zone) show that the simulated contaminant plume migrates mainly in a westerly direction into the Study Area following the regional hydraulic gradient (Figure 8-3).

50 years after closure the simulated plume has migrated 1 050 m away from the Target TSF and associated dams. The simulated plume migrated approximately 1 300 m from the Target TSF and associated dams 100 years after closure.

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A sensitivity analysis was performed on this parameter by varying the porosity values between 3 and 7% for the weathered zone and 1 and 3% for the fractured zone. Results show that plume from the Target TSF would migrate 2 000 m for the lowest porosity values and 650 m using the highest porosity values.

Figure 8-3 shows that:

- For the base-case scenario, third-party boreholes B1, B7, B8 and B38N are located within the plume extents for 50 and 100 years post-closure and groundwater quality in these boreholes may thus be impacted in the post-closure phase. For the conservative scenario (low porosity) borehole B2N1 is also projected to be within the simulated plume extent;
- These boreholes should be included in the monitoring programme for the Jelani operations and compared to model results as well as SANS 241 drinking water standards.

As some downgradient groundwater users are likely to be impacted post-closure, the significance of this impact is expected to be medium.

Table 8-67: Significance Rating of Post-Closure Impact 2

NATURE OF IMPACT 2: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Moderate	Moderate
Probability (Definite, Possible, Unlikely)	Definite	Possible
Calculated Significance Rating (Low, Medium, High)	Medium	Medium
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Impact on groundwater quality by cumulative impact from the Target TSF and RWDs		
Mitigation measures • Rehabilitation of process water storage dams; • Rehabilitation and evaporative cover on the Target TSF; • Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling; • Continuous monitoring of water quality in dams and pans for a period of at least five years; • Continuous monitoring of groundwater quality in downgradient monitoring and third-party boreholes for a minimum period of five years; • Yearly reporting of groundwater quality monitoring and comparison to groundwater model results		

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NATURE OF IMPACT 2: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use.
• Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.

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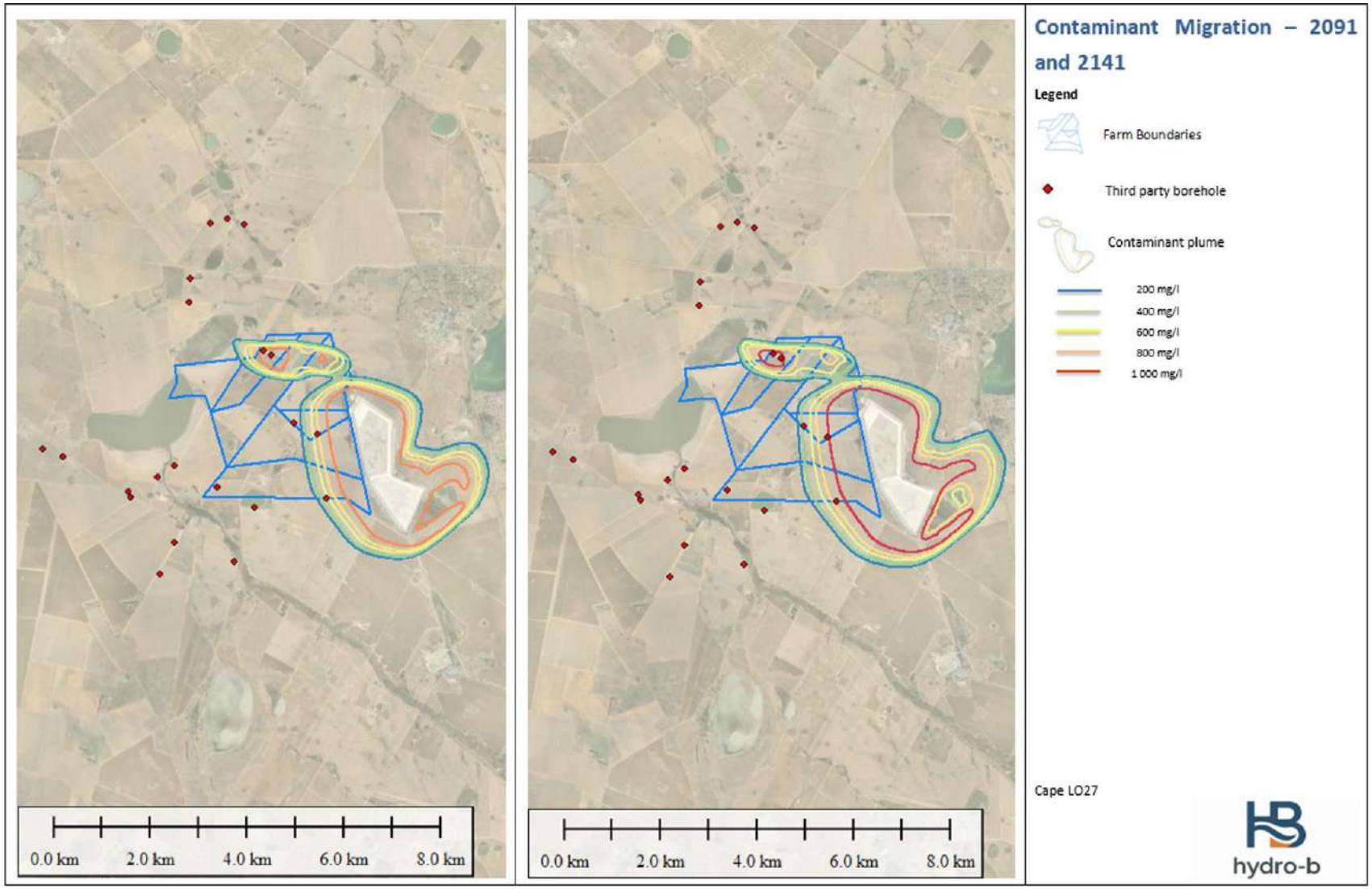


Figure 8-3: Contaminant Plume – 2091 and 2141 Situation (50 and 100 Years Post-Closure)

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8.2.3.3 Freshwater

Following the completion of the proposed underground mining operations, the decommissioning, closure, and rehabilitation activities for the proposed project will be limited to the removal of underground infrastructure.

Table 8-68: Potential freshwater habitat/functionality loss and impacts to biota due to potential subsidence post mine closure.

NATURE OF THE IMPACT: Potential freshwater habitat loss and impacts to biota		
	Impact Rating Without Mitigation	Impact Rating With Mitigation
Impact Status:	Negative	Negative
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	Medium	Low
Reversibility:	Irreversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes, with rehabilitation measures.	

Potential Residual impacts

- Possible localised but irreversible loss of wetland habitat and functionality, particularly where subsidence causes sinkholes or persistent ground deformation.
- Disturbed and fragmented habitats remain susceptible to invasion by AIPs.
- Altered runoff patterns within the local catchment of the freshwater ecosystems, potentially leading to increased erosion and sedimentation of the receiving freshwater environment.
- Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the impacted freshwater ecosystems.
- Impact of increased sedimentation, potentially leading to smothering of biota and potentially altering surface water quality (if present).

Mitigation measures

- Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.
- A Rehabilitation and Landscape Plan should be developed as a precautionary measure for subsidence to follow protocols and guidelines provided by qualified experts.
- Monitoring post mine closure and decommission should take place for at least 5 year post closure to ensure no delayed subsidence has occurred.

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8.2.3.4 Hydrological

Once the Jelani Project is complete, the fate of the "dirty" water infrastructure (Emergency Overflow Dam, Blue RWD and North-west RWD) will depend on if the Target Operation owned by Harmony is still in operation. Assuming that it is, the operation and maintenance of the infrastructure will continue to be the responsibility of Harmony.

The activities and impacts that are likely to occur during the closure and rehabilitation phase are summarised in Table 8-69.

Table 8-69: Summary of activities and impacts for the closure and rehabilitation phase

Activity	Impact Description
Demolition of existing "dirty" water infrastructure, and open bypass channel	**Impact 1:** Effluents residues containing alkaline or heavy metals pollutes nearby soil and water resources
Rehabilitation of the existing "dirty" water infrastructure, and open bypass channel	**Impact 2:** Erosion and wash off soils resulting in water quality issues in the surrounding watercourses
Reprofiling of land to restore original topography	**Impact 3:** Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns

The ratings and proposed mitigation measures for the closure and rehabilitation phase are indicated in Table 8-70 to Table 8-72.

Table 8-70 : Significance rating of closure and rehabilitation impact 1

NATURE OF IMPACT 1: Effluents residues containing alkaline or heavy metals pollutes nearby soil and water resources		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Possible, unless potential spills are rehabilitated		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		

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Mitigation measures
• Remove and treat effluent before demolition begins. • Neutralise pH to environmentally acceptable limits before discharge or containment. • Stormwater infrastructure to be implemented once end land use has been determined. • Post-Rehabilitation monitoring.

Table 8-71 : Significance rating of closure and rehabilitation impact 2

NATURE OF IMPACT 2: Erosion and wash off soils resulting in water quality issues in the surrounding watercourses		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Stormwater infrastructure to be implemented once end land use has been determined. • Design reprofiled areas with stable drainage patterns. • Post-Rehabilitation monitoring.		

Table 8-72 : Significance rating of closure and rehabilitation impact 3

NATURE OF IMPACT 3: Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term

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NATURE OF IMPACT 3: Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns		
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Stormwater infrastructure to be implemented once end land use has been determined. • Design reprofiled areas with stable drainage patterns. • Post-Rehabilitation monitoring.		

8.2.3.5 Air Quality

The closure phase was not assessed in the AQIA Report. However, the impacts associated with closure should be similar to those observed for the construction phase. Thus, the incremental concentrations projected, and isopleth plots created for the construction phase in the AQIA are considered as applicable to the closure phase.

8.2.3.6 Social

Section 8.2.1.4 for the social impacts identified.

8.2.3.7 Heritage

The quantitative evaluation of the impacts associated with the Proposed Project is presented in below

Table 8-73: Impact Table – Palaeontology

Palaeontological								
Nature	**Loss of fossil heritage by destruction, movement or sealing in of fossil heritage in or below the earths structure**							
Development phase	**Development impact**			**Impact Rating**		**Recommended Mitigation**	**Is Impact Acceptable**	
	Criteria	**BM**	**AM**				**BM**	**AM**
Operational Phase	Extent	1	1	Positive Low Impact	Positive Low Impact	None	Yes	Yes
	Probability	1	1					
	Reversibility	1	1					

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	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					

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8.2.3.8 Climate

Table 8-74: Summary of Impacts.

No.	Activity	Impact Description	BEFORE MITIGATION						CI	Mitigation measures / Recommendations	AFTER MITIGATION					
			M	D	SS	C	P	S			M	D	SS	C	P	S
Decommissioning and Closure																
4	Decommissioning of surface infrastructure, rehabilitation earthworks, and associated vehicle/equipment use	Temporary generation of greenhouse gas emissions from diesel-powered equipment used during the removal of monitoring infrastructure, regrading of access tracks and revegetation of disturbed footprints. Emissions are limited by the small scale of the rehabilitation obligation within the Jelani mining right area, where no shafts, processing facilities, tailings facilities or waste rock dumps require decommissioning.	Minor -	Short Term < 18 months	National/ International	Medium	Definite	Medium	No	Minimise the duration and intensity of earthworks; use well-maintained equipment; prioritise progressive rehabilitation to reduce the overall equipment hours required.	Minor -	Short Term < 18 months	Regional	Medium	Definite	Medium

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8.2.4 Cumulative Impacts

8.2.4.1 Biodiversity

8.2.4.1.1 Flora

Given the available information, the Proposed Project is unlikely to have significant cumulative impacts on floral ecology.

Table 8-75: Habitat loss and fragmentation from potential subsidence post mine closure.

NATURE OF THE CUMULATIVE IMPACT: Habitat fragmentation, spread of AIPs (resulting in habitat degradation) and additional development resulting in loss of floral communities and potential floral SCC (provincially protected).		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status:	Negative	Negative
Extent	Regional	Local
Duration	Long term	Medium term
Magnitude	Moderate	Minor
Probability	Possible	Possible
Calculated Significance Rating	Low	Low
Reversibility:	Reversible. With adequate assessment of direct and cumulative risk assessment of current and future project the cumulative risk of this (and future) project can reduced.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: (Yes or No)		
Residual impacts • Loss of natural vegetation and native floral species. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs. • Elevated management requirements post-closure. • Lower habitat resilience (i.e., capacity of ecosystems to recover from drought, fire, or extreme weather events) as a result of affected genetic variability within populations).		

8.2.4.1.2 Fauna

The local area around the study area has already been subjected to impacts as a result of historic mining activities, agriculture, and vegetation clearing for development activities. This has already negatively impacted faunal diversity, habitat and abundance within the region, forcing fauna into the remaining natural habitat. These fragmented habitats have become important hotspots for faunal diversity in a largely disturbed environment. Remaining intact and connected portions of natural vegetation will be fragmented. Cumulative impacts will result in isolated natural areas that are no longer connected to functioning corridors (leading to a decrease in ecosystem functioning and ecosystems services).

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Table 8-76 Cumulative impacts associated with the proposed underground mining project (Faunal)

NATURE OF THE CUMULATIVE IMPACT: Habitat fragmentation, spread of AIPs (resulting in habitat degradation) and additional development resulting in loss of faunal communities and potential faunal SCC.		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	Negative	Negative
Extent	Regional	Local
Duration	Long term	Medium term
Magnitude	Major	Minor
Probability	Possible	Possible
Calculated Significance Rating	High	Low
Reversibility:	Reversible. With adequate assessment of direct and cumulative risk assessment of current and future project the cumulative risk of this (and future) project can reduced.	
Irreplaceable loss of resources:	No.	
Can impacts be enhanced: (Yes or No)	No.	
Residual impacts • Loss of natural vegetation and native faunal species. • Disturbed and fragmented habitats remain susceptible to invasion by AIPs. • Elevated management requirements post-closure. • Lower habitat resilience (i.e., capacity of ecosystems to recover from drought, fire, or extreme weather events) as a result of affected genetic variability within populations), and • Cumulative noise and vibrational disturbance accompanying the ongoing surrounding mining activity.		

8.2.4.2 Freshwater

Freshwater ecosystems within the region are under continued threat largely due to ongoing mining and agricultural activities as well as urbanisation. These cumulative impacts lead to increasing impacts on the functioning and service provision by wetlands and rivers.

Table 8-77: Potential cumulative effects on wetland habitat due to potential subsidence post mine closure.

NATURE OF THE CUMULATIVE IMPACT: Potential freshwater habitat loss and impacts to biota		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status:	Negative	Negative
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Minor	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	Low	Low

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NATURE OF THE CUMULATIVE IMPACT: Potential freshwater habitat loss and impacts to biota	
Reversibility:	Irreversible
Irreplaceable loss of resources:	No
Can impacts be enhanced: (Yes or No)	Yes, with rehabilitation measures.
Potential Residual impacts • Increased risk of AIP proliferation due to disturbances within the delineated extent of the freshwater ecosystems and within the immediate surrounds. • Increased risk for erosion and sedimentation due to increased stormwater runoff within the catchment of the freshwater ecosystems. • Increased risk of nutrient inputs from the mining and agricultural activities resulting in changes to the water quality of the freshwater ecosystems. • Increased dust generation due to mining and agricultural activities and vehicle movement within the freshwater ecosystems and within the immediate surrounds. • Increased likelihood of deterioration of ecological functioning and ecoservice provisioning potential of the freshwater ecosystems.	
Mitigation measures • Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. • A Rehabilitation and Landscape Plan should be developed as a precautionary measure for subsidence to follow protocols and guidelines provided by qualified experts. • Monitoring post mine closure and decommission should take place for at least 5 year post closure to ensure no delayed subsidence has occurred.	

8.2.4.3 Hydrological

The project is located in a catchment that is highly impacted by mining activities. The implementation of a sound SWMP is crucial to separate “clean” and “dirty” water systems in the project area. The monitoring and maintenance of the implemented SWMP is of utmost importance, to ensure that spillages into the downslope watercourses do not occur.

The removal of the “dirty” water infrastructure and the open bypass channel and the successful implementation of a rehabilitation plan could enhance the catchment baseline water quality. Should the rehabilitation plan not be followed, then in the long term, the proposed project has the potential to cumulatively add to the already deteriorated water quality within the Losdoringspruit catchment.

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Table 8-78: Cumulative impact rating for surface water quality

NATURE OF IMPACT: Should dirty water runoff not be contained and an appropriate rehabilitation plan for the area not be undertaken and successfully implemented, then the proposed project has the potential to add cumulatively to the already deteriorated surface water quality of the catchment		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Effective stormwater management that captures and contains all site runoff as proposed in this report, and in accordance with GN R704. • Effective monitoring of the stormwater management system to ensure it is operational and maintained. • Successful removal of the “dirty” water infrastructure and the open bypass channel and rehabilitation of the areas • Water quality monitoring must be implemented upstream and downstream of site.		

8.2.4.4 Hydrogeological

The project is located in an area that is already impacted by existing mining activities. As already mentioned, existing Target Mine surface water infrastructure for mine waste and water is present which locally impacts on groundwater quality. As it is proposed that much of the mine water infrastructure will be used for the proposed Jelani operation, this will lead to cumulative impacts that are impossible to divide into historical and future impacts.

As such, the impacts and their significance included in the previous sections are already considered to be cumulative. As such, there will be no additional cumulative impacts expected other than what has already been reported on above.

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8.2.4.5 Air Quality

There was background ambient data available for dustfall for the project site, from Harmony's dustfall monitoring network (please refer to Section 7.10.3). Cumulative concentrations were estimated by adding maximum predicted (modelled) concentrations to the average background (measured) concentrations. The mean background value was considered representative of existing ambient conditions at the project site. Cumulative dustfall rates at the shaft boundaries are provided in Table 8-79and are shown to remain below the non-residential limit for all three (3) scenarios.

Predicted concentrations are generally low and decrease when moving further away from the emission sources. Thus, cumulative impacts for these pollutants will be higher near the areas of planned construction and surface mining activities. At the Nyakallong residential area (DR6), however, elevated cumulative dustfall impacts may occur due to the relatively high maximum background dustfall recorded at this location. The residential area dustfall limit of 600 mg/m²/day was exceeded on one occasion during the July 2024 – June 2025 monitoring period, with a dustfall rate of 1 570 mg/m²/day recorded in March 2025. Therefore, even relatively low incremental dustfall from the proposed activities could result in elevated cumulative dustfall at DR6.

Table 8-79: Summary of the cumulative impacts using the maximum modelled dustfall rates at the shaft boundaries and the average background dustfall rate at the Harmony monitoring sites.

Pollutant	Averaging Period	Average Background Dustfall Rate (C_B) (1)	Maximum Modelled Dustfall Rate (C_P) (2)	Cumulative Dustfall- 24HR (C_B + C_P)	Air Quality Standard (mg/m²/day)
Construction Phase					
Dustfall (TSP)	Daily	202.86	280	482.86	1200
Operational Phase 1					
Dustfall (TSP)	Daily	202.86	230	432.86	1200
Operational Phase 2					
Dustfall (TSP)	Daily	202.86	610	812.86	1200

Notes:

1. Considered the average background dustfall rate recorded at the Harmony monitoring sites. Refer to Section 7.10.3 for more details on the background air quality data.

2. Considered the maximum predicted incremental dustfall rates at the shaft boundaries.

8.2.4.6 Soil, Land Use and Land Capability

The proposed development does not include establishment of any operational mining infrastructure, thus, minimal to no direct impact on soil, land use, and agricultural land capability is anticipated. However, in the event of a possible ground subsidence, the cumulative loss and long-term impacts on arable soil and associated agricultural productivity of the study area is anticipated to be high since the proposed underground mine operation is directly beneath commercial agricultural cultivation of crops (maize, sunflower) as well as several

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farm dams providing drinking water for the livestock (cattle and sheep). If appropriately managed or mitigated, the cumulative loss and long-term impacts can be reduced to low through monitoring, farm inspection (e.g., surface cracks) and adaptive management strategies.

Table 8-80: Significance of identified cumulative impacts.

NATURE OF THECUMULATIVE IMPACT: Loss of Agricultural Capability & Commercial Productivity		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status: (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Local	Local
Duration (Short term, medium term, long term)	Long	Short
Magnitude (Major, Moderate, Minor)	Major	Moderate
Probability (Definite, Possible, Unlikely)	Possible	Unlikely
Calculated Significance Rating (Low, Medium,High)	High	Low
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Can impacts be enhanced: (Yes or No)	No	
Residual impacts • Permanent land deformation which may result in irreversible loss of agricultural value.		
Mitigation measures • It must be ensured that areas of active cultivation are protected from subsidence. • The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities. • Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs		

8.2.4.7 Heritage

Table 8-81: The cumulative rating system

NATURE OF THECUMULATIVE IMPACT: Cumulative impact on palaeontological resources		
	Impact Rating without Mitigation	Impact Rating with Mitigation
Impact Status: (positive or negative)	Negative	Negative
Extent (Local, Regional, International)	Regional	Regional
Duration (Short term, medium term, long term)	Long Term	Long Term
Magnitude (Major, Moderate, Minor)	Minor	Minor
Probability (Definite, Possible, Unlikely)	Unlikely	Unlikely
Calculated Significance Rating (Low, Medium, High)	Medium	Low
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Can impacts be enhanced: (Yes or No)	Yes	

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NATURE OF THECUMULATIVE IMPACT: Cumulative impact on palaeontological resources
Residual impacts • Residual impacts: Loss of fossil Heritage: The excavations and clearing of vegetation during the construction phase of the infrastructure areas will consist of digging into the superficial sediment cover as well as underlying deeper bedrock. These excavations will change the existing topography and may possibly destroy or even permanently close-in fossils at or below the ground surface. These fossils will then be lost for research.
Mitigation measures • Chance finds protocol

8.3 Specialist Studies Conclusions and Recommendations

The preceding sections of Chapter 8 of this report together with the specialist studies contained within Appendices D of this EIA provide a detailed assessment of the potential impacts that may result from the Proposed Project.

This section aims to conclude the environmental assessment providing a summary of the results and conclusions of the assessment of the project as found in the Specialist Studies. In so doing, it draws on the information gathered as part of the EIA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented.

8.3.1 Biodiversity

8.3.1.1 Floral

The Proposed Project activities are not expected to have a significant impact on important or sensitive floral resources, since no operational mining infrastructure developments are associated with this project. The risk of significant impacts such as subsidence are considered to be of low risk and given the mitigations provided the impact to floral and terrestrial receptors are considered low. In terms of both the Plant Species Theme there is no impacts anticipated for threatened floral SCC and for the Terrestrial Biodiversity Theme, the impact is expected to be low.

Consequently, the specialist believes that, provided strict implementation of mitigation measures occurs together with sound environmental procedures, the project can be considered for approval strictly from a botanical and terrestrial biodiversity standpoint.

The floral assessment provides the relevant information necessary to implement Integrated Environmental Management (IEM) and ensure the optimal long-term use of ecological resources in the study area, in support of the principle of sustainable development. The findings, results, observations, conclusions, and recommendations given in the floral assessment report are based on the author's best scientific and professional knowledge as well as available information.

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8.3.1.2 Faunal

The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected. The findings, results, observations, conclusions, and recommendations given in the faunal assessment report are based on the author's best scientific and professional knowledge as well as available information.

The Proposed Project activities are not expected to have a significant impact on important or sensitive faunal resources. This is because no operational mining infrastructure development is associated with the project and no direct impacts are anticipated. The risk of significant impacts such as subsidence is considered low, and with the mitigation measures outlined in this report, potential impacts on faunal receptors are expected to be minimal. The proposed mining is not expected to have a significant impact on the faunal assemblages, provided the proponent carries out all the recommend mitigation measures.

It is the opinion of the ecologists that the faunal assessment study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.

8.3.2 Freshwater and Aquatic

Multiple seep and depression wetlands were identified within the study and investigation areas. The results of the assessment are summarised in the table below:

Table 8-82: Summary of results of the field assessment

Freshwater ecosystems	PES	Ecoservices importance	EIS	REC / RMO / BAS
Seep Wetlands	C	Very low to Moderate	Moderate	REC Category: C BAS Category: C RMO: Maintain
Depression Wetlands	D			REC Category: D BAS Category: D RMO: Maintain
Extent of modification anticipated.	**Low** Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a "Low" risk to the ongoing functionality of the systems. Key mitigation measures include: • Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and • It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.			

Following the freshwater ecosystem assessment, the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2023) was applied to determine the significance of impacts of the proposed undermining of the wetlands. Provided that all mitigation measures outlined in the freshwater assessment report are adhered

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to throughout the life of the proposed underground mining operation, the perceived impact significance is "Low" provided that the mitigation measures as outlined in this report are strictly adhered to.

The assessment of potential impacts to groundwater was not part of the scope of this report but was considered, at a high level, as the potential for decant relates to surface freshwater resource management. As such, the mitigation measures as outlined in the Technical Report (Bara Consulting, 2025) to mitigate against potential subsidence, creation of a groundwater pollution plume, that poses a risk to surface water resources, and possible decant must be implemented and strictly adhered to in order to ensure a low impact significance. It is also recommended that the pillar safety factor under the wetlands be included as an additional margin of safety to ensure that no subsidence of the wetlands takes place.

The outcome of the freshwater impact assessment states that the operational and closure phase activities associated with the proposed project are medium without the implementation of mitigation measures and low with the implementation of mitigation measures.

Thus, it is the opinion of the specialist that the proposed undermining of the wetlands associated with the proposed Jelani JV project is considered acceptable and can be authorised by means of a Water Use Authorisation process in terms of GN 4167 as it relates to the NWA and is acceptable for EA.

8.3.3 Hydrogeological

Based on this Impact Assessment, the following can be concluded:

- The proposed Jelani Operation will be developed in an area already impacted by existing mining activities. It will overlap in extent with the Target mine and partially utilise existing Target mining and water management infrastructure, especially those related to the Target Shaft No. 2 and 3;
- The Jelani mine extent is significantly smaller in extent than the existing Target Mine with mining only extending 140 m deeper than current mining at 1 250 mbgl;
- The Hydrogeology of the Study Area can be described as a shallow, perched, weathered and fractured Karoo aquifer overlying a deep, confined, fractured Ventersdorp/Witwatersrand aquifer;
- Hydraulic connectivity between the shallow Karoo aquifer and the deep aquifer is considered limited;
- Current groundwater use is mainly for existing gold mining operations which abstract considerable volumes of water from the deep fractured aquifer. Small-scale third-party use, mainly for domestic purposes, is the main use of groundwater in the shallow aquifer;
- Groundwater levels in the shallow Karoo aquifer indicate good correlation with topography, showing groundwater levels remain close to surface;
- For sampled domestic groundwater sources, no cyanide or uranium was detected and sulphate only detected at concentrations below the SANS drinking water limit, showing no indication of current impacts of mining on groundwater sources;
- Existing groundwater impacts are largely associated with current mining infrastructure, particularly the Target Mine TSFs and associated RWDs, locally impacting on groundwater quality in proximity of existing mine surface infrastructure;
- Volumes of underground water to be pumped to surface for the proposed underground workings are expected to be in line with those for the Target Mine, with an estimated volume of approximately 5.4 Ml/day (3.4 Ml/day of groundwater make and 2 Ml/day of inter-mine flow from Freddies No. 9 Shaft);
- Currently no drawdown effects have been observed in the shallow aquifer due to mine dewatering;

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- Post-closure groundwater rebound in the deep aquifer and potential cross-contamination is not expected as piezometric levels will remain below the shallow Karoo aquifer;
- The impact assessment identifies no additional cumulative groundwater impacts beyond those assessed for the individual project phases, as the assessed impacts already incorporate the effects of existing Target Mine infrastructure;
- Construction-phase groundwater-quality impacts are assessed as low significance after mitigation;
- Operational impacts on shallow groundwater availability and levels are assessed as low significance after mitigation, provided abstraction and shallow groundwater levels are monitored throughout the Life of Mine;
- Operational contaminant plume migration remains a medium-significance impact after mitigation, with B38N and B8 identified as potential groundwater receptors;
- Post-closure groundwater recovery and potential hydraulic connection with the shallow Karoo aquifer are assessed as low significance after mitigation; and
- Post-closure contaminant plume migration remains a medium-significance long-term impact, with several third-party boreholes potentially affected based on the simulated plume extent.

The following recommendations are made:

- The current Harmony Target Mine monitoring network should be used for further monitoring for this project, but should be updated in terms of monitoring locations, frequency and parameters;
- Groundwater level and quality trigger levels and corresponding response actions should be defined and incorporated in the groundwater monitoring programme;
- Retrieve additional samples from third-party boreholes not previously sampled to confirm the understanding of the current groundwater quality situation;
- Undertake site-specific seepage and aquifer characterisation (dam water quality and levels, seepage rates, soil and unsaturated-zone properties and aquifer hydraulic properties) to further refine the contaminant transport assessment for the Jelani Project;
- Updating the groundwater model every two years at a minimum, or after new information becomes available or significant changes in mine layouts or scheduling;
- Jelani resources should co-operate with Harmony Gold with regards to carrying out source-term determinations and geochemical modelling for the Target TSF, and this should feed into cumulative impact assessment updates for the Jelani Operation. The results should be incorporated into future cumulative groundwater impact assessments for the Jelani Operation;
- Jelani Resources to implement the construction-phase pollution prevention, stormwater and spill-response measures before activities commence;
- Monitor Jelani groundwater abstraction volumes and shallow Karoo groundwater levels throughout LoM and definition of trigger levels;
- Include B38N and B8 in the groundwater monitoring network as key potential receptors of operational contaminant plume migration;
- Maintain regular process-water and groundwater-quality monitoring and compare results with model predictions and SANS 241 requirements;
- Rehabilitate process-water storage infrastructures at closure;
- Continue post-closure groundwater-level and groundwater-quality monitoring, including downgradient receptor boreholes, and update the transport model as new monitoring data become available; and
- Where a mining-related reduction in third-party borehole yield or groundwater quality is demonstrated, provide an alternative water supply;

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- Any groundwater related comments received through the EIA/WULA consultation process should be incorporated into subsequent groundwater assessment updates.

8.3.4 Soil, Land Use, & Land Capability

According to (DALRRD, 2022) database, the study area is located within the rainfed (RF) protected agricultural areas. However, no operational mining infrastructure is proposed within the study area, only the underground mine and related activities. As a result, no impact is anticipated on the protected agricultural areas (provided no subsidence occurs) as well as the active commercial farming taking place within the study area. Therefore, it is recommended that all mine operation and related activities be restricted to underground. This is to ensure that impact on agricultural production as well as regional and provincial food security is preserved throughout the life of mine (LoM).

The proposed development does not include establishment of any additional operational mining infrastructure, thus, minimal to no direct impact on soil, land use, and agricultural land capability is anticipated. However, in the event of a possible ground subsidence, the cumulative loss and long-term impacts on arable soil and associated agricultural productivity of the study area is anticipated to be high since the proposed underground mine operation is directly beneath commercial agricultural cultivation of crops (maize, sunflower) as well as several farm dams providing drinking water for livestock (cattle and sheep). If properly managed or mitigated, the cumulative loss and long-term impacts can be reduced to low through monitoring, farm inspection (e.g., surface cracks) and adaptive management strategies. It is therefore the opinion of the specialist that the rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities.

Based on the Natural Agricultural Resources Atlas Manual (NAR Atlas Manual, 2018) database, the study area is characterised by approximately 7 hectare per large stock unit (ha/LSU). This grazing capacity potential is considered sufficient to support commercialised livestock farming with veld management practices in place. The proposed underground mine does not pose any risk on current livestock grazing activities since no operational mining infrastructure is to be established.

Following the assessment of the study area and the identified potential impacts as a result of the proposed underground mine and related activities; key mitigation as outlined below has been developed to minimise the impact on soil resources of the area:

- It must be ensured that areas of active cultivation are protected from subsidence.
- The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities.
- It is also recommended that the safety pillar factor under cultivated areas be included as an additional margin of safety to ensure that no subsidence takes place; and
- Regular monitoring of surface above the undermined areas must be considered to ensure that no subsidence occurs.

It is therefore the opinion of the soil study team that the proposed underground mine and related activities is deemed acceptable and within limits from a soil, land use, and agricultural capability point of view, provided that the risk of subsidence by the rock engineers is confirmed to be low for all phases of development.

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8.3.5 Air Quality

The project area is situated within a predominantly rural environment, with surrounding land uses consisting primarily of grassland, cultivated land, mining areas, water bodies and exposed/bare areas, together with formal and informal residential areas. Existing sources of airborne emissions in the broader area include commercial agricultural activities, surrounding mining operations, wind erosion from exposed surfaces, and vehicle dust entrainment on unpaved roads. The proposed project will therefore introduce additional particulate emission sources into an environment where dust-generating activities already occur.

Meteorological conditions are an important consideration in assessing the potential dispersion of project-related emissions. The dispersion assessment was based on MM5 modelled meteorological data for the period January 2023 to December 2025. The prevailing wind fields indicate that emissions from the proposed activities are most likely to be transported towards the south-westerly wind quadrant. Wind speeds are generally within the light-air to fresh-breeze range, which is expected to promote dispersion of pollutants. However, periods of higher wind speeds may increase the potential for fugitive dust emissions from exposed surfaces, particularly areas such as the WRDs and other open areas.

The baseline assessment identified a limitation in the availability of representative ambient air quality monitoring data for criteria pollutants. The nearest permanent ambient air quality monitoring station is located at the Bayswater Clinic in Bloemfontein, more than 10km from the project site and approximately 150km to the south-west. This station was therefore considered unsuitable for representing background concentrations at the project site. No other suitable ambient monitoring station was identified within approximately 10km of the project area and, consequently, representative baseline concentrations of PM10, PM2.5, CO, SO2, and NO2 could not be established.

In contrast, representative dustfall monitoring data were available from the Harmony Gold monitoring network in the vicinity of the project. The network comprised seven monitoring locations for the July 2024 – June 2025 period, of which six (6) were classified as non-residential and one (1) as residential. Of the 70 dustfall measurements recorded, only one exceedance of the residential dustfall limit of 600 mg/m²/day was recorded, at the Nyakallong monitoring site (HAR1) in March 2025. Although the cause of this exceedance was not known at the time of the assessment, the available monitoring data indicates that background dustfall was generally compliant with the applicable NDCR during the assessment period.

The principal pollutants of concern associated with the proposed mining project are dustfall, PM10 and PM2.5. The main sources considered in the assessment include refurbishment and construction activities at the Target No. 2 and No. 3 Shafts, material handling and truck loading/offloading during Phase 1, wind erosion from exposed areas such as WRDs, vehicle dust entrainment from unpaved roads, and emissions associated with conveyor transfer points and the transport of run-of-mine ore to the Target 1 Plant. Processing activities at the Target 1 Plant were excluded from the assessment as these activities form part of Harmony's existing operations and are not included in the proposed JV project.

During the construction phase, predicted dustfall deposition and PM10 and PM2.5 concentrations are highest in the immediate vicinity of the construction area and decrease rapidly with increasing distance from the sources. Localised exceedances of the applicable dustfall, PM10 and daily PM2.5 standards are predicted within the shaft boundary, with short-term PM10 exceedances extending locally beyond the southern shaft boundary. Importantly, however, no modelled sensitive receptor is predicted to experience an exceedance of the applicable

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dustfall or PM standards, and annual PM2.5 concentrations remain below the applicable standard throughout the modelling domain.

During Operational Phase 1, surface activities will be centred on the No. 3 Shaft, with ore transported to the Target 1 Plant via an approximately 7.67km haul route. Predicted incremental dustfall, PM10 and PM2.5 concentrations are generally low, with isolated exceedances of the daily and annual PM10 standards predicted along the north-western shaft boundary. The dispersion footprint is elongated between the No. 3 Shaft and Target 1 Plant, reflecting the distributed nature of emissions from the haul route. Concentrations decrease with increasing distance from the emission sources, and no exceedances of the applicable standards are predicted at sensitive receptor locations.

During Operational Phase 2, surface activities will be centred on the No. 2 Shaft, with ore transported to the Target 1 Plant via an approximately 2.45km overland conveyor system. The predicted impact footprint is more concentrated around the No. 2 Shaft and extends towards Target 1 Plant along the conveyor alignment. This reflects the concentration of emissions associated with material handling and the open conveyor system. Localised exceedances of the applicable dustfall and PM10 limits are predicted within the shaft boundary, with PM10 exceedances extending to a small section of the eastern shaft boundary. Nevertheless, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM10 standards, while predicted incremental PM2.5 concentrations remain below the applicable standards throughout the modelling domain.

The cumulative assessment indicates that cumulative impacts at the shaft boundaries are expected to range from low to moderate, with concentrations decreasing as distance from the operational areas increases. At surrounding sensitive receptor areas, cumulative impacts are generally expected to be low to negligible. The Nyakallong residential area is, however, considered a particular area of sensitivity due to the relatively high maximum background dustfall recorded at this location. A dustfall rate of 1 570 mg/m2/day was recorded at Nyakallong in March 2025, exceeding the residential limit of 600 mg/m2/day. As a result, even relatively low incremental dustfall contributions from the proposed project could contribute to elevated cumulative dustfall levels at this receptor.

Overall, the modelling indicates that the highest air quality impacts are expected within or immediately adjacent to the proposed operational and construction areas, while impacts decrease rapidly with increasing distance from the emission sources. Although localised exceedances of dustfall and PM10 standards are predicted within the shaft boundaries, these impacts are largely confined to the operational areas and are not predicted to result in exceedances at the modelled sensitive receptors. The overall predicted impact significance at sensitive receptor locations is therefore low, while moderate impacts may occur within the shaft boundaries.

Based on the findings of the baseline and impact assessments, the proposed Jelani Resources underground mining project is considered acceptable from an air quality perspective, subject to the implementation and maintenance of the recommended mitigation and management measures throughout the construction and operational phases. Emphasis should be placed on controlling fugitive dust from exposed surfaces, material handling, vehicle movements and conveyor-related activities, as well as monitoring the effectiveness of these measures. Monthly dustfall monitoring is recommended to support compliance monitoring, identify changes in background dustfall, and track the effectiveness of dust control measures, particularly at sensitive areas such as Nyakallong. Where practical, the JV project's dustfall monitoring network could be coordinated with or complement the existing Harmony Gold monitoring network.

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8.3.6 Social

As the Project entails an underground mining operation adjoining the existing Target operation, social impacts will be minimal. The impact assessment supports this observation.

During the construction phase, the short term nature impacts of dust, noise, traffic, light spill and population influx were rated as having a low significance prior to mitigation. Through the application of mitigation measures, the magnitude and/ or probability of these impacts during the construction phases can be further reduced.

For the operational phase (which will occur over a much longer period than the construction phase), the above impacts were rated as having a medium significance level prior to mitigation. Through mitigation measures, the significance ratings of all of these impacts can be reduced to a low level.

All of the impacts described above had a low significance rating for the decommissioning phase, in regard to both pre- and most-mitigation scenarios.

Although the labour force will be sourced from the Harmony Target Operation, the Project's SLP will facilitate skills development opportunities for employees and the local community. The LED project for the initial SLP cycle will also provide benefits to the community, through local procurement and improved facilities. This positive impact is applicable throughout the life of the Proposed Project. Through implementation of the SLP, the Project can maximise its contributions to local community development.

The SLP will also be instrumental in providing opportunities for workers to progress their careers and diversify their skills, thereby increasing the likelihood of employment after the mine closes. Through the implementation of the SLP, the impact of retrenchment on mine employees can be reduced from a high significance level to a minimal (low) level.

8.3.7 Heritage and Palaeontology

Due to the Sensitivities, no site investigation was conducted for this project. However, Desktop research has found that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. A High Palaeontological Significance has been allocated for the mining /operational phase of the development pre-mitigation and a low significance post mitigation. The mining /operational will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Decommissioning phase.

The No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, will have a Neutral impact on the Palaeontological Heritage of the development. The Cumulative impacts of the development are considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

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8.3.8 Ground Vibration

Ground vibration is one aspect as a result from blasting operations in general. This report evaluates the effects of ground vibration from the underground mining operation and intends to provide information, calculations, predictions, possible influences and mitigations of blasting operations for this project.

The evaluation of effects yielded by blasting operations was evaluated over an area as wide as 100 m horizontally from the mining area considered. The range of structures observed are Powerlines / Pylons, Industrial structures / Buildings, Houses, Public Buildings, Gravel roads, Dams, farmlands, Tailings Storage Facilities, etc.

Blasting operations from the mining area are located such that specific impacts were investigated and addressed in the report.

The evaluation mainly considered structures located within a horizontal distance of up to 100 m from the surface footprint of the mining area. The distance between the structures and the roof elevation of the mining area is a contributing factor to the levels of ground vibration expected at surface and the subsequent possible influences. The ground vibration levels predicted for all POIs evaluated ranged between 0.50 mm/s and 0.55 mm/s for structures surrounding the mining area. The predicted ground vibration levels associated with private structures and houses were also within the mentioned range. These buildings are located such that the predicted levels of ground vibration from the assumed charge may not even be perceivable.

Based on the predicted ground vibration levels, no specific mitigation measures are considered necessary at this stage. The predicted levels at surface are below those expected to result in damage to surrounding structures and significant impacts on neighbouring communities. As mining progresses deeper, ground vibration levels at surface are expected to reduce further. Blasting activities should, however, be monitored during the mining process to confirm that actual levels remain in line with the predictions.

This concludes this investigation for the proposed Jelani Resources - Joint Venture Project. There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.

8.3.9 Climate

The Climate Change Assessment has quantified the greenhouse gas emissions attributable to the proposed Jelani underground mining project and evaluated the Project's exposure to projected changes in the local climate over its operational life. The following conclusions are drawn.

- The Project will generate approximately 47 715 tCO_2e during construction and approximately 2 958 538 tCO_2e over the 15-year operational phase. Purchased grid electricity accounts for approximately 98 per cent of operational emissions, making energy consumption and grid carbon intensity the determining factors in the Project's footprint.
- The Project's contribution to climate change cannot be eliminated, as emissions are inherent to the proposed mining activities. The mitigation measures identified reduce the magnitude of the impact from Major to Moderate. Because the impact is long term and national to international in extent, its significance remains High after mitigation. The re-use of existing shafts and processing infrastructure avoids a substantial quantum of embodied emissions that a greenfield development would incur.
- Heat presents the most significant physical climate risk. The ventilation and cooling system is engineered around a fixed design summer surface condition, and projected warming erodes the operating margin

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that design carries. Existing constraints, including conditions in the No. 5 Shaft return airway and limited main fan redundancy, compound this exposure for both infrastructure and the workforce.

- Extreme rainfall and flooding present a significant risk to surface infrastructure, to the receiving tailings storage facility and to overlying landowners. The site already floods under present-day conditions, and the stormwater designs derive from historical rainfall statistics with no allowance for projected increases in intensity.
- The Project is materially exposed through infrastructure outside its operational control. The receiving tailings storage facility is the most significant of these dependencies, as a climate-related loss of deposition capacity would prevent ore processing and halt mining.
- Transition risk is moderate to low over the Project life, with the principal exposure arising from carbon pricing and greenhouse gas reporting obligations rather than from fundamental threats to operational viability.
- The inventory is an indicative estimate prepared at prefeasibility level. It establishes the order of magnitude of the footprint and identifies the sources that dominate it, and it provides a defensible basis for assessing significance at this stage.

Recommendations:

It is recommended that the following measures be implemented and that they be incorporated into the Environmental Management Programme and the Project's operational risk management processes.

- Energy and emissions management. Implement ventilation-on-demand, high-efficiency motors and pumps, efficient lighting and optimised compressed-air systems. Investigate renewable energy supply, wheeling arrangements and power purchase agreements, given that grid electricity governs the footprint. Develop a progressive emissions reduction plan with defined targets and establish greenhouse gas monitoring and reporting aligned to the Carbon Tax Act and to future carbon budget requirements.
- Confirm the generating plant. Confirm the fuel type, rated capacity and expected duty of the proposed on-site generating plant. At 5 MVA the implied rated thermal input exceeds the 10 MW(th) threshold for IPCC category 1A2i, which is assessed on rated capacity irrespective of utilisation, and may attract carbon tax liability.
- Heat and ventilation resilience. Reassess the ventilation and cooling design against projected surface temperatures rather than historical design conditions, and confirm that sufficient margin and redundancy exist at the No. 4 and No. 5 Shaft fan installations. Implement thermal work limits, acclimatisation protocols, hydration provision and heat-stress monitoring for underground and surface personnel.
- Stormwater and flood management. Verify the stormwater and dirty water containment designs against short-duration rainfall intensities that incorporate a climate change allowance, and implement the separation measures recommended in the hydrological assessment. Operate the return water dam complex at a level that retains capacity for the design event, and undertake post-storm inspection of the bypass channel and lined works.
- Tailings deposition assurance. Formalise assurance over the receiving tailings storage facility through the agreements governing access to it. Obtain visibility of the operator's monitoring data and management systems, confirm that the facility is designed and operated in accordance with the Global Industry Standard on Tailings Management, and identify contingency measures to be applied should deposition be curtailed.

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- Occupational solar ultraviolet exposure. Implement a solar ultraviolet exposure control programme for surface personnel, including shade provision at fixed work positions, appropriate personal protective equipment and scheduling of outdoor work away from peak irradiance periods.
- Wildfire and severe weather preparedness. Maintain firebreaks and manage vegetation around the shaft and ventilation infrastructure and establish coordination protocols with local emergency services and with the Nyakallong community. Confirm lightning protection, surge protection and post-storm inspection protocols for surface electrical and control systems.
- Inventory refinement. Refine the greenhouse gas inventory as Project-specific information becomes available, in particular measured fuel consumption, the confirmed electrical load schedule, refrigerant type and charge for the quantification of fugitive emissions, and finalised design parameters. The inventory should be recalculated using the applicable emission factors for each future reporting year.
- Monitoring and periodic review. Monitor climate indicators, infrastructure performance and critical dependencies as part of the Project's environmental and operational risk management processes. Review this Assessment where material changes occur to Project design, operating conditions, the underlying climate evidence or the regulatory framework, and in any event periodically over the life of mine.

8.4 Summarised Environmental Risk Matrix

A detailed description of the methodology utilised to determining the environmental impacts and their respective probability, magnitude and severity is provided in Section 8.1 as well as in the specialist reports contained in Appendix D.

During the risk assessment process, it was found that the negative impacts of the Proposed Project with mitigation would be mostly medium to low in nature, and the positive impacts low to medium.

The EAP and environmental consultants responsible for the compilation of this document, and PPP feel that the project should be approved, on condition that the Jelani implements all identified management measures and implements the monitoring and mitigation plans.

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Table 8-83: Key Findings

Impact	Rating Pre-Mitigation	Construction Phase	Operation Phase	Decommissioning Phase	Rating Post Mitigation	Construction Phase	Operation Phase	Decommissioning Phase
Positive (+)	Moderate (medium)				Moderate (medium)	• Social	• Social	
Positive (+)	Minor (low)	• Social	• Heritage • Social	• Heritage	Minor (low)		• Heritage	• Heritage
No Impact	No Impact				No Impact			
Negative (-)	Minor (low)	• Social • Hydrological • Hydrogeological • Air Quality	• Social • Hydrological • Ground Vibration	• Social • Hydrological • Hydrogeological	Minor (low)	• Heritage • Social • Hydrological • Hydrogeological • Air Quality	• Agricultural • Biodiversity • Freshwater • Social • Hydrological • Ground Vibration	• Biodiversity • Freshwater • Social • Social • Hydrological
Negative (-)	Moderate (medium)	• Heritage	• Agricultural • Biodiversity • Freshwater • Social • Hydrogeological • Air Quality	• Freshwater • Social • Climate • Hydrogeological	Moderate (medium)	• Climate	• Agricultural • Hydrogeological • Air Quality	• Climate • Hydrogeological
Negative (-)	Major (high)	• Climate	• Agricultural • Biodiversity • Climate	• Biodiversity • Social	Major (high)		• Climate	

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9. Information for Consideration

9.1 Assumptions, Uncertainties and Gap in Knowledge

The following assumptions and limitations are applicable to this EIA report:

9.1.1 Biodiversity

9.1.1.1 Flora

The following assumptions and limitations apply to the Terrestrial Biodiversity Specialist Assessment Report and Plant Species Compliance Statement:

- The results of the floral assessment as presented in the assessment report is confined to the study area. The immediate surroundings do not form part of this assessment but were included in the desktop analysis.
- The report will only focus on the activities associated with the study area, which is focussed on underground mining activities. Any other activities related to the Harmony Target mining right area (i.e., refurbishment of existing infrastructure) is not associated with this scope of work for the report;
- Sampling by its nature means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. Nevertheless, given the experience of the specialist within the area, together with adequate coverage of the study area within an appropriate flowering season, the survey was deemed sufficient for drawing adequate conclusions regarding the ecological condition and sensitivity of the various habitats therein;
- The identities of some floral SCCs will not be disclosed in the report, although their potential occurrence within the study area was still evaluated. According to the best practice guideline accompanying the DFFE's screening tool and the Species Environmental Assessment Guidelines (SANBI, 2020), the names of sensitive species may not appear in any of the specialist reports that would be publicly available. Such species will be referred to as sensitive plants, with their threat status included; and
- The floral assessment took place on 10th December 2025 (summer season); according to the Species Environmental Assessment Guideline (SANBI 2020) the period of assessment is in line with the optimal survey periods for grassland ecosystems, i.e., peak flowering time for grassland ecosystems is considered between October and April.

9.1.1.2 Fauna

The following assumptions and limitations are applicable to the Faunal Assessment:

- The faunal assessment is confined to the proposed study area but the immediate surroundings were however taken into consideration in terms of faunal habitat utilisation and movement patterns. The entire study area and immediate surroundings were included in the desktop analysis.
- The report will only focus on the activities associated with the study area, which are underground mining activities. Any other activities related to the Harmony Target mining right area (i.e., refurbishment of existing infrastructure) is not associated with the scope of work for this report;
- With ecology being dynamic and complex and the habits of many faunal species, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered

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sufficient to allow informed decision making to take place and facilitate integrated environmental management;

- Due to the nature and habits of many faunal taxa, it is unlikely that all species or classes would have been observed during a field assessment. Therefore, site observations were compared with literature studies where necessary;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the footprint area may therefore have been missed during the assessment;
- For the faunal SCC assessment, the most recent Regional Red Data Book of Birds of South Africa, Lesotho, and Eswatini (Lee et al., 2025) was consulted. However, as this publication is not yet reflected in the South Africa National Biodiversity Institute (SANBI) database, the precautionary principle was applied, and the highest conservation status from either source was used in this report;
- One site assessment was undertaken which took place on 10th of December 2025 (summer season). A more comprehensive assessment would require that assessments take place across several seasons of the year. However, given the largely transformed nature of the site, multiple assessments were not deemed necessary. Additionally, on-site data was augmented with all available desktop data and specialist experience in the area, and the findings of the assessment are considered to be an accurate reflection of the ecological characteristics of the study area.

9.1.2 Freshwater and Aquatic

The following assumptions and limitations are applicable to the Freshwater and Aquatic assessment:

- The determination of the freshwater ecosystem boundaries and the assessment thereof, is confined to the reaches of the freshwater ecosystems that traverse the study area and associated investigation area;
- Delineations depicted in the report are largely based on a desktop analysis with limited site verification. As a result, the delineations within this report can only be used as part of the underground mining application, as it was assumed that the existing surface infrastructure would be used. If additional surface infrastructure is required, a more detailed site verification will need to be undertaken;
- The study and investigation areas and their immediate surrounds have undergone historical transformation including agriculture, urbanisation and current and historic mining activities. As a result, various areas within the study and associated investigation area displayed transformed topography, soil profiles and runoff patterns within the landscape. As such, these disturbances have likely resulted in alterations to the hydroperiod of the identified freshwater ecosystems;
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the study area at the scale required to inform the EA process. However, the information is considered to be useful as background information to the study;
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater ecosystems will need to be surveyed and pegged according to surveying principles and with surveying equipment;
- Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundaries may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results;
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. It is, however, expected that the freshwater ecosystems that may be affected by the

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proposed underground mining operation have been accurately assessed and considered, based on the site observations undertaken in terms of freshwater ecosystem ecology; and

- To ensure that our turnaround time meets expectations diatom analysis and identification is done on "live" diatom samples. There are no limitations through the use of "live" samples with accurate analysis and identification of samples and as such results for the report are considered accurate. There is no substantial impact on the validity of the final conclusions drawn in this report.

9.1.3 Hydrological

The Hydrological Impact Assessment has been conducted based on the assumption that the proposed conceptual Stormwater Management Plan will be fully implemented. At this stage, the timeline and sequence of Project activities remain preliminary. As a result, the potential for interactions or cumulative effects between different hydrological impacts cannot yet be fully assessed and may evolve as the Project design is refined.

9.1.4 Hydrogeological

The groundwater assessment was based on, historical monitoring data, existing mine information, previous hydrogeological investigations (including (AquiSim Consulting, 2025), (MvB Consulting, 2026) and (Groundwater Square, 2016) and numerical modelling (AquiSim Consulting, 2025) undertaken for the Harmony Free State operations.

The available datasets vary in age, spatial coverage and temporal frequency. Recent project and mine information was used where available, while historical information was retained where it provides relevant information on long-term groundwater conditions, groundwater quality trends or mine-water behaviour. The principal limitations affecting the assessment are:

- Groundwater monitoring data are not available at all locations at the same spatial and temporal frequency;
- Existing groundwater-quality impacts associated with Target mine infrastructure pre-date the proposed Jelani development;
- Detailed site-specific seepage rates and source-term characterisation are not available for all existing surface water-management facilities; and
- The contaminant transport assessment therefore incorporates assumptions regarding contaminant source concentrations and seepage conditions.

These limitations have been considered in the conceptual and numerical models and in the interpretation of the impact assessment. Where uncertainty is deemed important to the assessment outcome additional monitoring or site-specific investigation has been recommended. The assessment is regarded suitable for identifying and assessing the potential groundwater impacts associated with the proposed development subject to monitoring, source-term characterisation and model-update requirements as identified in this report.

9.1.5 Soil, Land Use and Land Capability (Agriculture)

For the purpose of the assessment, the following assumptions and limitations are applicable:

- The information gathered during the desktop assessment must be considered with caution, as inaccuracies and data capturing errors are often present within these databases;

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- The soil survey conducted as part of the land capability assessment was confined to within the study area outline. However, consideration of the immediately adjacent areas was given;
- A detailed investigation of economic aspects pertaining to the current agricultural activities was not undertaken as part of the specialist study;
- Sampling by definition means that not all areas are assessed, and therefore some aspects of soil characteristics may have been overlooked on this assessment; and
- Chemical analysis was not conducted as part of this soil study because the chemistry of the soils is not seen as a limitation, since the soil fertility status can be corrected based on the crop type being cultivated.

9.1.6 Air Quality

The key assumptions, limitations and exclusions of the study are given below:

Assumptions:

- Data/information provided by the client and used as input into the model were assumed to be accurate and complete at the time of modelling.
- Dustfall buckets from Harmony Gold's monitoring network are located at the Allanridge silos, the Nyakallong residential area and the exiting Target and Freddies 9 TSFs. It is assumed that the background dust fallout rates reported are representative of the ambient conditions at the JV project site as well as at the No. 2 and No. 3 Shafts.
- Dustfall emissions from nearby background emission sources surrounding the project site are already included in Harmony's dustfall monitoring data. Therefore, no modelling of background emissions was undertaken.
- Cumulative impacts were estimated based on a sum of the maximum predicted/modelled concentrations at the shaft boundaries and the average monitored dustfall rate in the July 2024 – June 2025 period from the Harmony dust buckets. The methodology used to assess cumulative impacts (i.e., sum of background and modelled concentrations) is in accordance with the dispersion modelling regulations (DEA, 2014).
- Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.
- Construction was assumed to occur during the day for 10 hours a day for 7 days a week, to represent the worst-case scenario.
- A phased construction approach was assumed, given that the construction activities are expected to extend over a 45-month period.
- 40% control efficiency was applied to construction activity, due to the assumed use of water sprays to mitigate dust during construction.
- Maximum height of release for the construction area was assumed to be 0.5m since construction occurs at ground level.
- A conservative approach was undertaken where emissions associated with all construction activities were assumed to be covered under Heavy Construction Activity. In other words, emissions were not calculated separately for each individual activity.

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- Wind erosion from the exposed areas (WRDs) was assumed to occur for 24 hours a day for seven days a week.
- Maximum heights of the WRDs were estimated from Google Earth.
- All hauling and material handling activities (truck loading/offloading) during operational phase 1 were assumed to occur for 10 hours a day for 7 days a week, based on information provided by the client.
- All conveyor transfer and material handling activities during operational phase 2 were assumed to occur for 16 hours a day for 7 days a week, based on information provided by the client.
- The conveyor transfer and haul routes planned to be used for the transfer of ore from the No. 2 and 3 Shafts, respectively, were identified from the technical report prepared for the JV Project by Bara Consulting in April 2026.
- The haul road was conservatively modelled as unpaved for the purposes of the air quality assessment. This approach represents a conservative, worst-case assumption with respect to fugitive dust emissions from vehicle travel along the haul road.
- Mitigation measures that were included in this study for the operational phase are as follows:
    - water spraying on the unpaved haul route (assumed to achieve at least 40% control efficiency.
    - 30% control efficiency associated with the WRDs due to rocky nature of waste rock material.
- Material throughputs for the No. 2 and No. 3 Shafts were estimated based on the mining schedule provided by the client in the technical report. For dispersion modelling purposes, average hourly material throughputs were calculated for each operational phase by distributing the scheduled annual-average material throughput over the expected hours of operation.
- The dimensions of the haul trucks were based on the specifications provided for a CAT AD30 ADT, which is similar in capacity to the trucks that will be used at the mine during operational phase 1.
- Dimensions, exact locality and footprints of the remainder of the sources were assumed based on information provided by client. Where information was not provided or was unknown, assumptions were made.

Limitations:

- Emission sources included in the model are limited to the surface mining activities associated with the proposed mine.
- Detailed information for each emission source is required for input into the model, such as the dimensions, material throughputs, material characteristics and the exact locality of the sources. In some instances, not all these details are known. To account for the emissions, assumptions and estimates were made where necessary.
- The study is limited by the amount of detailed information that could be provided at the time of modelling.

Exclusions:

- Activities that are not associated with the proposed project and occur outside the scope of the proposed operations were not included in the assessment. These may include any potential background emission sources. The assessment focused on the impact of emissions attributable to emission source activities associated with the proposed mine, specifically.

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9.1.7 Climate

The Climate Change Assessment has been prepared using the information available at the time of writing and the level of Project definition reached at that stage. The assumptions, limitations and exclusions described below establish the basis on which the findings and risk ratings should be interpreted. They reflect the current stage of Project development and the availability and resolution of climate and Project-specific information, rather than deficiencies in the Assessment. The data assumptions adopted in the quantification of the greenhouse gas inventory are detailed separately in Section 4.3 of the Climate Change Assessment, together with the limitations attaching to them, and are not repeated here. The findings should therefore be regarded as proportionate to the current level of Project definition and reviewed as the Project progresses through detailed design and operation.

Climate projections for the Project area are based on the South African Green Book and associated CSIR high-resolution municipal-scale projections, which remain based on CMIP5 simulations under the RCP 4.5 and RCP 8.5 pathways. Although CMIP6 represents the latest generation of global climate models, equivalent downscaled municipal-scale projections were not available for the Project area at the time of the Assessment. The CMIP5 projections therefore represent the most appropriate high-resolution dataset currently available for the Project. RCP 8.5 is considered a high-end scenario rather than a central representation of future emissions trajectories; accordingly, results under this pathway are interpreted as an upper-bound risk scenario rather than a prediction of the most likely future. The Green Book modelled baseline also exhibits a pronounced wet bias relative to observed rainfall in the Project area. Its rainfall outputs have consequently been used primarily to assess the direction and relative magnitude of projected change rather than absolute rainfall totals. Confidence in projections of localised convective hazards, including hail and lightning, and extreme wind is lower than for temperature and mean rainfall. These hazards have therefore been assessed primarily using present-day exposure and regional hazard characterisation.

The 2050 projection horizon extends beyond the anticipated fourteen-year full-production life of the Project. This horizon has nevertheless been retained as it provides the most appropriate available municipal-scale projection period for assessing climate risks across the Project lifecycle, including construction and operation. The ThinkHazard! outputs presented in Section 8.1 of the Climate Change Assessment have been used for regional hazard screening and contextualisation only. As these datasets are based on globally standardised information and generic thresholds, they do not constitute project-level risk assessments. Where regional screening results differ from the site-specific assessment, the site-specific ratings presented in Section 8.5 govern of the study.

The Assessment relies on Project information available at prefeasibility level, including engineering parameters, infrastructure layouts, power demand estimates, ventilation and refrigeration requirements and stormwater design criteria. These parameters remain subject to change during detailed design and any risk arising from a material design assumption should be reassessed once the relevant design has been confirmed. Site-specific hydrological modelling has been undertaken separately for the Project (Kongiwe Environmental, 2026) and its findings are relied upon in this Assessment. Storm rainfall depths in that study derive from historical rainfall statistics and incorporate no allowance for projected changes in intensity. The design outputs should accordingly be understood as representing present-day conditions, with Section 8.3 addressing the implications of projected intensity increases for the operating margins those designs carry.

The Assessment also considers the Project's dependence on infrastructure and systems outside Jelani's operational control, including the receiving tailings storage facility, Target No. 1 metallurgical plant, shared ventilation and cooling infrastructure at the Target No. 4 and No. 5 Shafts, and the Eskom bulk electricity supply.

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These dependencies have been assessed in terms of the Project's exposure and the assurance required to manage that exposure; the design adequacy, condition and climate resilience of the underlying assets have not been independently assessed where the necessary information was unavailable or responsibility rests with another operator.

International literature has been used primarily to establish climate-risk mechanisms and pathways where South African evidence is limited, particularly for pumping, dewatering, hoisting and water supply. Such evidence has not been directly transferred to the Project as a measure of impact magnitude; hazard characterisation and significance have instead been informed by South African, provincial and site-specific information. Coastal flooding, storm surge, sea-level rise, tsunami and volcanic activity have been excluded as non-credible hazards at the Project location. Tropical cyclones have similarly been excluded as a direct hazard due to the inland location, while the potential for remnant tropical systems to contribute to extreme rainfall has been retained within the assessment of that hazard. Fugitive emissions of refrigerant gases from the Project's refrigeration and ice plant have been excluded from the greenhouse gas inventory due to data limitations, as the refrigerant type, charge and leakage rate had not been confirmed at the time of the Assessment. Transition risks have been considered at a strategic level, but no quantitative modelling of carbon prices, electricity tariffs or commodity market scenarios has been undertaken.

Finally, the Assessment represents the climate risk position at the date of issue. Climate projections, regulatory requirements, engineering designs and operational conditions will continue to evolve. The findings should therefore be incorporated into ongoing environmental and operational risk management and periodically reviewed as updated climate information becomes available, the regulatory framework under the Climate Change Act is implemented, and detailed design and operational information are confirmed. Where material changes to Project design, operating conditions or the underlying climate evidence occur, the relevant risk assessments should be revisited.

9.1.8 Heritage and Palaeontology

Geological maps primarily focus on the lithology and structural geology of an area, and their accompanying sheet explanations were not intended to emphasise palaeontological heritage. Many remote regions of South Africa remain unexplored by palaeontologists, with available data often derived solely from aerial imagery. Furthermore, fossil locality and geological data stored in museum and university collections are frequently outdated or were historically recorded with limited accuracy.

To supplement these gaps, comparable Assemblage Zones and geological formations from better-studied regions are often referenced to infer the potential for fossil presence in previously undocumented areas. In desktop studies, it is typically assumed that fossil heritage may be present where similar stratigraphy is exposed. However, a field-based assessment is essential to validate and refine these assumptions, thereby enhancing the accuracy of the palaeontological sensitivity rating.

9.1.9 Ground Vibration

The following assumptions have been made:

- The project will use existing infrastructure to access the mining area, with no new surface developments required.

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- The blast impact is calculated from the cumulative charge mass per delay determined by the three most likely blast design parameters to be blasted simultaneously.
- It is assumed that no more than one (1) stoping panel, one (1) development end, and one (1) decline development panel will be blasted simultaneously without any time delays between them.
- The anticipated levels of influence estimated in this report are calculated using standard accepted methodology according to international and local regulations.
- The assumption is made that the predictions are a good estimate with significant safety factors to ensure that expected levels are based on worst-case scenarios. These will have to be confirmed with actual measurements once the operation is active.
- The work done is based on the author's knowledge and information provided by the project applicant.

9.2 Aspects for Inclusions as Considerations of the Environmental Authorisation

Should the DMPR grant EA for this project, it should be subject to the following conditions:

- Minimise the extent of an impact during the life of the Proposed Project.
- Maintain a state of Environmental Quality following completion of the Proposed Project.
- Ensure appropriate restoration of areas affected by the Proposed Project.
- Prevent long term environmental degradation.
- The project may not commence prior to the EA being issued;
- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements;
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EMPr. Such persons must be issued with a written mandate by Jelani management to provide guidance and instructions to employees and contractors;
- Jelani must undertake external auditing of the environmental performance as per the conditions of the Environmental Authorisation and provide the DMPR with a copy of the auditing report;
- The Applicant must report to the Department, with reason, if requirements of the EA have not been met.
- Stakeholder engagement must be maintained throughout the life of the project, with an emphasis on the continuous provision of information.
- A community forum should be implemented by Jelani, with the aim of engaging Stakeholders and the public;
- Implement the stormwater management plan;
- All necessary authorisations must be in place prior to commencement of the project activities.
- All employees and contractors should receive induction that includes an environmental awareness component (noise). This is to allow employees and contractors to become aware of the potential noise risks that activities pose to the surrounding environment.
- The Applicant must maintain all financial responsibility throughout the life of the project, including monitoring.
- The Applicant must ensure that there are sufficient funds set aside to complete the project fully.
- Management and Monitoring plans contained in the EMPr must be strictly adhered to.
- A Chance Find procedure for heritage resources and artefacts needs to be in place.
- The mitigation and monitoring measures recommended by specialist assessments are to be implemented fully.
- Undertake rehabilitation activities as per the approved rehabilitation plan for the site.

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- The first phase (five years) of the SLP must be implemented. Subsequent SLP renewals or amendments must be undertaken in accordance with applicable legislative requirements.
- The EIA and EMPr Report is a dynamic document. Since Proposed Project will be implemented in phases over a number of years, it is recommended that the EIA and EMPr Report be updated, especially for the areas that will only be mined years after the start of the project.
- The groundwater monitoring programme described in this report shall be implemented prior to and throughout construction, operation and closure of the Jelani Project;
- Groundwater levels and groundwater quality shall be monitored at representative monitoring points, including identified third-party groundwater receptors where appropriate;
- Monitoring results shall be compared against established baseline conditions and defined trigger levels;
- Where monitoring identifies a prolonged or significant deterioration in groundwater quality or groundwater levels attributable to the project, the cause shall be investigated and appropriate corrective measures implemented;
- The groundwater monitoring network shall be reviewed periodically and updated where monitoring results, mine development or changes in groundwater conditions indicate that additional monitoring is required;
- The groundwater model shall be reviewed and updated at least every two years, or sooner where new relevant information, changes in mine development or material deviations from model predictions occur;
- Existing Target Mine sources that may contribute to cumulative groundwater impacts shall continue to be managed by the responsible operator and incorporated into future cumulative groundwater assessments;
- Site-specific seepage and source-term characterisation shall be undertaken where required to refine the assessment of contaminant loading from mine water infrastructure.
- Energy and emissions management. Implement ventilation-on-demand, high-efficiency motors and pumps, efficient lighting and optimised compressed-air systems. Investigate renewable energy supply, wheeling arrangements and power purchase agreements, given that grid electricity governs the footprint. Develop a progressive emissions reduction plan with defined targets and establish greenhouse gas monitoring and reporting aligned to the Carbon Tax Act and to future carbon budget requirements.
- Confirm the generating plant. Confirm the fuel type, rated capacity and expected duty of the proposed on-site generating plant. At 5 MVA the implied rated thermal input exceeds the 10 MW(th) threshold for IPCC category 1A2i, which is assessed on rated capacity irrespective of utilisation, and may attract carbon tax liability.
- Heat and ventilation resilience. Reassess the ventilation and cooling design against projected surface temperatures rather than historical design conditions, and confirm that sufficient margin and redundancy exist at the No. 4 and No. 5 Shaft fan installations. Implement thermal work limits, acclimatisation protocols, hydration provision and heat-stress monitoring for underground and surface personnel.
- Stormwater and flood management. Verify the stormwater and dirty water containment designs against short-duration rainfall intensities that incorporate a climate change allowance, and implement the separation measures recommended in the hydrological assessment. Operate the return water dam complex at a level that retains capacity for the design event, and undertake post-storm inspection of the bypass channel and lined works.
- Tailings deposition assurance. Formalise assurance over the receiving tailings storage facility through the agreements governing access to it. Obtain visibility of the operator's monitoring data and management systems, confirm that the facility is designed and operated in accordance with the Global

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Industry Standard on Tailings Management, and identify contingency measures to be applied should deposition be curtailed.

- Occupational solar ultraviolet exposure. Implement a solar ultraviolet exposure control programme for surface personnel, including shade provision at fixed work positions, appropriate personal protective equipment and scheduling of outdoor work away from peak irradiance periods.
- Wildfire and severe weather preparedness. Maintain firebreaks and manage vegetation around the shaft and ventilation infrastructure and establish coordination protocols with local emergency services and with the Nyakallong community. Confirm lightning protection, surge protection and post-storm inspection protocols for surface electrical and control systems.
- Inventory refinement. Refine the greenhouse gas inventory as Project-specific information becomes available, in particular measured fuel consumption, the confirmed electrical load schedule, refrigerant type and charge for the quantification of fugitive emissions, and finalised design parameters. The inventory should be recalculated using the applicable emission factors for each future reporting year.
- Monitoring and periodic review. Monitor climate indicators, infrastructure performance and critical dependencies as part of the Project's environmental and operational risk management processes. Review this Assessment where material changes occur to Project design, operating conditions, the underlying climate evidence or the regulatory framework, and in any event periodically over the life of mine.

9.3 Propose Management Objectives and Outcome for Inclusion in the EMPr

The EMPr is compiled with the aim of achieving a required end state that, as far as possible, ensures that environmental quality is maintained. The impact management objectives and outcomes for the Proposed Project are as follows:

- To minimise the negative environmental impacts as far as feasible;
- To maximise the positive and minimise the negative socio-economic impacts;
- To maintain cordial relationships with local residents, authorities and other stakeholders via sustained open communication.
- To capture, contain, treat and recycle all contaminated water arising from the mining operations on site and to prevent the discharge of contaminated water to the environment.

The EMPr describes how activities that have, or could have, an adverse impact on the environment will be mitigated, controlled and monitored. Moreover, the EMPr will address the environmental impacts associated with the Proposed Project. Due regard must be given to environmental protection during the entire Project, and a number of environmental recommendations are made in this regard. These recommendations are aimed at ensuring that the contractor maintains adequate control over the Project to:

- Minimise the extent of an impact during the life of the Project;
- Maintain a state of Environmental Quality following completion of the Project;
- Ensure appropriate restoration of areas affected by the Project; and
- Prevent long term environmental degradation.

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9.4 Rehabilitation Requirements

As the mine is an underground mine, there will be no concurrent rehabilitation. Final rehabilitation must be carried out once the underground mining project goes into its closure phase. This final rehabilitation must be carried out within the context of the closure plan.

The principles for proper rehabilitation, which must be followed, are:

- Preparing a comprehensive rehabilitation plan prior to the commencement of all Jelani mining areas.

The objective of the final rehabilitation and mine closure plan, must be measurable and auditable, is to identify a post-mining land use that is feasible through:

- Providing the vision, objectives, targets and criteria for final rehabilitation and closure of the project.
- Outlining the design principles for closure.
- Explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation.
- Detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/ or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure.
- Committing to a schedule, budget, roles and responsibilities for final rehabilitation and closure of each relevant activity.
- Identifying knowledge gaps and how these will be addressed and filled.
- Outlining monitoring, auditing and reporting requirements.

9.5 A Reasoned Opinion: Should the Proposed Project be Approved?

Key findings from the EIA have been incorporated into a high-level summary presented in the risk matrix found in Chapter 8.4.

9.5.1 Conclusions of the report

An impact assessment has been undertaken using qualified specialists, which has incorporated extensive consultation with and participation of interested and affected parties. Applying the hierarchical approach to impact management, alternatives were firstly considered to avoid negative impacts, but where avoidance was not possible, to better mitigate and manage negative impacts. Where impacts were found to be potentially significant, various mitigation measures to manage and monitor the impacts of the project have been proposed.

Although mining activities often generate positive social and economic benefits, they also result in notable negative environmental impacts. Prioritising environmental stewardship, complying with relevant environmental legislation and implementing specialist recommendations and sustainable operational practices will be required to minimise its environmental footprint and reduce ecological impacts as far as possible while balancing the economic and social benefits.

The findings of the impact assessment indicate that the Proposed Project would result in several negative environmental impacts, primarily during the operational phase, however, none of the specialist studies identified any fatal flaw to the project. Scientific specialist mitigation measures have been included into this EIA and EMPr

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report to reduce the significance of all the identified negative impacts. Most of the negative impacts from the Proposed Project can be reduced to low negative through the implementation of mitigation measures.

Based on the findings outlined in this report, the EAP concludes that the potential negative environmental impacts associated with the Proposed Project can be mitigated to acceptable levels. Therefore, it is recommended that the Proposed Project be authorised to proceed. This opinion holds provided that all the recommendations proposed in the specialist studies and the EIA and EMPr report as well as legislative requirements are implemented and adhered to.

10.Financial Provisions

10.1.1 Purpose and Application of this Chapter

This section presents a structured risk assessment of the planned closure and unplanned (premature) closure of the surface works that are costed in the Jelani Class 5 Rehabilitation Cost Estimate (Rev 00, 20 March 2026). It is written for inclusion in the Environmental Risk Report and Final Rehabilitation, Decommissioning and Mine Closure Plan required under the Financial Provisioning Regulations, and to support the Mining Work Programme submitted with the Mining-Right application.

The assessment is written from a risk-management perspective. It identifies the sources of harm that can arise when the Class 5 surface works are decommissioned, the pathways by which those sources can reach environmental and social receptors, the likelihood and consequence of those events, and the controls required to reduce residual risk to a level that is acceptable to the Competent Authorities and to adjacent land users.

The assessment is deliberately confined to the Class 5 estimate. It does not assess underground mining, Harmony-owned Target shaft infrastructure, the Target metallurgical plant, any new tailings storage facility on the Loraine/Target mining right, or socio-economic impacts of the mining operation itself. Those elements sit outside the battery limits of the Class 5 quantum and of this chapter.

10.1.1.1 Objectives

(a) Identify and rank environmental, social, health, safety, financial and reputational risks associated with planned end-of-life removal of the four seismographic stations and associated tracks, fencing and small disturbed pads.
(b) Identify and rank the additional risks that arise if the project ceases earlier than planned (unplanned or premature closure) while the stations and tracks are still in place.
(c) Distinguish operational-phase risks that persist into closure from risks generated by the closure activities themselves.
(d) Define residual and latent risks that must be carried in the Environmental Risk Report and in the quantum of financial provision.
(e) Confirm that the Class 5 quantum (R 1 480 314.57 excluding VAT; R 1 702 361.76 including VAT) is proportionate to the residual closure risk of these works.

10.1.2 Project Closure Context

Jelani is the joint-venture vehicle of White Rivers Exploration and Harmony Gold. Underground gold (and associated) mineralisation will be accessed exclusively through refurbished Target No. 2 and Target No. 3 shafts located on Harmony's existing, fully permitted Loraine/Target mining right. No new shafts, declines, plants,

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tailings facilities, waste-rock dumps or bulk surface infrastructure will be constructed on the Jelani mining-right area. Ore will be hoisted and processed on Harmony ground.

The only new surface works proposed on the Jelani right, and the only works costed in the Class 5 rehabilitation estimate, are four seismographic monitoring stations installed along the shared boundary with Harmony Target. Their purpose is to monitor mining-induced seismicity and boundary interaction. Each station comprises:

(a) A small sensor pad / housing of approximately 5–10 m².
(b) Basic power and communications equipment.
(c) Approximately 6 m of perimeter fencing per station (24 m in total); and
(d) Short gravel access tracks totalling approximately 1 km at 4 m wide, costed in the estimate at 8 748 m² to allow for turning heads, drainage and localised widening.

General surface rehabilitation is costed at 0.04 ha (the combined pad footprints). Aftercare maintenance and monitoring is costed against 8 ha, which is a conservative envelope around the tracks and stations rather than a contiguous disturbed block.

Table 10-1: Class 5 quantum summarised

No.	Description (Class 5 estimate)	Quantity	Amount (ZAR)
3	Rehabilitation of access roads	8 748 m²	R 616,354
10	General surface rehabilitation / grassing of denuded areas	0.04 ha	R 8,713
12	Fencing (removal)	0.40 ha eq.	R 99
14	Decommissioning of seismographic monitoring stations	4 No.	R 420,000
15	Maintenance and monitoring	8 ha	R 232,068
	Sub-total 1		R 1,277,234
	P&G (12%) + Contingency (10%) + weighting adjustment		R 203,080
	Sub-total 3 (financial provision excl. VAT)		R 1,480,315
	VAT at 15%		R 222,047
	Grand total incl. VAT		**R 1,702,362**

Table 10-1– Class 5 rehabilitation quantum that defines the battery limits of this risk assessment (rounded).

Items 1, 2A/2B, 4A/4B, 5, 6, 7, 8A–8C, 9, 11 and 13 of the standard DMPR master-rate schedule are zero. That is a project fact, not an omission: there is no plant, no building stock, no shaft collar, no waste deposit and no river diversion on the Jelani mining-right area.

10.1.3 Conclusion

Planned closure of the Jelani Class 5 surface works is a small, conventional clean-up: four instrument pads, a short length of farm track and a few tens of metres of fence. No planned-closure risk is a fatal flaw. After the controls that the Class 5 estimate already funds, residual significance is Low or Very Low across the register.

Unplanned or premature closure does not change the source term. It only changes the duration for which pads, batteries and tracks might stand unattended. That case is controlled by holding the existing quantum in a callable instrument and by a short premature-closure protocol written into the EMPr. No High or Very High unplanned-closure risk has been identified for these works.

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The Class 5 rehabilitation cost estimate of R 1,480,314.57 excluding VAT (R 1,702,361.76 including VAT) is proportionate to the risk. The estimate correctly sets every major DMRE master-rate item (plant, buildings, shafts, waste deposits, river diversions, water treatment) to zero, because those features do not exist on the Jelani mining-right area. This risk assessment does not identify any excluded activity that should now be added to that quantum.

Two interface matters sit outside the rand value but inside the management system: a written handover protocol with Harmony Target before any boundary station is isolated, and surface-use agreements that give each host landowner a callable right to require removal. Both should be captured in the EMPr.

Until as-built quantities are known, the residual significance of C-02 (track erosion) and U-01 (orphaned stations) should be treated as not lower than Low, and financial provision should not be reduced below the current Class 5 quantum. There is no basis, on the information in the project description, the Mining Work Programme and the Class 5 estimate, to increase it.

11.Oath Undertaking

11.1 Undertaking Regarding Correctness of Information

The EAP hereby confirms:

- The correctness, to the best of his knowledge, of the information provided in the specialist reports and on information provided by Jelani. The information was accepted as being as reliable as information generated during an EIA and a feasibility study, and provided in good faith, can be;
- The inclusion of comments and inputs from stakeholders and I&APs;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Kongiwe Environmental (Pty) Ltd

Company Name



Ripfumelo Macevele

Name of the Environmental Assessment Practitioner **Signature**

11 September 2026

Date

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Appendix A: EIA Project Team CV



RIPFUMELO MACEVELE

Environmental Consultant
Kongiwe Environmental

RMACEVELE@KONGIWE.COM

+27 (10) 140 6508

150 BRYANSTON DRIVE
BRYANSTON, SANDTON, 2191
SOUTH AFRICA

PROFESSIONAL REGISTRATIONS

South African Council for Natural Science Professionals (SACNASP) – 2021

Environmental Assessment Practitioners Association of South Africa (EAPASA) – 2023

EDUCATION

2024 - B.Sc. Honours Environmental Management, University of South Africa

2018 - Bachelor of Environmental Sciences, University of Venda

LANGUAGES

English – Fluent
isiZulu – Fluent
Xitsonga – Fluent
Tshivenda – Fluent
Setswane – Fluent

KONGIWE

IMPACT

Ripfumelo is an Environmental Consultant with 8 years of hands-on experience supporting environmental assessments and compliance processes across the mining and infrastructure sectors. He holds a B.Sc. Honours Degree in Environmental Management and is registered with both SACNASP as a Candidate Natural Scientist and EAPASA as an Environmental Assessment Practitioner. His project contributions include Environmental Impact Assessments, Water Use Licence Applications, Environmental Management Programmes, and site-based environmental monitoring and auditing. Ripfumelo is committed to regulatory compliance, technical quality, and building his expertise in environmental management through practical project involvement.

KEY SKILLS

- Environmental Compliance Monitoring and Auditing
- Environmental Impact Reporting and Authorisation
- ECO Field Work and Reporting
- Report Writing
- GIS and Google Earth

SELECTED PROJECT EXPERIENCE

Mining and Industrial Projects – Gauteng, South Africa (2024–Current)

Environmental Consultant
Assisted in the EIA process for multiple mining rights application and mining infrastructure and effluent management projects, including mechanical reclamation of gold-bearing silts and tailings processing facilities. Supported IWULAs through the E-WULAAS portal and conducted authority engagements and stakeholder consultation meetings. Oversaw logistics and ensured compliance across overlapping EIA and WULA processes.

Renewable Energy Projects – Mpumalanga, South Africa (2025–Current)

Environmental Consultant
Contributed to the Basic Assessment process for a large-scale solar PV and BESS project. Responsibilities included environmental screening, regulatory coordination, and stakeholder engagement to support project authorisations.

Environmental Compliance Audits – Mpumalanga & KwaZulu-Natal, South Africa (2024–Current)

Environmental Consultant
Conducted external environmental compliance audits (EMPr, WUL, and WML as well as AEL) across multiple operational mining and manufacturing facilities. Evaluated compliance against authorisations, identified gaps, and proposed practical mitigation and improvement measures to align with legal and corporate environmental standards.

Environmental Assessment Practitioners Association of South Africa

Registration No. 2019/1051

Herewith certifies that

RIPFUMELO CLARENCE MACEVELE

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 April 2026

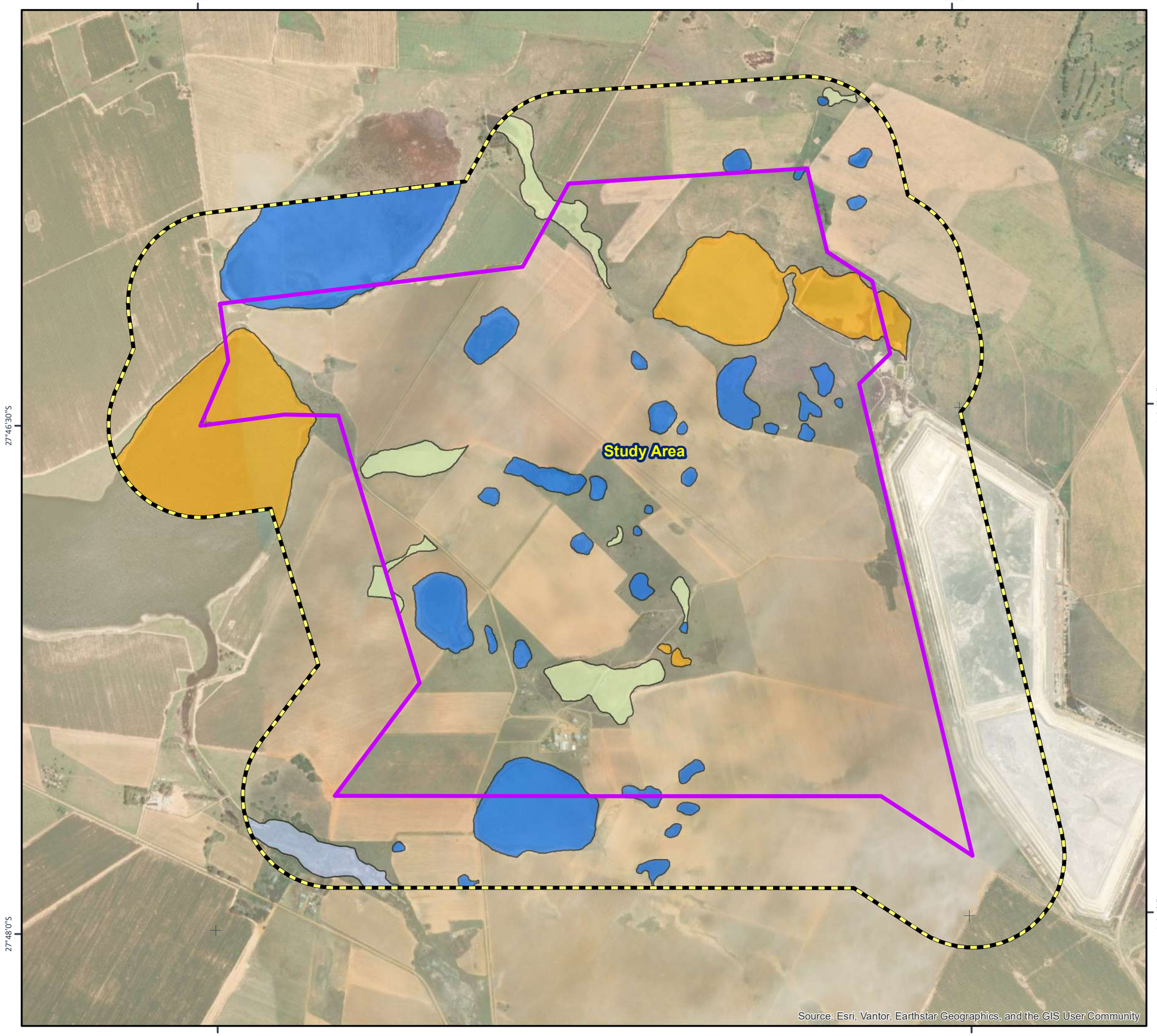
Expires: 31 March 2027

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Appendix B: A3 Maps



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JELANI RESOURCES

FRESHWATER ECOSYSTEMS DELINEATION

Legend

- River
- Investigation Area
- Study Area

Artificial Features

- Artificial Impoundment

Freshwater Ecosystems

- Channelled Valley Bottom (CVB) Wetland
- Depression Wetland
- Seep Wetland

0 0,25 0,5 1 1,5

Kilometers

Project Code: JELA#001
Client: Jelani Resources
Drawn: Z Omar
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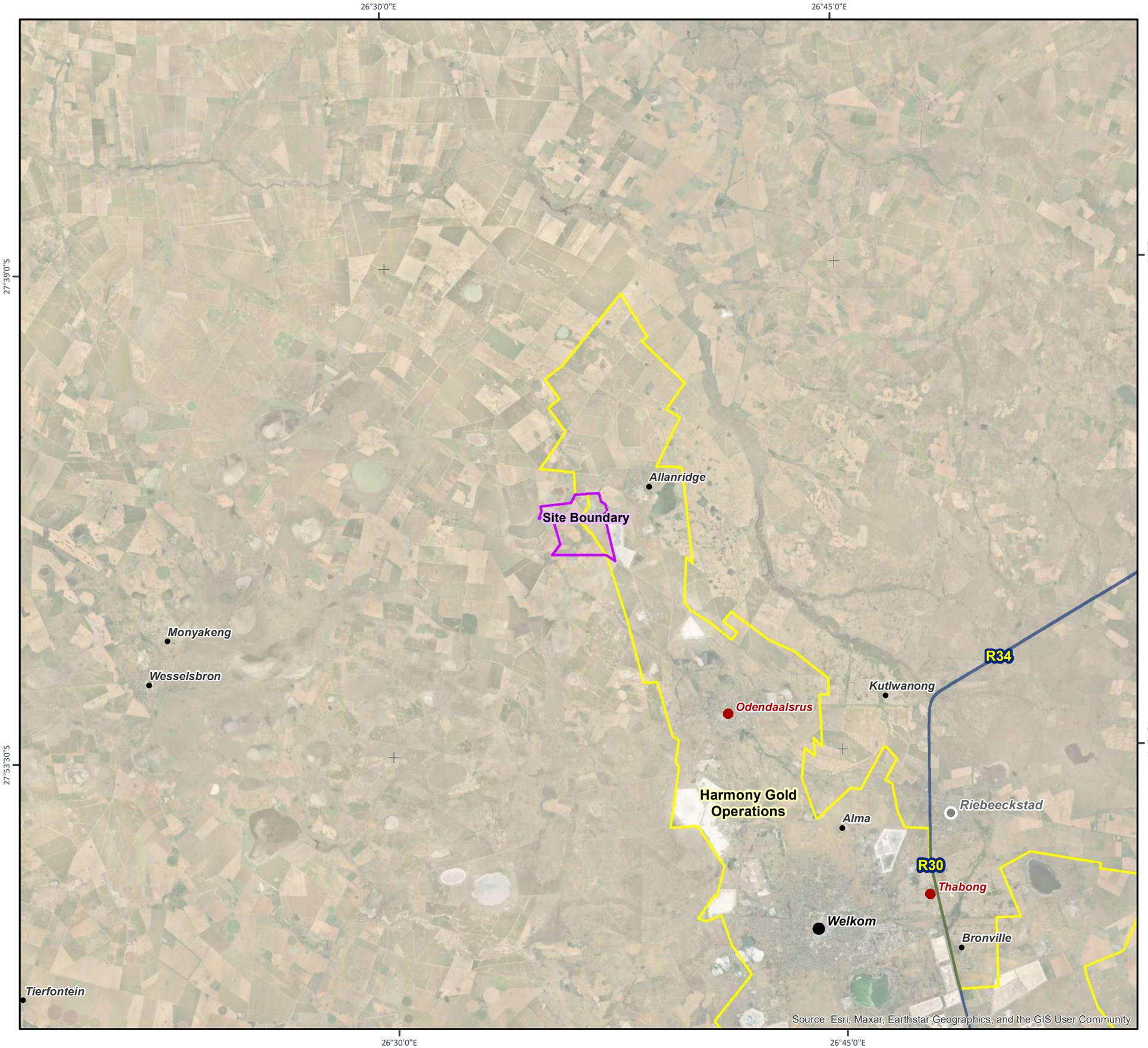
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FILE REF:
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KONGIWE

JELANI RESOURCES

CUMULATIVE IMPACTS

Legend

- Other Settlement
- SecondaryTown
- Major Town
- City
- National Road
- Harmony Operations
- Jelani Resources Boundary

0 2 4 8 12 16

Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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26°34'55"E

26°39'50"E

27°45'0"S

27°49'30"S

Site Boundary

Land Uses

- Barren Land
- Built-up
- Cultivated
- Forested Land
- Grassland
- Mines & Quarries
- Shrubland
- Waterbodies
- Wetlands

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

KONGIWE

JELANI RESOURCES

LAND USE

Legend

Jelani Resources Boundary

0 0.5 1 2 3

Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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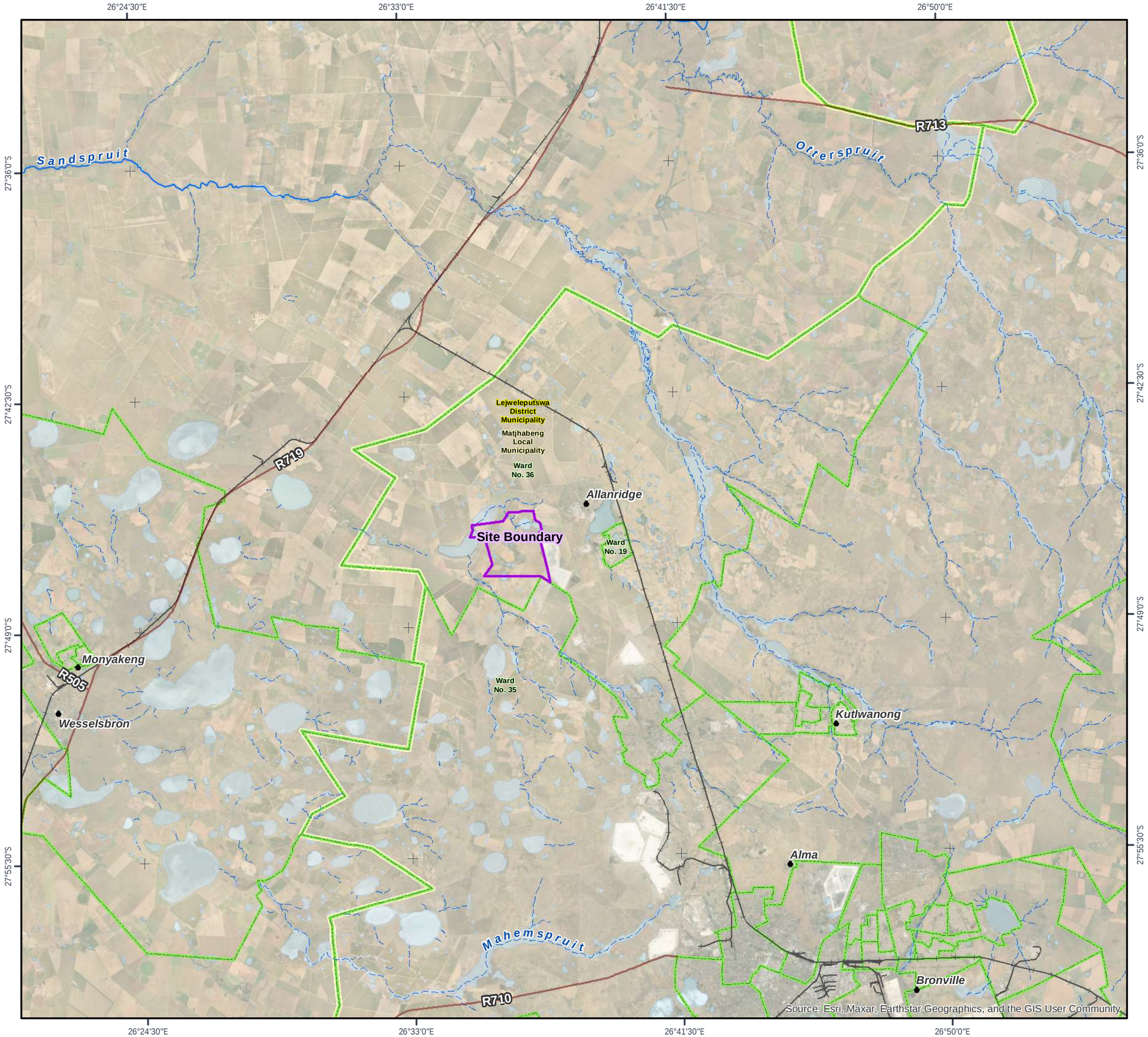
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KONGIWE

JELANI RESOURCES

LOCAL ORIENTATION

Legend

- Other Settlement
- Non-Perennial River
- Perennial River
- Main Road
- Railway
- Jelani Resources Boundary
- Ward Boundary
- Local Municipality
- District Municipalities
- Water Areas

0 1 2 4 6 8 10 12 14

Kilometres

Project Code: MERA#001
Client: Mera Advisers
Drawn: C Strooh | Checked: Z Omar
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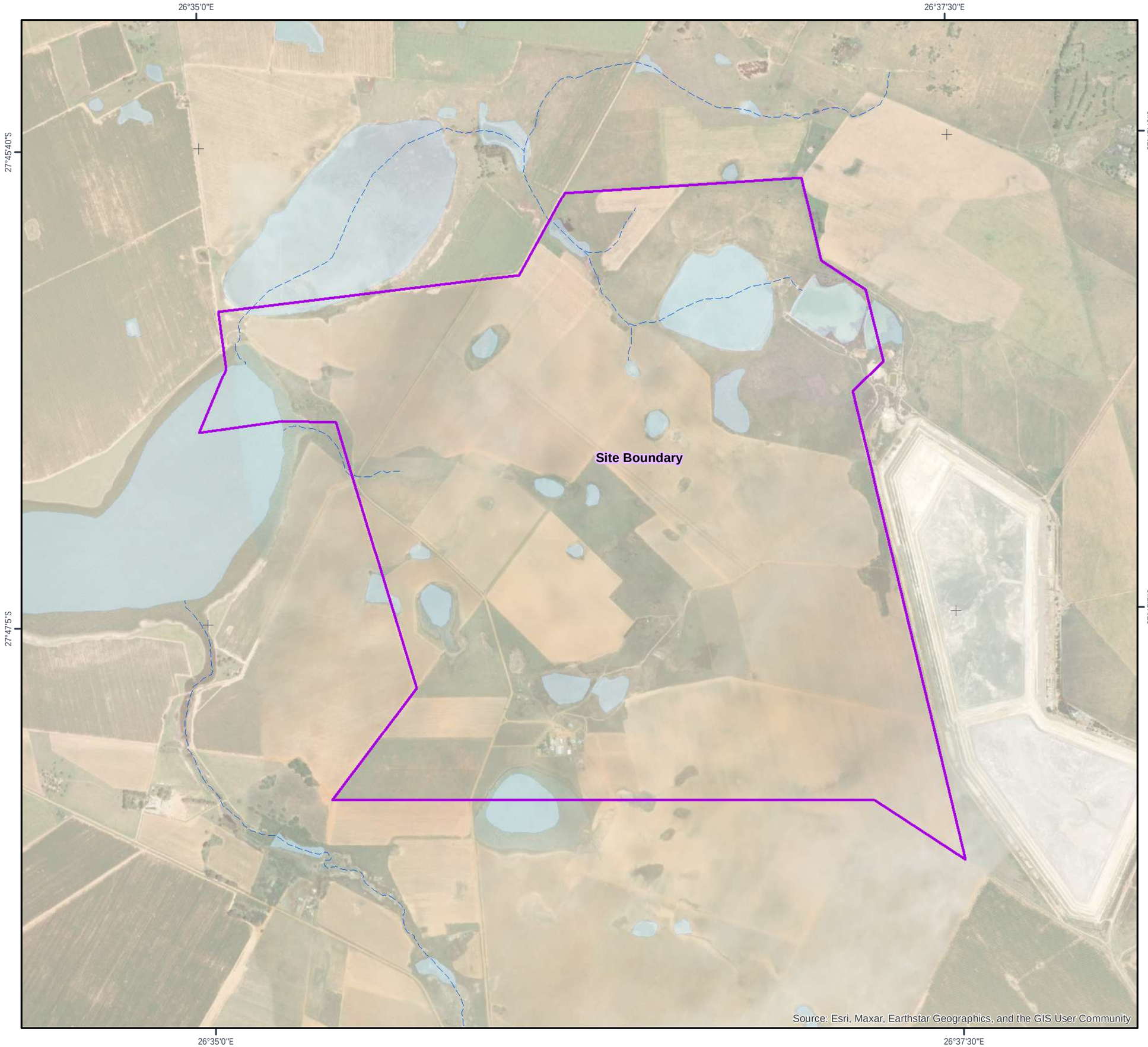
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KONGIWE

JELANI RESOURCES

SITE INFRASTRUCTURE

Legend

- Other Settlement
- Non-Perennial River
- Perennial River
- Main Road
- Railway
- Jelani Resources Boundary
- Water Areas

0 0.25 0.5 1 1.5

Kilometres

Project Code: MERA#001
Client: Mera Advisers
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 17 November 2025

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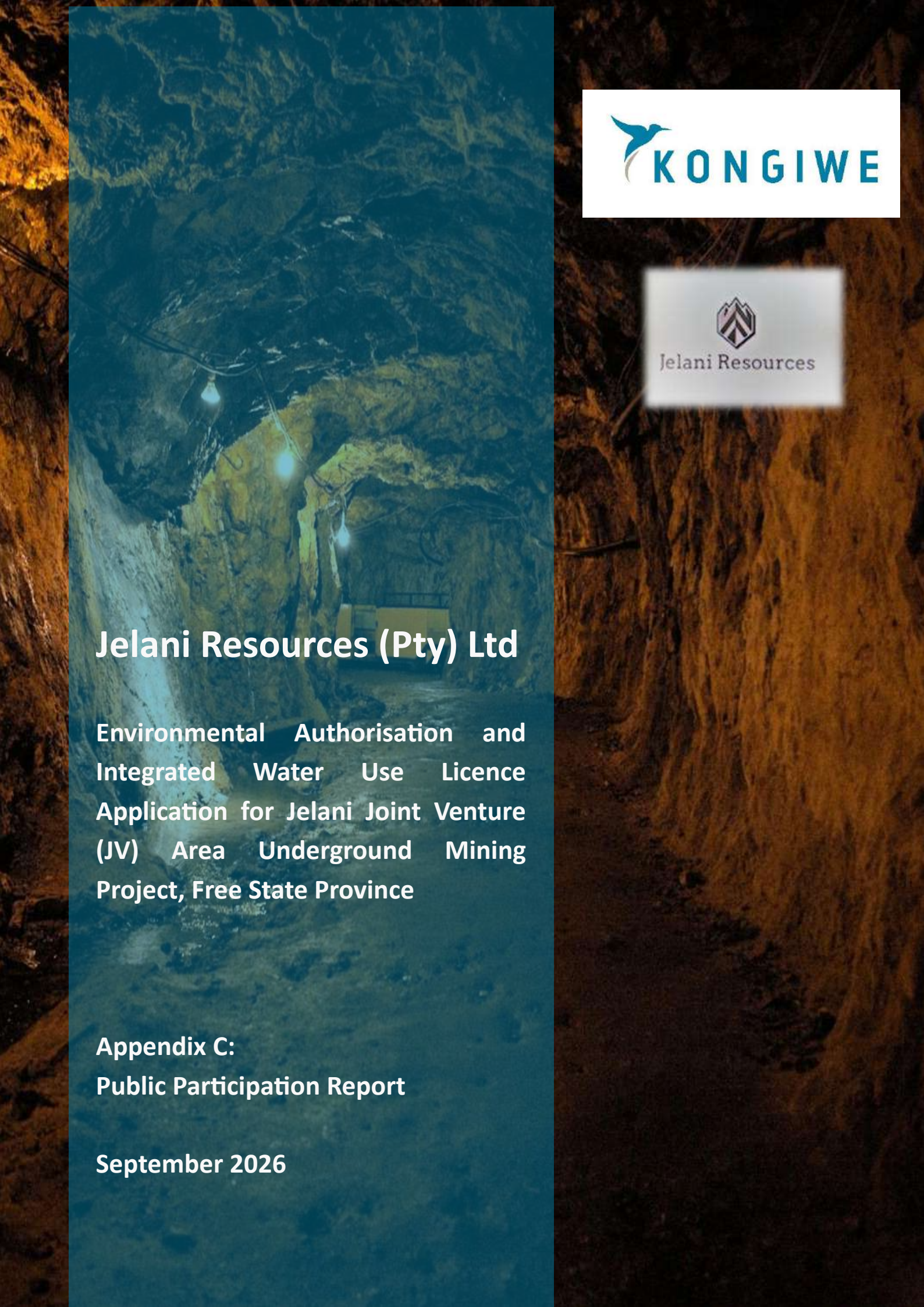
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Appendix C: Public Participation Information



Jelani Resources (Pty) Ltd

Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

Appendix C:
Public Participation Report

September 2026

Report Preparation By

Kongiwe Environmental (Pty) Ltd	
Registration Number	2016/135562/07
Telephone Number	+27 (10) 140 6508
Email	info@kongiwe.com
Registered Address	150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Website	www.kongiwe.com

Report Information

Client	Jelani Resources (Pty) Ltd
Project	Jelani Joint Venture (JV) Area Underground Mining Project
Report Title	Public Participation Report
DMPR Reference No.	FS30/5/1/2/3/2/1(10098) MR
DWS Reference No.	WU50090
Project No.	JELA#001
Compilation Date	September 2026
Status of Report	Public Participation Report for the Draft EIA/EMPr Reports and the Draft IWWMP
Actions	Application for Environmental Authorisation (EA)

Approval

Verification	Name	Capacity	Signature	Date
Compiled by	Vanessa Viljoen	Principal Stakeholder Consultant		2 September 2026
Reviewed by	Ripfumelo Macevele	Environmental Consultant		4 September 2026
Approved by	Bradly Thornton	CEO		9 September 2026

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Abbreviations

Abbreviation	Description
BID	Background Information Document
CA	Competent Authority
CBO	Community-Based Organisation
CRR	Comments and Response Report
DALRRD	Department of Agriculture, Land Reform and Rural Development
DMPR	Department of Mineral and Petroleum Resources
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
FSR	Final Scoping Report
ha	Hectare
I&AP	Interested and Affected Party
IAP2	International Association for Public Participation
IFC	International Finance Corporation
JV	Joint Venture
km	Kilometre
m	Metre
MLM	Matjhabeng Local Municipality
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NGO	Non-Governmental Organisation
PAIA	Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)
POPIA	Protection of Personal Information Act, 2013 (Act No. 4 of 2013)
PPP	Public Participation Process
PR	Prospecting Right
PS	Performance Standard
S&EIA	Scoping and Environmental Impact Assessment
SMME	Small, Medium and Micro Enterprise
SMS	Short Message Service
t/month	Tonnes per month (production rate)
TSF	Tailings Storage Facility

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Reference Documents

References	Description
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	Framework environmental law for South Africa
Environmental Impact Assessment Regulations, 2014 (as amended) (EIA 2014 Regulations)	Regulations under NEMA governing EIAs
Public Participation guideline in terms of NEMA Act No. 107 of 1998	Guideline on public participation under NEMA
National Environmental Management: Waste Act, 2008 (Act 59 of 2008)	Waste management legislation
National Water Act, 1998 (Act 36 of 1998)	Water resource management legislation
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA)	Law promoting access to information
Protection of Personal Information Act, 2013 (Act No. 4 of 2013) (POPIA)	Law safeguarding personal information

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1. Project Background and Motivation

Kongiwe Environmental ('Kongiwe') was appointed by Jelani Resources (Pty) Ltd ('Jelani') to compile this Public Participation Report for their proposed mining Project ('the Proposed Project'), which is located adjacent to Harmony Gold Limited's Target Operation (Target). The Proposed Project's centre point is approximately 3 kilometres (km) south-west of the small mining town of Allanridge, and 32 km north of Welkom in the Matjhabeng Local Municipality (MLM), Free State Province.

Jelani is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution). Following the exploration, Jelani intends to initiate underground mining operations within the same area.

The Proposed Project entails the licensing of underground mining activities for various minerals, with a primary focus on gold ore, as well as silver, uranium and other associated minerals.

The project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area.

Project operations will focus on the main horizons within the Central Rand Group of the Witwatersrand Supergroup, which sub-crops against the Ventersdorp Supergroup. It is anticipated that the extensions of these two reefs, together with other reefs, will be economically viable at a depth of between 1,500 and 2,600 metres (m) below surface. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, withshort gravel access tracks provided for each station . These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

2. Public Participation Process (PPP)

The Public Participation Process (PPP) offers stakeholders an opportunity to be informed about the Proposed Project, to raise issues and to make suggestions for enhanced project benefits. The PPP will be undertaken to ensure compliance with the relevant legal framework applicable to the Proposed Project.

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2.1 Applicable Legislation and International Best Practice

The Public Participation Process (PPP), as required by the environmental law and regulations specified therein, is being undertaken in line with the statutory requirements for public participation. The following legislation was considered when developing and implementing the PPP:

- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) (EIA 2014 Regulations).
- Public Participation guideline in terms of NEMA.
- National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEM:WA) and the List of Waste Management Activities (GN R921 of 29 November 2013, as amended).
- National Water Act (Act No. 36 of 1998).
- Protection of Personal Information Act, 2013 (Act No. 4 of 2013) (POPIA).
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA).

NEMA mandates public participation for environmental decision-making, ensuring affected communities have a voice in development projects through the EIA Regulations, 2014. The NEMA Public Participation Guideline (in terms of the EIA Regulations) is a mandatory part of the EA process, aiming for transparent, informed decisions that promote sustainable development by integrating social, economic, and environmental factors.

The NWA is the primary law for the protection, management, and equitable use of the water resources. The NWA establishes the government's role in allocating water resources, promoting sustainable use of water resources, and preventing pollution.

The POPIA regulates the processing of personal information by both public and private bodies, aiming to protect individuals' constitutional right to privacy.

The PAIA gives effect to the constitutional right to access information held by both the state and private bodies. The Act establishes procedures for individuals to request information for the protection or exercise of their rights.

POPIA: Safeguarding Registered Person's Personal Information
In terms of Section 19 of POPIA, a responsible party must, subject to Sections 9 and 11 of the Act, ensure the integrity and confidentiality of personal information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss of, damage to or unauthorised destruction of personal information, unlawful access to or processing of personal information. POPIA requires that personal information should be adequately protected to avoid unauthorised access. Therefore, Kongiwe continuously reviews security controls and procedures to ensure that personal information is secured. It should be noted that in terms of Section 11, personal information may be processed to the extent that this is necessary for pursuing the legitimate interests of the responsible party or parties to whom the information is supplied.

2.2 International Standards

In addition to the above legislation, the PPP is to be aligned to International good-practice guidelines for public participation, particularly in regard to the following Core Values of the International Association for Public Participation (IAP2):

- To be based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
- To include the promise that the public's contribution will influence the decision.
- To promote sustainable decisions by recognising and communicating the needs and interests of all participants, including decision makers.
- To seek out and facilitate the involvement of those potentially affected by or interested in a decision.

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- To seek input from participants in designing how they participate.
- To provide participants with the information they need to participate in a meaningful way.
- To communicate to participants how their input affected the decision.

2.3 Objectives of the Public Participation Process

The PPP is designed to build and maintain constructive relationships. It is an ongoing process between the applicant and the project stakeholders that extends throughout the life of a project. The PPP for the Proposed Project ensures that adequate and timely information is provide to all potentially project affected people and other stakeholders, that stakeholders are given sufficient opportunity to raise comments, and that these comments are taken into consideration during the project decisions.

The PPP objectives for this Proposed Project are to:

- Ensure that stakeholders are informed about the Proposed Project.
- Provide stakeholders with the opportunity to participate in the environmental regulatory processes and provide comment.
- Involve stakeholders in identifying ways in which comments can be addressed.
- Work directly with stakeholders throughout the environmental regulatory processes to ensure that stakeholder comments are consistently understood and considered.
- Verify that stakeholder comments have been recorded and addressed.

The stakeholder engagement process was undertaken in four phases as presented in Table 2-1 below.

Table 2-1: Stakeholder Engagement Activities

Project Phase	Activities to be Undertaken
Pre-Scoping Phase **Completed**	• Pre-Application meeting with the Department of Mineral and Petroleum Resources (DMPR). • Consultation meeting with DMPR, regarding the Social and Labour Plan (SLP). • Stakeholder identification (WinDeed searches, compilation of stakeholder database). • Consultation with communities (within the nearby surroundings of the Proposed Project). • Consultation with the relevant Authorities (including ward councillors/ward committees) (Microsoft Teams/ One-on-one consultation meetings). • Compilation of announcement documents, such as Background Information Documents (BIDs), Registration and Comment Forum, adverts, site notices and Draft Scoping Report (DSR) notification letter. • Obtaining initial comments, suggestions from stakeholders. • Land Claims enquiry.
Scoping Phase **Completed**	• Consultations with Directly and Indirectly Affected Landowners (Consultation meetings). • Distribution and placement of Project announcement materials (site notices, and newspaper advertisements). • Updating of the stakeholder database. • Making available the DSR for public review and comment. • Providing stakeholders with further details of the Proposed Project and associated specialist studies. • Consultations with stakeholders (Online meetings and Open Day meetings). • Obtaining comments from stakeholders on the SLP at the Open Day. • Obtaining further comments or suggestions from stakeholders.

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Project Phase	Activities to be Undertaken
	• Development of Comments and Response Report (CRR), capturing all comments/questions and responses. • Informing specialists and the applicant about comments received from stakeholders. • Making available the Final Scoping Report.
EIA Phase	• Pre-Consultation meeting will be undertaken with the Department of Water and Sanitation (DWS), Free State Province. • Site visit will be undertaken with DWS. • Provide feedback about the specialist studies conducted and mitigation measures proposed by means of consultation with stakeholders. • Provide opportunity for stakeholders to comment on specialist findings, impacts assessments and recommendations. • Make the relevant environmental reports available for public review and comment. • Consultation with stakeholders (Open Day and Online Meeting). • Verify that comments raised by stakeholder have been accurately recorded • Update CRR with new comments, questions and responses. • Inform specialists and the proponent of stakeholders' comments. • Making available the Final EIA / EMPr.
Decision Making Phase EIA	• Once the Competent Authority which is DMPR had come to a decision regarding the authorisation of the Proposed Project, all registered stakeholders will be notified of the decision made and the appeal process will be explained with associated timeframes.
Decision Making Phase WUL	• The IWULA has been submitted to DWS in terms of the NWA. Once DWS has come to a decision regarding the WULA, the DWS will notify the applicant and any person who has objected to the application. Written reasons for the decision will be given.

2.4 Summary of Issues Raised by Stakeholders

Comments raised by stakeholders during the Scoping Phase was included in the CRR, a template of which is presented in **Appendix C10**.

2.5 Public Participation Approach

2.5.1 Submission of the Environmental Authorisation Application

The application for the EA was submitted to the DMPR, which is the Competent Authority (CA) for the Proposed Project on **Tuesday, 21 April 2026**. A pre-application meeting was held with DMPR**.**

2.5.2 Pre-Application Meeting with Department of Mineral and Petroleum Resources (DMPR)

An online meeting was arranged and attended with DMPR officials on **Friday, 6 February 2026 from 08:00 – 09:00**.

The purpose of the meeting was to:

- Present and discuss the Proposed Project details.
- Provide an overview of the Environmental Process and Procedure.
- Provide an overview of the specialist studies.
- Provide an overview of the PPP.
- Present and discuss the Proposed Project Timeframes.

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Information was presented by means of a PowerPoint presentation. Minutes of the meeting were compiled and distributed to Mr Tuwani Monyai, Assistant Director: Mine Environmental Management and to Mr Cedrick Fhedzisani, Deputy Director: Mine Environmental Management. **(Appendix C8)**.

2.6 Submission of the Integrated Water Use Licence Application

The IWULAs process started when the Proposed Project was registered on the DWS' electronic Water Use Licence Application and Authorisation System (e-WULAAS)**.** A pre-application meeting will be held with DWS for the application.

2.7 Stakeholder Mapping and Identification

Stakeholder mapping is a process of identifying stakeholders before a project commences. Identified stakeholders are grouped according to their levels of participation, interest, and influence in a project. These groupings assist in determining how best to involve and communicate to each group throughout the PPP. Project stakeholders are defined as individuals / groups / entities that have an interest in the Proposed Project. Such stakeholders are referred to as Interested & Affected Parties (I&APs).

To ensure a proper representation of all stakeholders, the following identification methods were used as part of the stakeholder identification and analysis process for the Proposed Project:

- Desktop and online research and WinDeed search for the directly affected and adjacent farms.
- Identify and consult with relevant communities (within the nearby surroundings of the Proposed Project).
- Identify and consult with relevant Authorities (DMPR/ DWS).
- Identify and consult with the Matjhabeng Local Municipality (MLM) and the Lejweleputswa District Municipality.
- Identify and consult relevant ward councillors and ward committees for affected wards:
  - Mr Clement Hanisi, Ward Councillor: Ward 36.
  - Mr Paseka Thomas Ramatisa, Ward Councillor: Ward 19. (SLP)
- Consult with adjacent landowners and land occupiers (directly and adjacent affected landowners).
- Consult with the Department of Land Reform and Rural Development (DLRRD), Office of the Regional Land Claims Commissioner: Free State Province.
- Consulting government departments on a National, Provincial and Local level relevant to the Proposed Project.
- Consult with stakeholders who respond to the publication of newspaper advertisements.
- Consult with stakeholders who respond to the distribution of project documentation.

I&APs have been grouped into the following broad categories:

- Landowners and occupiers:
  - With assets within the Project footprint (i.e., directly affected by the Project).
  - With assets adjacent to the Project footprint (i.e., adjacent affected by the Project).
  - Vulnerable persons, including female-headed household heads, children/ youth, the elderly, ethnic minorities, and disabled persons.
- Government: National, Provincial, and Local Municipality Authorities (including ward councillors and ward committee members).
- Parastatals: Various semi-government entities, organs of State.
- Communities: Surrounding communities (community leaders).
- Agriculture and Water: Associations, entities responsible for water management and/or regulation
- Environmental forums.
- Non-governmental Organisations (NGOs) : Environmental organisations.
- Community-based Organisations (CBOs): Community forums.

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- Business and Industry: Small, Medium and Micro Enterprises (SMMEs), mines, as well as industrial and large business organisations.

Updating the stakeholder database from attendance registers from a broad range of stakeholder meetings that were held throughout the process, as detailed in **Appendix C1**.

2.7.1 Land Claims Enquiry

A formal letter of enquiry was compiled and sent to the DLRRD, Free State to **Mr Khomotso Mahlatji**, Office of the Regional Land Claims Commissioner on **Thursday, 14 May 2026**. The letter includes a list of all directly affected properties, which was evaluated to determine if there are land claims, as presented in **Appendix C2**.

Feedback was received from DLRRD by means of a letter dated **Wednesday, 10 June 2026**, indicating that there are **no land claims,** as detailed in **Appendix C2.**

3. Communication and Engagement

3.1 Public Participation Materials: Scoping Phase

Considering the legislative requirements and good practice guidelines, the following documents were developed and distributed to stakeholders. The PPP information materials which were used as part of the Scoping and Environmental Impact Assessment (S&EIA) process.

Background Information Document (BID): The BID, as detailed in **Appendix C3,** were emailed on **Thursday, 14 May 2026**, to I&APs listed on the stakeholder database as illustrated in **Appendix C6.** The BID was made available on the Kongiwe website: (https://kongiwe.com/projects/).

The BID provides the following details:

- An overview of the Proposed Project.
- The PPP to be undertaken in support of the Scoping and EIA process.
- Details about how stakeholders can register as an I&AP and be kept informed about the Proposed Project.
- Invitation to attend an online meeting via Microsoft Teams.
- Invitation to attend an Open Day.
- Contact details of the stakeholder engagement consultants.

Notification Letter with a Registration and Comment Form: An email was sent to stakeholders on **Thursday, 14 May 2026**, to inform them about the Proposed Project. The email also shared details of the Open Day and invited the greater public to formally register as I&APs. A 'Registration and Comment Form' was also provided for stakeholders to use for formal registration as an I&AP and to submit their comments as detailed in **Appendix C3.**

A reminder notification was emailed to further notify stakeholders of the availability of the DSR for public review and comment. The reminder emails served the purpose of reminding stakeholders to attend the Open Day and is presented in **Appendix C6.**

Short Message Service (SMS): An SMS was sent to stakeholders with no access to the internet. Arrangements were made to ensure that these stakeholders had full access to Project documentation. Stakeholders were also notified on when the online meeting and Open Day were held.

Newspaper Advertisements: A newspaper advert was placed in the **Vista,** a local newspaper within the Proposed Project area, on **Thursday, 21 May 2026,** as detailed in **Appendix C4.** The advert included the following details:

- An overview of the Proposed Project.
- Legal framework and details of the competent authorities.

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- How stakeholders can access the Draft Scoping Report for public review and comment.
- Registration as I&APs.
- Invitation to attend an online meeting via Microsoft Teams.
- Invitation to attend an Open Day.
- Contact details of the stakeholder engagement consultants.

Site Notice: The site notice, presented in **Appendix C5**, included the following:

- An overview of the Proposed Project, including a locality map.
- Legal framework and details of the competent authorities.
- PPP to be followed and where relevant information could be obtained.
- Invitation to attend an online meeting via Microsoft Teams.
- Invitation to attend an Open Day and where stakeholders can register to attend.

Photographs and co-ordinates of where the site notices were placed was recorded into in the site notice report, and a site notice map was developed, and is presented in **Appendix C5.**

Telephonic Discussions: Stakeholders were also consulted by means of telephonic discussions where required. These discussions facilitate the process of inviting stakeholders to stakeholder meetings and provide stakeholders with a platform to raise comments and suggestions regarding the Project. Comments raised through telephonic discussions were recorded and addressed by the project team (including the Environmental Assessment Practitioner (EAP) and relevant specialists).

4. Consultation undertaken for the Social and Labour Plan (SLP)

This Section outlines the consultation approach as well as details of consultations in relation to the Social and Labour Plan (SLP).

4.1 Consultation Approach

The consultation approach in regard to identifying a suitable Local Economic Development (LED) project included the following:

- Online Meeting with DMPR.
- Correspondence with the Matjhabeng Local Municipality.
- Broader Public Consultation Meeting: An Open Day was held with the broader public during the public review period.

4.1.1 Online Meeting with DMPR

Kongiwe arranged an online meeting with the DMPR, which was held on Tuesday, 25 November 2025.

The invitation for the meeting was sent to the following DMPR representatives:

- Ms Cecelia Sedutla (DMPR Officer for the Promotion of Access to Information Act (PAIA)).
- Mr Mphatheleni Khomola (DMPR SLP Officer).

The meeting, which took place from 10H00-10H30 on Tuesday, 25 November 2025, comprised the following participants:

- Ms Sedutla.
- Mr. Khomola.
- Mr Neels Hoek (Applicant, Jelani).
- Mr Bradly Thornton (Project Director, Kongiwe).
- Mr Andrew Hamlet (Principal Social Consultant, Kongiwe).

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- Ms Thuli Phakathi (Stakeholder Engagement Consultant, Kongiwe).

The PowerPoint presentation, presented by Mr Thornton, is shown in **Appendix C11**. Minutes of the meeting are included in **Appendix C11**.

In the meeting, Kongiwe was advised that a stand-alone LED project should be identified by the Matjhabeng Local Municipality's LED Department. Ms Sedutla confirmed that discussions with the municipality were necessary to identify suitable projects. She further emphasised that, since the Matjhabeng Local Municipality is responsible for the Integrated Development Plan (IDP), any proposed projects must be aligned with their Integrated Development Plan (IDP).

4.1.2 Correspondence with the Matjhabeng Local Municipality

Kongiwe contacted Matjhabeng Local Municipality's Executive Director of LED (Dr. Sefako Ramphoma) in January 2026 regarding Jelani's proposed funding for a LED project. On Wednesday, 21 January 2026, Kongiwe sent a Background Information Document (BID) to Dr. Ramphoma. This BID is presented in **Appendix C11**.

Following numerous delays to meet, a telephonic meeting was arranged on Monday, 26 January 2026 between Mr Hamlet and Dr. Ramphoma. The email confirming the meeting time is shown in **Appendix C11**. Between 13H00-13H30, Mr Hamlet and Dr Ramphoma discussed the Project and potential LED projects aligned to the Matjhabeng Local Municipality IDP (2024/2025). The discussion was based on the information presented in the BID. Dr. Ramphoma advised that he would liaise with the Ward Councillor for Ward 19 (Cllr Pasaka Ramatisa), in regard to identifying a suitable LED project. Ward 19 is a key labour sending area for the Target Mine.

Following consultation with the Ward Councillor of Ward 19, Dr Ramphoma advised Kongiwe (on Wednesday, 4 February 2026) that a priority LED project was the refurbishment of Nyakallong Community Hall (refer to email from Dr Ramphoma in **Appendix C11**).

On Wednesday, 11 February 2026, Dr Ramphoma confirmed that he presented the LED proposal to the Matjhabeng Local Municipality Executive Committee (refer to email from Dr Ramphoma in **Appendix C11)**.

On Thursday, 19 March 2026, the MLM issued a letter of approval (signed by Dr Vuyo Adonis, Acting Municipal Manager) for Jelani to allocate R1,000,000 to the refurbishment of Nyakallong Community Hall. The letter of approval is shown in **Appendix C11**.

4.1.3 Open Day Notification to Ward Councillors

An Open Day notification letter, presented in **Appendix C11,** was emailed to Cllr Clement Hanisi on Friday, 29 May 2026. Cllr Hanisi shared the Open Day notification via a WhatsApp group that encompassed the communities of **Ward 36 and Ward 19**. Cllr Hanisi also notified Cllr Ramatisa of Ward 19. The Open Day notification letter invited the communities of the two wards to an Open Day facilitated by Kongiwe on **Saturday, 30 May 2026.** The Open Day notification letter presented details of the Project and disclosed the availability of the Draft Scoping Report (DSR) for public review and comment.

4.1.4 Broader Stakeholder Meetings (Open Day)

The SLP was discussed during the broader stakeholder meeting (Open Day), which was held at the **S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge** on **Saturday, 30 May 2026 from 11H00 – 13H00**. Photos of the meeting are shown in Figure 5-1. Information was presented by means of a Poster presentation in English and translated into Sesotho where needed. Details of the SLP (as well as Project description and proposed infrastructure) were presented and discussed.

Copies of the non-technical summary of the DSR were also distributed to stakeholders who attended, presented in **Appendix C3.**

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The purpose of the Broader Stakeholder Meetings (Open Day) was to:

- Present and discuss the Proposed Project.
- Present and discuss the SLP.
- Provide an overview of the specialist studies to be undertaken.
- Present the Public Participation Process.
- Provide an opportunity to raise comments/seek clarity as well as provide input.
- Address comments raised by Stakeholders.



Figure 4-1: Photo of the Stakeholder Meeting held at S.A. Mokhothu Primary School on Saturday, 30 May 2026 where the SLP was presented.

5. Consultation undertaken for the Scoping Phase

This Section outlines the consultation approach as well as details of consultations in relation to the Draft and Final Scoping Report.

5.1 Consultation Approach

Consultation during the Scoping phase aimed at providing stakeholders with an overview of the Proposed Project and to obtain comments to inform specialist studies and project planning. Stakeholders were invited to participate through online and in-person engagements depending on preference. The purpose of these meetings was to discuss the Proposed Project, contents of the DSR, provide stakeholders with an opportunity to raise their comments and to interact with the Project team members. Locality, infrastructure and land tenure maps were displayed and distributed as part of these meetings.

The following meetings were held:

- **Authority Meetings:** Meetings were held with the relevant Authorities.
- **Landowner Meetings:** Consultation meetings were held with directly and indirectly affected landowners.
- **Online Meeting:** Online meeting was held with stakeholders who prefer online engagements.
- **Broader Public Consultation Meeting:** An Open Day was held with the broader public during the public review period (Note: This meeting was the same public meeting discussed in Section 4 for the SLP consultations).

Refer to Table 5-1 below for the schedule of stakeholder meetings.

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Table 5-1: Stakeholder Meetings

Meeting Dates	Stakeholders	Time Slots
In-Person Meetings		
Saturday, 30 May 2026	Broader Stakeholder Meeting (Open Day) held with all sectors of society at S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge, 9490.	11H00 – 13H00
Online Meetings		
Monday, 15 December 2025	Microsoft Teams - Online meeting was held with Adjacent Affected Landowners within a 2km radius to ask landowner consent for the hydrocensus specialist to access properties.	10H00 – 11H00
Friday, 6 February 2026	Microsoft Teams - Online pre-application meeting was held with Competent Authority, Department of Mineral and Petroleum Resources (DMPR) officials.	08H00 – 09H00
Tuesday, 26 May 2026	Microsoft Teams - Online meeting was held with Lejweleputswa District Municipality, Free State.	14H00 – 15H00
Wednesday, 27 May 2026	Microsoft Teams – Online Meeting with indirectly affected landowners and the broader stakeholders.	10H00 – 11H00
Thursday, 28 May 2026	Microsoft Teams - Online meeting was held with Matjhabeng Local Municipality, Free State.	10H00 – 11H00

Focused efforts were made to engage with directly impacted stakeholders (those residents in the Project area), including vulnerable groups at local level. These individuals were consulted directly and via their representatives and other influential people within communities. Meetings were held in a culturally appropriate manner, allowing stakeholders to voice their opinions openly. Stakeholders were given the option to raise issues in the language of their choice and where translation is required, it was provided.

Authorities, NGOs, landowners / land occupiers and community members were engaged to promote attendance, by means of telephonic consultation and distribution of emails and SMS.

A list of meetings and consultations undertaken during the process is detailed in **Appendix C8.**

Minutes of these meetings, along with the presentation materials, were compiled and distributed to all stakeholders who attended, and is detailed in **Appendix C8.**

All comments raised by stakeholders during these meetings were recorded in the CRR, with responses prepared in accordance with the Proposed Project scope and available information, as detailed in **Appendix C10.**

5.2 Stakeholder Meetings Held

5.2.1 Online Meeting with Adjacent Affected Landowners

An Online meeting was arranged and attended by Adjacent Affected Landowners within a 2km radius on **Monday, 15 December 2025 from 10:00 - 11:00.** Information was presented by means of a PowerPoint presentation.

The purpose of the meeting was to:

- Present and discuss the Proposed Project.

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- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
- Provide an opportunity to raise comments/seek clarity as well as provide input.
- Record comments raised and included them in the Comments and Responses Report (CRR)
- Landowner consent for specialist to access properties.

5.2.2 Online Meeting with Lejweleputswa District Municipality: Free State

An Online meeting was arranged and attended by Lejweleputswa District Municipality on **Tuesday, 26 May 2026 from 14:00 - 15:00.** Information was presented by means of a PowerPoint presentation.

The purpose of the meeting was to:

- Present and discuss the Proposed Project.
- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
- Provide you with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and included in the Comments and Responses Report.

5.2.3 Online Meeting with Matjhabeng Local Municipality

An Online meeting was arranged and attended with Matjhabeng Local Municipality on **Thursday 28 May 2026 from 10:00 - 11:00.** Information was presented by means of a PowerPoint presentation.

The purpose of the meeting was to:

- Present and discuss the Proposed Project.
- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
- Content of the Social and Labour Plan.
- Provide you with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and included in the Comments and Responses Report.

5.2.4 Online Meeting with Broader Stakeholders

Formal consultation meeting was held online via Microsoft Teams during the public review period for all stakeholders on the database. This meeting was held on **Wednesday 27 May 2026 from 10H00 - 11H00**. Information was presented by means of a PowerPoint presentation.

The purpose of the meeting was to:

- Present and discuss the Proposed Project.
- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
- Provide you with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and included in the Comments and Responses Report.

5.2.5 Broader Stakeholder Meetings (Open Day)

Broader Stakeholder Meeting (Open Day) was held at the **S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge** on **Saturday, 30 May 2026 from 11H00 – 13H00**, as shown in Figure 5-1. Information was presented by means of a Poster presentation in English and translated into Sesotho where needed.

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Posters with information regarding the Proposed Project Description and information on the SLP, Locality, Infrastructure and the Land Tenure maps were displayed. Copies of the non-technical summary of the DSR were also distributed to stakeholders who attended, presented in **Appendix C3.**

The purpose of the Broader Stakeholder Meetings (Open Day) was to:

- Present and discuss the Proposed Project.
- Present and discuss the SLP.
- Provide an overview of the specialist studies to be undertaken.
- Present the Public Participation Process.
- Provide an opportunity to raise comments/seek clarity as well as provide input.
- Address comments raised by Stakeholders



Figure 5-1: Photo of the Stakeholder Meeting held at S.A. Mokhothu Primary School on Saturday, 30 May 2026 where the Draft Scoping Report was presented.

5.2.6 Availability of the Draft Scoping Report for Public Review and Comment

As part of the Scoping Process, the applicant is required to compile a Draft Scoping Report (DSR) for mining-related activities. The DSR was available for public review and comment from **Thursday, 21 May 2026 to Monday, 22 June 2026.**

A notification of the availability of the DSR for public review and comment was distributed on **Thursday, 14 May 2026** to all stakeholders on the database.

The DSR was available as follows:

- An electronic copy on Kongiwe's website: https://kongiwe.com/projects/.
- A hard copy at the Allanridge Public Library. Contact details are shown in Table 5-2

Non-technical summaries of the DSR were available electronically to all stakeholders on the stakeholder database and distributed in hard copy at the Open Day.

Relevant Authorities received an email with a website link of the DSR as part of the announcement of the Proposed Project.

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Table 5-2: Place where the DSR Report was circulated

Location	Physical Address	Contact Person / Times
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063 Monday – Friday Open: 08H00 - Close: 15H30

5.3 Summary of Consultations

Table 5-3 below provides a summary of the stakeholder engagement activities that formed part of the Draft Scoping Phase.

Table 5-3: Summary of activities undertaken as part of the Scoping Phase

Activity	Details	Appendices
Stakeholder Mapping and Identification	• Landowners were identified by means of WinDeed searches and a stakeholder database was compiled. • Stakeholders were identified through research and stakeholder networking. • The database was updated with new I&APs who have formally registered and attended stakeholder meetings or submitted comments throughout the process.	**Appendix C1** Stakeholder Database
Identification of Land Claims	• A formal letter of enquiry was compiled and submitted to the Land Claims Commission, DLRRD – Free State. • The letter includes a list of all directly affected properties, which was evaluated to determine if there are land claims on the affected properties.	**Appendix C2** Land Claims Enquiry Letter and Correspondence from the DLRRD
Compilation of BID	• The BID was developed and emailed to all stakeholders on the database. • The BID was available on Kongiwe's website (under public documents).	**Appendix C3** BID
Placement of Newspaper Advertisements	• A newspaper advert was placed in the Vista.	**Appendix C4** Newspaper Advertisements
Placement of Site Notices	• Site notices were placed at publicly accessible places within proximity of the Proposed Project area. Site notices were placed at the Allanridge Public Library. • A site notice report and site notice map was developed, indicating the exact locations of where the site notices were placed, with photos and GPS coordinates.	**Appendix C5** Site Notice Report and Placement Map

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Activity	Details	Appendices
Announcement of the Project and the Availability of the Draft Scoping Report	• The announcement letter was distributed to stakeholders to: - Announce availability of the DSR. - Invite stakeholders to the Online Meeting and Open Day; and - Indicate where the DSR is available for public review and comment.	**Appendix C6** Announcement Correspondence **Appendix C3** BID
Stakeholder Consultation Meetings	• Consultation during the Scoping phase was aimed at providing key stakeholders with an overview of the Proposed Project, and to obtain comments which informed specialist studies and project planning. • Stakeholders were invited to participate through online and in-person engagements. One-on-one consultation meetings with authorities, directly and indirectly affected landowners were held via on-line forums such as Microsoft Teams or in-person depending on preference. • The Project team presented a formal presentation of the Proposed Project the Locality, Infrastructure and Land Tenure maps were displayed as part of the meetings. • Minutes of these meetings were compiled and distributed to everyone who attended these meetings. • Comments raised from the meeting were included into the CRR.	**Appendix C8** List of Meetings and Meeting Minutes **Appendix C10** CRR
Broader Stakeholder Meetings: Scoping Phase	• Stakeholders were invited to participate through online and in-person engagements. The purpose of these meetings was to discuss the Proposed Project, contents of the DSR, to provide stakeholders with an opportunity to raise their comments and to interact with the Project team members. • Minutes of these meetings were compiled and distributed to everyone who attended these meetings. • Comments raised from the meeting were included into the CRR.	**Appendix C8** List of Meetings and Meeting Minutes **Appendix C10** CRR

5.3.1 Consultation Undertaken as part of the Final Scoping Phase

The Final Scoping Report (FSR) was submitted to the DMPR on **Wednesday, 1 July 2026.**

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Stakeholders were notified by email of the availability of the FSR for review. Stakeholders were provided with the opportunity to verify that their comments were captured during the Draft Scoping Phase and to review responses provided by the Project team. All comments received on the FSR were incorporated into the CRR.

Table 5-4 below is a summary of the activities during the Final Scoping Phase.

Table 5-4: Summary of Activities to be Undertaken During the Final Scoping Phase

Activity	Details
Update of Stakeholder Information	• The stakeholder database was updated with new I&APs who formally registered, participated in stakeholder meetings or submitted comments.
Placement of Final Scoping Report	• The FSR is available on the Kongiwe's website.
Submission to the Authorities	• The FSR was submitted to DMPR.
Announcement of the submission of the Final Scoping Report	• A notification letter notifying stakeholders that the FSR has been submitted to DMPR was emailed to the full stakeholder database. • An SMS was sent to stakeholders who have no access to the internet.

6. Consultation undertaken for the Impact Assessment Phase

Consultation with stakeholders during the Environmental Impact Assessment Phase entails providing stakeholders with comments on specialist study findings, recommendations and mitigation measures proposed. These studies and recommendations were included as part of the Draft Environmental Impact Assessment Report (EIA) including the Environmental Management Programmes (EMPr) and the Draft Integrated Water and Waste Management Plan, in support of the EA application. Stakeholders will be invited to participate in both online and in-person engagements depending on their preference. The purpose of these meetings will be held to present the findings of the specialist studies and to get comments from stakeholders.

6.1.1 Public Participation Materials: Impact Assessment Phase

Notification Letter: An email notification was sent to stakeholders on **Tuesday, 22 September 2026**, informing them of the availability of the Draft EIA/EMPr Reports and the Draft IWWMP for public review and comment. The notification also provided details of the Public Meeting and invited stakeholders of the broader public to formally register as Interested and Affected Parties (I&APs), as presented in **Appendix C6.**

A reminder notification will subsequently be emailed to stakeholders to remind them of the availability of the Draft EIA/EMPr Reports and the Draft IWWMP for public review and comment. The reminder notification will also serve to encourage stakeholders to attend the Public Meeting, as presented in **Appendix C6**.

SMS: An SMS was sent to stakeholders with no access to the internet. Stakeholders were notified on the availability of the Draft EIA/EMPr Reports and the Draft IWWMP for public review and comment and when the Public Meeting will be held.

Newspaper Advertisements: A newspaper advert was placed in the **Vista** local newspaper within the Project area, on **Thursday 24 September 2026**. The advertisement provided details about the public review period for the Draft EIA/EMPr Reports and the Draft IWWMP and how the public can access the Reports for their review and comment. The advert provided information about the online and in-person engagements sessions.

Telephonic Discussions: Stakeholders will be consulted, where required, through telephonic discussions. These discussions facilitate the process of inviting stakeholders to stakeholder meetings and provide stakeholders with an opportunity to raise comments, concerns and suggestions regarding the Project. Comments and concerns raised during telephonic discussions are recorded and addressed by the Project team.

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Maps: Various maps which are part of the Draft EIA/EMPr Reports and the Draft IWWMP will be on display during online and the in-person engagements.

6.1.2 Availability of the Draft EIA/EMPr Reports and the Draft IWWMP for Public Review and Comment

The Draft EIA/EMPr Reports has been compiled and will be made available for a 30-day public review and comment period from **Tuesday, 29 September 2026 until Wednesday, 28 October 2026**.

The Draft IWWMP will be made available for a 60-day public review and comment period from **Tuesday, 29 September 2026 until Friday, 27 November 2026**.

The Draft EIA Report and the Draft IWWMP will be made available as follows:

- Electronic copies on Kongiwe's website: https://kongiwe.com/projects/.
- The non-technical summary of the Draft EIA/EMPr Reports will be emailed to all stakeholders on the database.
- Hard copies of the non-technical summary will be distributed to the Stakeholder Meeting attendees (English and Sesotho).
- Hard copies of the Draft EIA/EMPr Reports and the Draft IWWMP will be available at the Allenridge Public Library and Nyakallong Public Library (shown in table below)

Table 6-1: Places where the Draft EIA/EMPr Reports and the Draft IWWMP will be circulated

Location	Physical Address	Contact Person / Times
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063 Monday – Friday Open: 08H00 - Close: 15H30
Nyakallong Public Library	Nyakallong, Allanridge, 9492	Ms Vivian Dasheka (081) 761 1620 Monday – Friday Open: 08H00 - Close: 16H00

6.1.3 Submission of the Draft EIA/EMPr Reports to DMPR

The Draft EIA/EMPr Reports and appendices was submitted to the DMPR which is the Competent Authority (CA) for the Proposed Project on **Tuesday, 29 September 2026**.

Subsequently to above the Draft IWWMP will be made available for public review at the listed public places.

6.2 Stakeholder Meetings

Stakeholders are invited to participate through both online and in-person engagements. Online consultations will be conducted using platforms such as Microsoft Teams, while in-person consultations will be conducted through Broader Stakeholder Meetings.

The purpose of these Stakeholder Meetings is to discuss the Draft EIA Report and the Draft IWWMP, present the findings of the specialist studies, provide stakeholders with an opportunity to raise comments and concerns regarding the Reports, and facilitate interaction with the Project team. Information regarding the Proposed Project description, specialist study findings, potential impacts, and proposed mitigation measures will be presented. The presentation will include relevant maps illustrating the affected areas.

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Copies of the non-technical summary will be made available to stakeholders attending the meetings. The non-technical summary will be available in both English and Sesotho.

6.2.1 The following meetings will be held:

- **Online Meeting with Broader Stakeholders:** An online meeting will be held during the public review period, providing stakeholders with an opportunity to engage with the Project team and discuss the Draft EIA/EMPr Reports and the Draft IWWMP.
- **In-Person Meeting with Broader Stakeholders:** An in-person Public Meeting will be held during the public review period, providing stakeholders with an opportunity to engage directly with the Project team and discuss the Draft EIA/EMPr Reports and the Draft IWWMP.
- **Landowner Meeting:** Consultation meetings will be held with directly and adjacent affected landowners, where applicable or requested.

Table 6-2 provides a summary of the Stakeholder Meetings scheduled.

Table 6-2: Stakeholder Meetings

Meeting Dates	Stakeholders	Time Slots
In-Person Meetings		
Saturday, 10 October 2026	Broader Stakeholder Meeting (Public Meeting) held at S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490	10H00 – 12:00
Online Meetings		
Tuesday, 6 October 2026	Microsoft Teams – Online Meeting was held with Broader Stakeholder including directly and indirectly affected landowner's / land occupiers /community members / authorities /NGOs and other.	10H00 – 11H00

Focused efforts will be made to engage with directly impacted stakeholders, including residents within the Proposed Project area and vulnerable groups at the local level. These stakeholders will be consulted directly and, where appropriate, through their representatives and other influential members of the community. Meetings will be conducted in a culturally appropriate manner, providing stakeholders with an opportunity to openly express their views and concerns. Stakeholders will be given the opportunity to raise issues in the language of their choice, and translation services will be provided where required.

Authorities, NGOs, landowners, land occupiers and community members will be engaged to promote participation and attendance at stakeholder meetings through telephonic consultations and the distribution of emails and SMS notifications.

A list of meetings and consultations undertaken during the process will be provided in the Final EIA Report and the Final IWWMP and presented in **Appendix C8**.

Minutes of the meetings, together with the presentation materials, will be compiled and made available to stakeholders who attended the meetings. These will be included in **Appendix C8** of the Final EIA/EMPr Reports and the Final IWWMP.

All comments and concerns raised by stakeholders during the meetings will be recorded in the Comment and Response Report (CRR). Responses will be prepared by the Project team in accordance with the Project scope and available information and will be included in **Appendix C10** of the Final EIA/EMPr Reports and the Final IWWMP.

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6.3 Summary of Consultations

Table 6-3 below provides a summary of the stakeholder engagement activities that formed part of the Impact Assessment Phase.

Table 6-3: Summary of activities to be undertaken as part of the Impact Assessment Phase

Activity	Details	Appendices
Announcement of the Availability of the Draft EIA Report and the Draft IWWMP	• The announcement letter was distributed to stakeholders on **Tuesday, 22 September 2026** to: - Announce availability of the Draft EIA/EMPr Reports and the Draft IWWMP. - Invite stakeholders to the Online Meeting and Public Meeting; and - Indicate where the Draft EIA/EMPr Reports and the Draft IWWMP will be available for public review and comment. - The non-technical summary will be emailed to the full stakeholder database and will be made available at the Public Meeting in English and Sesotho.	**Appendix C6** Announcement Letter
Placement of Newspaper Advertisements	• Newspaper advert was placed on **Thursday, 24 September 2026** in **Vista Local Newspaper.**	**Appendix C4** Advertisement
Placement of the DEIA Report and the DIWWMP	• The Draft EIA/EMPr Reports has been compiled and will be made available for 30-day public review and comment period. • The Draft IWWMP will be made available for a 60-day public review and comment period. • The Draft EIA/EMPr Reports and the Draft IWWMP will be available on Kongiwe's website. • Copies of the Draft EIA/EMPr Reports and the Draft IWWMP will be placed in the following public place: - Allenridge Public Library; and - Nyakallong Public Library.	
Broader Stakeholder Meetings (Online and Public Meeting)	• Stakeholders will be invited to participate through online and in-person engagements. • The purpose of these Stakeholder Meetings is to discuss the Draft EIA/EMPr Reports and the Draft IWWMP, present findings from the specialist studies, provide stakeholders with a platform to raise comments on the Reports and interact with the project team. • Minutes of these meetings will be compiled and distributed to everyone who attended these meetings. • Comments raised from the meeting will be included into the Comment and Response Report (CRR).	**Appendix C8** List of Meetings and Meeting Minutes **Appendix C10** (CRR)

6.3.1 Consultation activities undertaken as part of the Final EIA/EMPr Reports Phase

The Final Environmental Impact Assessment Report will be submitted to DMPR.

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The Final IWWMP will be submitted to DWS, uploaded onto the DWS' electronic Water Use Licence Application and Authorisation System (e-WULAAS).

Table 6-4 below is a summary of the consultation activities during the Final EIA/EMPr Reports Phase.

Table 6-4: Summary of activities to be undertaken during the Final EIA/EMPr Reports Phase

Activity	Details
Update of Stakeholder Information	The stakeholder database was updated with new I&APs who formally registered, participated in stakeholder meetings or submitted comments.
Placement of Final EIA/EMPr Reports	The Final EIA/EMPr Reports will be available on the Kongiwe's website.
Submission to DMPR	The Final EIA/EMPr Reports will be submitted to DMPR.
Submission to DWS	The Final IWWMP will be submitted to DWS.
Announcement of the submission of the Final EIA/EMPr Reports	• A notification letter notifying stakeholders that the Final EIA/EMPr Reports has been submitted to DMPR will be emailed to the full stakeholder database. • An SMS was sent to stakeholders who have no access to the internet.

7. Consultation with Stakeholders during the Decision-Making Phase

Once the Competent Authority which is **DMPR** has come to a decision regarding the EA authorisation of the Proposed Project, all stakeholders will be notified of the decision made and the appeal process to be followed. The decision from the Competent Authority (CA) will be communicated to stakeholders by means of a notification letter (electronic), SMS, local newspaper advertisement, and on Kongiwe's website.

The IWULA will be submitted to the **DWS** in terms of the NWA. Once the competent authority, which is DWS, has come to a decision regarding the IWULA, the DWS will notify the applicant and any person who has objected to the application, written reasons for decision will be given.

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Appendix C1: Stakeholder Database

Environmental Authorisation for the Jelani Joint Venture (JV) Area Underground Mining Project, in the Matjhabeng Local Municipality, Free State Province

Stakeholder Database

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Agricultural Union	Afgri South Africa: National	Mr	Ernest	Botha	Afgri-Attorney	Free State
Agricultural Union	Afgri South Africa: National	Ms	Nadia	Hetzel	Legal Representative (Afgri)	Free State
Agricultural Union	Agri South Africa: National	Mr	Janse	Rabie	Head of Natural Resources	Free State
Agricultural Union	Free State Agriculture	Dr	Jack	Armour	Commercial Manager	Free State
Agricultural Union	Free State Agriculture	Dr	Jane	Buys	Safety and Risk Analyst	Free State
Agricultural Union	Free State Agriculture	Mr	Christo	Doman	Mangaung Representative	Free State
Agricultural Union	Free State Agriculture	Mr	Francois	Wilken	President	Free State
Agricultural Union	Free State Agriculture	Mr	Gernie	Botha	Chief Executive Officer	Free State
Agricultural Union	Free State Agriculture	Mr	Stefan	Hanekom	Region 10 - Matjhabeng	Free State
Agricultural Union	Grain SA	Mr	MJ	Swart	Regional Contact	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Agricultural Union	Grain SA	Mr	Werner	Vos	Regional Contact	Free State
Agricultural Union	TLU SA Central Region	Ms	Lynette	Du Plessis	Manager TAU SA Central Region	Free State
Agricultural Union	TLU SA Free State Region	Mr.	Jannie	Raath	Manager TAU SA Free State Region	Free State
Agricultural Union	Transvaal Agricultural Union of South Africa (TAUSA)	Mr	Henry	Geldenhuys	President	Free State
Community Member	Allanridge Community (Ward 36)	Mr	M	Dhlamini	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Mr	Malefu	Kesa	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Mr	Malofe	Mohlolo	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Mr	Molefi	Mthuthi	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Ms	Anna	Kabane	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Ms	M.S	Qaliuge	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Ms	Mfuthi	Maluka	Community Member	Free State
Community Member	Allanridge Community (Ward 36)	Ms	Pulane Gloria	Molefe	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	A	Malako	Community Member	Free State
Community Member	Nyakallong Community	Mr	Arnold	Tshware	Community Member	Free State
Community Member	Nyakallong Community	Mr	Balen	Ravebe	Community Member	Free State
Community Member	Nyakallong Community	Mr	Barney	Mjebekoa	Community Member	Free State
Community Member	Nyakallong Community	Mr	Ben	Vikilanle	Community Member	Free State
Community Member	Nyakallong Community	Mr	Ben	Themba	Community Member	Free State
Community Member	Nyakallong Community	Mr	Bokang	Rathelzane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Bongani	Mashiya	Community Member	Free State
Community Member	Nyakallong Community	Mr	Bongani	Mantjie	Community Member	Free State
Community Member	Nyakallong Community	Mr	Booi	Peacemaker	Community Member	Free State
Community Member	Nyakallong Community	Mr	Charles	Vuyisile	Community Member	Free State
Community Member	Nyakallong Community	Mr	Daniel	Potlako	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	David	Mokati	Community Member	Free State
Community Member	Nyakallong Community	Mr	David	Fumelo	Community Member	Free State
Community Member	Nyakallong Community	Mr	David	Shabangu	Community Member	Free State
Community Member	Nyakallong Community	Mr	Desmond	Seboholi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Dimakatso	Khamadi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Disemelo	Mabele	Community Member	Free State
Community Member	Nyakallong Community	Mr	Ditaba	Hlalele	Community Member	Free State
Community Member	Nyakallong Community	Mr	Dumisani	Koni	Community Member	Free State
Community Member	Nyakallong Community	Mr	Elias	Makhooe	Community Member	Free State
Community Member	Nyakallong Community	Mr	Ephraim	Bonakele	Community Member	Free State
Community Member	Nyakallong Community	Mr	Fanie	Matlala	Community Member	Free State
Community Member	Nyakallong Community	Mr	Frans	Letube	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Harmans	Keketso	Community Member	Free State
Community Member	Nyakallong Community	Mr	Hendrik	Molholotsi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Jimmy	Mokoena	Community Member	Free State
Community Member	Nyakallong Community	Mr	Joseph	Maboara	Community Member	Free State
Community Member	Nyakallong Community	Mr	Justice	Lepele	Community Member	Free State
Community Member	Nyakallong Community	Mr	Kedibone	Toons	Community Member	Free State
Community Member	Nyakallong Community	Mr	Kekeletso	Rakometsi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Kenny	Mpato	Community Member	Free State
Community Member	Nyakallong Community	Mr	Kholong	Seipati	Community Member	Free State
Community Member	Nyakallong Community	Mr	Koos	Letaba	Community Member	Free State
Community Member	Nyakallong Community	Mr	L	Mkhonto	Community Member	Free State
Community Member	Nyakallong Community	Mr	L.G	Molelekop	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Latu	Monoametsi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Laukazi	Mamkeli	Community Member	Free State
Community Member	Nyakallong Community	Mr	Lucky	Nale	Community Member	Free State
Community Member	Nyakallong Community	Mr	M	Setsosa	Community Member	Free State
Community Member	Nyakallong Community	Mr	M.J	Motembe	Community Member	Free State
Community Member	Nyakallong Community	Mr	M.S	Molotsane	Community Member	Free State
Community Member	Nyakallong Community	Mr	MacDonald	Sootho	Community Member	Free State
Community Member	Nyakallong Community	Mr	Macione	Sekege	Community Member	Free State
Community Member	Nyakallong Community	Mr	Makwera	Vele	Community Member	Free State
Community Member	Nyakallong Community	Mr	Malefu	Mokoena	Community Member	Free State
Community Member	Nyakallong Community	Mr	Malefu	Matela	Community Member	Free State
Community Member	Nyakallong Community	Mr	Malefu	Mabitsi	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Malethola	Seeteng	Community Member	Free State
Community Member	Nyakallong Community	Mr	Malgas	Moleleki	Community Member	Free State
Community Member	Nyakallong Community	Mr	Martin	Sekhalo	Community Member	Free State
Community Member	Nyakallong Community	Mr	Maserane	Khatlane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Matlakeng	Molefi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Meli	Nalashiya	Community Member	Free State
Community Member	Nyakallong Community	Mr	Mfunyiswa	Mamelle	Community Member	Free State
Community Member	Nyakallong Community	Mr	Michael	Setsosa	Community Member	Free State
Community Member	Nyakallong Community	Mr	Mohau	Rakometsi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Mojalefa	Mabaso	Community Member	Free State
Community Member	Nyakallong Community	Mr	Molelekeng	Khoabane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Moselantja	Stasie	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Motshidisi	Motholo	Community Member	Free State
Community Member	Nyakallong Community	Mr	N.I	Mei	Community Member	Free State
Community Member	Nyakallong Community	Mr	Nelson	Ntate	Community Member	Free State
Community Member	Nyakallong Community	Mr	Nolubabalo	Mvakwendlu	Community Member	Free State
Community Member	Nyakallong Community	Mr	Nondlela	Mantjie	Community Member	Free State
Community Member	Nyakallong Community	Mr	Ntsala	Kgotso	Community Member	Free State
Community Member	Nyakallong Community	Mr	Ntswaki	Kunehe	Community Member	Free State
Community Member	Nyakallong Community	Mr	Orlando	Skosana	Community Member	Free State
Community Member	Nyakallong Community	Mr	Palesa	Malqas	Community Member	Free State
Community Member	Nyakallong Community	Mr	Paulus	Seboholi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Petrus	Xaba	Community Member	Free State
Community Member	Nyakallong Community	Mr	Petrus	Pitsi	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Phindani	Nomfundo	Community Member	Free State
Community Member	Nyakallong Community	Mr	Phiwe	Zungu	Community Member	Free State
Community Member	Nyakallong Community	Mr	Potso	Mokgoamme	Community Member	Free State
Community Member	Nyakallong Community	Mr	Pule	Nche	Community Member	Free State
Community Member	Nyakallong Community	Mr	Pule	Sakaja	Community Member	Free State
Community Member	Nyakallong Community	Mr	Puseletso	Mthombeni	Community Member	Free State
Community Member	Nyakallong Community	Mr	Qithiwe	Mabohlokwa	Community Member	Free State
Community Member	Nyakallong Community	Mr	Samuel	Maleme	Community Member	Free State
Community Member	Nyakallong Community	Mr	Seipati	Khamadi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Sello	Gogoane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Smous	Moleti	Community Member	Free State
Community Member	Nyakallong Community	Mr	Stephen	Motosi	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Stephen	Leshoro	Community Member	Free State
Community Member	Nyakallong Community	Mr	T	Tshokeko	Community Member	Free State
Community Member	Nyakallong Community	Mr	T	Mahlomola	Community Member	Free State
Community Member	Nyakallong Community	Mr	Tau	Sentimile	Community Member	Free State
Community Member	Nyakallong Community	Mr	Tau	Thakane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Teboho	Thelingoane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Teboho	Letsaba	Community Member	Free State
Community Member	Nyakallong Community	Mr	Thabang	Sephiri	Community Member	Free State
Community Member	Nyakallong Community	Mr	Thabo	Soonezi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Thabo	Moikabi	Community Member	Free State
Community Member	Nyakallong Community	Mr	Thabo	Maseme	Community Member	Free State
Community Member	Nyakallong Community	Mr	Thamsanga	Tsibane	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Mr	Thanks	Maditjane	Community Member	Free State
Community Member	Nyakallong Community	Mr	Thapelo	Magana	Community Member	Free State
Community Member	Nyakallong Community	Mr	Tsatsi	Leshoro	Community Member	Free State
Community Member	Nyakallong Community	Mr	Victor	Chauke	Community Member	Free State
Community Member	Nyakallong Community	Mr	Willem	Nonyque	Community Member	Free State
Community Member	Nyakallong Community	Mr	William	Kene	Community Member	Free State
Community Member	Nyakallong Community	Ms	Aletta	Latha	Community Member	Free State
Community Member	Nyakallong Community	Ms	Aletta	Lesekele	Community Member	Free State
Community Member	Nyakallong Community	Ms	Anita	Lietsiso	Community Member	Free State
Community Member	Nyakallong Community	Ms	Anna	Kiolea	Community Member	Free State
Community Member	Nyakallong Community	Ms	Anna	Matase	Community Member	Free State
Community Member	Nyakallong Community	Ms	Anna	Mabaso	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Bernett	Moorosi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Betty	Mosia	Community Member	Free State
Community Member	Nyakallong Community	Ms	Bohlokwane	Mokhele	Community Member	Free State
Community Member	Nyakallong Community	Ms	Bonang Evodia	Selanda	Community Member	Free State
Community Member	Nyakallong Community	Ms	Dikeledi	Moabi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Dikeledi	Mazibako	Community Member	Free State
Community Member	Nyakallong Community	Ms	Dipuo	Motabele	Community Member	Free State
Community Member	Nyakallong Community	Ms	E	Khashane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Elsie	Tlhone	Community Member	Free State
Community Member	Nyakallong Community	Ms	Emily	Xaba	Community Member	Free State
Community Member	Nyakallong Community	Ms	Emily	Leteane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Emily	Mazibuko	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Francinah	Kumalo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Gladys	Makwaji	Community Member	Free State
Community Member	Nyakallong Community	Ms	Gladys	Leshoro	Community Member	Free State
Community Member	Nyakallong Community	Ms	Innouentia	Mokhethu	Community Member	Free State
Community Member	Nyakallong Community	Ms	Jhabana	Mapo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Judith	Matata	Community Member	Free State
Community Member	Nyakallong Community	Ms	Kabane	Malefu	Community Member	Free State
Community Member	Nyakallong Community	Ms	Karabo	Sehloho	Community Member	Free State
Community Member	Nyakallong Community	Ms	Kgauhe	Radebe	Community Member	Free State
Community Member	Nyakallong Community	Ms	Kgotso	Thamae	Community Member	Free State
Community Member	Nyakallong Community	Ms	Khanyisile	Matsaba	Community Member	Free State
Community Member	Nyakallong Community	Ms	Kheswa	Morena	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	L	Mogotsola	Community Member	Free State
Community Member	Nyakallong Community	Ms	L.P	Mathapo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Leah	Goliath	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lenkie	Malete	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lerato	Thibakgoana	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lerato	Monyake	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lerato	Ramakaba	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lerato	Mofolo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lethusang	Tshabalala	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lettia	Matshepo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lindy	Keumile	Community Member	Free State
Community Member	Nyakallong Community	Ms	Lindy	Kehemile	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	M	Phelane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Madillo	Mory	Community Member	Free State
Community Member	Nyakallong Community	Ms	Maki	Moloke	Community Member	Free State
Community Member	Nyakallong Community	Ms	Malesedi	Tlale	Community Member	Free State
Community Member	Nyakallong Community	Ms	Malte	Mahoa	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mampho	Potsane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Manana	Majola	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mangali	Happiness	Community Member	Free State
Community Member	Nyakallong Community	Ms	Maria	Makhobeng	Community Member	Free State
Community Member	Nyakallong Community	Ms	Masorame	Maotzane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mathabo	Moloke	Community Member	Free State
Community Member	Nyakallong Community	Ms	Matshediso	Motlie	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Matsietsi	Challa	Community Member	Free State
Community Member	Nyakallong Community	Ms	Meriam	Koloti	Community Member	Free State
Community Member	Nyakallong Community	Ms	Merriam	Busakwe	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mhlapo	Malefu	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mianeeni	Mabaso	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mlindeni	Mose	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mmami	Khotle	Community Member	Free State
Community Member	Nyakallong Community	Ms	Modiehi	Tsilo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Moeketsi	Thelingone	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mohloho	Thibakhoane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mokgorwane	Pholo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Moretlo	Kodisany	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Moshoeshoe	Mokhele	Community Member	Free State
Community Member	Nyakallong Community	Ms	Motsamai	Kgiba	Community Member	Free State
Community Member	Nyakallong Community	Ms	Motshewa	Radebe	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mpho	Motlhabe	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mpho	Mokoaledi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mpho	Maeneli	Community Member	Free State
Community Member	Nyakallong Community	Ms	Mpnaka	Mafantiri	Community Member	Free State
Community Member	Nyakallong Community	Ms	Naangane	Molefi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Naledi	Msebeni	Community Member	Free State
Community Member	Nyakallong Community	Ms	Nkhopea	Moqaseng	Community Member	Free State
Community Member	Nyakallong Community	Ms	Nomakholwa	Koni	Community Member	Free State
Community Member	Nyakallong Community	Ms	Nomthanelazo	van Wyk	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Nomvula	Mabaso	Community Member	Free State
Community Member	Nyakallong Community	Ms	Ntshiwa Dina	Khiba	Community Member	Free State
Community Member	Nyakallong Community	Ms	Ntsoaki	Mphatsi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Nundu	Nosabelo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Nunu	Rasile	Community Member	Free State
Community Member	Nyakallong Community	Ms	Paballo	Hlwempu	Community Member	Free State
Community Member	Nyakallong Community	Ms	Palesa	Moloi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Patricia	Yoso	Community Member	Free State
Community Member	Nyakallong Community	Ms	Phindile	Solomone	Community Member	Free State
Community Member	Nyakallong Community	Ms	Pleasure	Magagula	Community Member	Free State
Community Member	Nyakallong Community	Ms	Portia	Vuka	Community Member	Free State
Community Member	Nyakallong Community	Ms	Princess	Santaoana	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Pulane	Moloke	Community Member	Free State
Community Member	Nyakallong Community	Ms	Puleng	Nyalela	Community Member	Free State
Community Member	Nyakallong Community	Ms	Rosita	Nuvelo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Rutu	Motsokolo	Community Member	Free State
Community Member	Nyakallong Community	Ms	Sandiswa	Kokwana	Community Member	Free State
Community Member	Nyakallong Community	Ms	Selina	Thibakhoana	Community Member	Free State
Community Member	Nyakallong Community	Ms	Selina	Jinkela	Community Member	Free State
Community Member	Nyakallong Community	Ms	Selinah	Montwedi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Selinah	Booi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Susan	Utloa	Community Member	Free State
Community Member	Nyakallong Community	Ms	Taeli	Thelma	Community Member	Free State
Community Member	Nyakallong Community	Ms	Teboho	Matome	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Thabiso	Maretele	Community Member	Free State
Community Member	Nyakallong Community	Ms	Thapelo	Shasha	Community Member	Free State
Community Member	Nyakallong Community	Ms	Thapelo	Mothabe	Community Member	Free State
Community Member	Nyakallong Community	Ms	Thato	Mokoena	Community Member	Free State
Community Member	Nyakallong Community	Ms	Thelinqoune	Kobedi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Thobeka	Komanisi	Community Member	Free State
Community Member	Nyakallong Community	Ms	Thulani	Gumede	Community Member	Free State
Community Member	Nyakallong Community	Ms	Tlale	Kuape	Community Member	Free State
Community Member	Nyakallong Community	Ms	Tlaleng	Mantsheane	Community Member	Free State
Community Member	Nyakallong Community	Ms	Tlhone	Pahah	Community Member	Free State
Community Member	Nyakallong Community	Ms	Tshepang	Mazibako	Community Member	Free State
Community Member	Nyakallong Community	Ms	Tshepo	Mpitsi	Community Member	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Community Member	Nyakallong Community	Ms	Valashiya	Malao	Community Member	Free State
Community Member	Nyakallong Community	Ms	Vanessa	Nkhatnom	Community Member	Free State
Community Member	Nyakallong Community	Ms	Zanele	May	Community Member	Free State
Community Member	Nyakallong Community	Ms	Zenande	Mahlanza	Community Member	Free State
Community Member	Nyakallong Community	Ms	Zeth	Mothabe	Community Member	Free State
Community Member	Nyakallong Community	Ms	Zikhona	Mahlumba	Community Member	Free State
Community Member	Nyakallong Community	Ms	Zizipho	Mahlanza	Community Member	Free State
Community Member	Odendaalsrus Community	Mr	Macdonald	Kgobe	Community Member	Free State
Directly Affected Landowner, Farmers Association, Indirectly Affected Landowner	Private Landowner	Mr	Willem	Taljaard	Landowner	Free State
Directly Affected Landowner, Indirectly Affected Landowner	Blaauwklip Trust	Mr	Eduard	Steyn	Owner	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Cllr	Veronica	Ntakumbana	Executive Mayor	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
District Municipality	Lejweleputswa District Municipality (LDM)	Mr		Silone	LED Manager	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Mr	AT	Jonas	LED, Agriculture	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Mr	Dewald	Kirsten	Manager Environmental Health Services	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Mr	Fannie	Zim	Environmental Management Practitioner	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Mr	Motlatsi	Makhetha	Municipal Manager	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Mr	Orapeleng	Manake	Environmental Manager	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Ms	Bogolo	Mapota	Air Pollution District Manager	Free State
District Municipality	Lejweleputswa District Municipality (LDM)	Ms	Michelle	Sello	Executive Manager of Environmental Health Services and Disaster Management	Free State
Environmental NGO's	African Wattle Crane Programme	Ms	Kerryn	Morrison	Manager	Free State
Environmental NGO's	Agricultural Research Council	Dr	Litha	Magingxa	President and CEO	Free State
Environmental NGO's	Benchmarks Foundation (BMF)	Mr	David	van Wyk	Environmental	Free State
Environmental NGO's	Benchmarks Foundation (BMF)	Mr	Moses	Cloete	Director	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Environmental NGO's	Benchmarks Foundation (BMF)	Mr	Simo	Gumede	Logistics and Administration Lead	Free State
Environmental NGO's	Benchmarks Foundation (BMF)	Ms	Busi	Thabane	General Manager	Free State
Environmental NGO's	Birdlife South Africa (BLSA)	Dr	Kirsten	Day	Policy & Advocacy Manager	Free State
Environmental NGO's	Birdlife South Africa (BLSA)	Mr	Sam Ralston	Paton	Birds & Renewable Energy Project Manager	Free State
Environmental NGO's	Centre for Environmental Rights (CER)	Mr	Brandon	Abdinor	Programme Head: Pollution & Climate Change	Free State
Environmental NGO's	Council of Geoscience: National	Dr	Thakane	Ntholi	Specialist Scientist	Free State
Environmental NGO's	Endangered Wildlife Trust (EWT)	Mr	Bradley	Gibbons	Free State Representative	Free State
Environmental NGO's	Endangered Wildlife Trust (EWT): National	Mr	Kishaylin	Chetty	Executive: Head of Sustainability	Free State
Environmental NGO's	Endangered Wildlife Trust (EWT): National	Ms	Samista	Rooplal	Biodiversity and Business Officer	Free State
Environmental NGO's	Federation for Sustainable Environment (FSE)	Ms	Mariette	Liefferink	Chief Executive Officer	Free State
Environmental NGO's	Groundwork	Mr	Bobby	Peek	Director	Free State
Environmental NGO's	Save the Vaal Environment	Mr	Malcolm	Plant	Chairman	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Environmental NGO's	Save the Vaal Environment	Mr	Michael	Gaade	Committee Member	Free State
Environmental NGO's	South African National Biodiversity Institute (SANBI)	Ms	A	Mohai	Free State Representative	Free State
Environmental NGO's	Vaal Environmental Justice Alliance	Mr	Samson	Mokoena	Coordinator	Free State
Environmental NGO's	Wildlife & Environmental Society of South Africa (WESSA)	Mr	John	Wesson	Manager: Conservation Specialist	Free State
Environmental NGO's	Wildlife & Environmental Society of South Africa (WESSA)	Mr	Morgan	Griffiths	Senior Manager: Advocacy, Membership and Governance	Free State
Indirectly Affected Landowner, Local Municipality	Matjhabeng Local Municipality	Mr	Eric Sello	Senoge	Property Department	Free State
Indirectly Affected Landowner	Avgold Limited	Mr	Assan	Ralebona	Specialist	Free State
Indirectly Affected Landowner	Dirk Botha Trust	Mr	Christo	Nel	Landowner	Free State
Indirectly Affected Landowner	Jaco Grobbelaar Trust	Mr	Jaco	Grobbelaar	Landowner	Free State
Interested & Affected Party	All Groups Grow Foundation	Mr	M	Buyisi	Member	Free State
Interested & Affected Party	KB Salman Civil Construction and General Projects	Mr	Molefi Abel	Thebeeahae	Director	Free State
Interested & Affected Party	Lekalake Attorneys INC	Mr	Kabelo	Lekalake	Director	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Interested & Affected Party	Lexington Gold	Mr	Bernard	Olivier	Member	Free State
Interested & Affected Party	Mathumbi Enterprise	Mr	Sepati	Mathumbi	Member	Free State
Interested & Affected Party	Sisu Community Social Organization	Mr	Ditsietsi	Makhobeni	Representative	Free State
Interested & Affected Party	Sisu Community Social Organization	Mr	Qondane	Tembani	Chairperson	Free State
Interested & Affected Party	Tetra4	Mr	David	Pule	Environmental Department	Free State
Interested & Affected Party	Tetra4	Mr	Tinashe	Maramba	Environmental Manager	Free State
Interested & Affected Party	Titan TP Tradings Pty Ltd	Mr	Pule	Sekaja	Director	Free State
Interested & Affected Party	Umkhonto Womnotho	Ms	Lerato	Mokonyane	Executive Secretary	Free State
Local Municipality	Matjhabeng Local Municipality	Adv	Lauretta	van Wyk-Williams	Municipal Manager	Free State
Local Municipality	Matjhabeng Local Municipality	Dr	Sefako	Ramphoma	Executive Director: Local Economic Development (LED)	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Adam	Pobe	Acting Executive Director	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Boipelo	Molelekoa	Area Manager: City Planning - Welkom / Virginia / Odendaalsrus / Allanridge	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Local Municipality	Matjhabeng Local Municipality	Mr	Johannes	Theunissen	Waste Manager	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Johannes S.J.	Griesel	Acting Manager: Development Planning	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Kabelo	Masekoa	Manager: Water	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Lennox	Rubulana	Speaker	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Lunga	Ncapai	Waste Officer	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Nico	Vorster	Manager	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Peter	Mathebula	Official	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Sello	Naniso	Manager at the Speakers Office	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Serake	Leeuw	Special Advisor to the Office of the Executive Mayor	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Thabo	Mthombeni	Senior Manager Civil Engineering	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Thanduxolo	Khalipha	Executive Mayor	Free State
Local Municipality	Matjhabeng Local Municipality	Mr	Tsekiso	Majake	IDP Manager	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Local Municipality	Matjhabeng Local Municipality	Mrs	Matshidiso	Seekoei	Legal Counsel	Free State
Local Municipality	Matjhabeng Local Municipality	Mrs	Yolette	Fransman		Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Akhona	Noholoza	Secretary to Municipal Manager	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Charlene	Smith	Official	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Malehloa	Leballo	Acting Director: Local Economic Development (LED)	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Mapitso	Mohapi	Office of the Speaker	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Mmase	January	Snr.Manager Planning	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Mmase	Moletsane	Spatial Planning and City Planning	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Morakane	Mothekhe	Planning and Human Settlement	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Nelia	Rust	Manager Water and Effluent Water - West	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Rosy	Ramalitswe	PA (Mr Mthombeni's PA)	Free State
Local Municipality	Matjhabeng Local Municipality	Ms	Suna	Swanepoel	PA to Mr Pope	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Forestry Fisheries and the Environment (DFFE)			DFFE	Forestry Branch	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)			DFFE - Biodiversity		Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Ronald	Nenungwi	Acting Chief Directorate	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Seoka	Lekota	Biodiversity Conservation	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Stanley	Tshitwamulomoni	Strategic Water Source Area	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Lydia	Kutu	Integrated Environmental Authorisations:Priority Infrastructure Developments	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Makhosi	Yeni	Environmental Officer	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Mashudu	Mudau	Protected Areas Planning and Management Effectiveness	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Mmatlala	Rabothata	Biodiversity Conservation	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Mulalo	Sundani	National Office: Directorate: Forestry Regulation and Oversight: Environmental	Free State
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Portia	Makitla	Biodiversity and Conservation	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Health (DOH): National	Ms	Belinda	Makhafola	Directorate: Environmental Health Services	Free State
National Government	Department of Land Reform and Rural Development (DLRRD)	Mr	Bushy	Ngamole	Commision on Restitution of Land Rights- Free State Supervisor	Free State
National Government	Department of Land Reform and Rural Development (DLRRD)	Mr	Clement	Modise	Commision on Restitution of Land Rights- Free State Officer	Free State
National Government	Department of Land Reform and Rural Development (DLRRD)	Mr	Khomotso	Mahlatji	Commission on Restitution of Land Rights (CRLR)- Free State Officer	Free State
National Government	Department of Land Reform and Rural Development (DLRRD)	Ms	Nozipho	Dlamini	Commission on Restitution of Land Rights (CRLR)- Free State Officer	Free State
National Government	Department of Mineral and Petroleum Resources (DMPR)	Adv	Mmadikeledi	Moloto	DDG: Mineral Regulation	Free State
National Government	Department of Mineral and Petroleum Resources (DMPR)	Mr	David	Msiza	Mine Health and Safety Inspectorate	Free State
National Government	Department of Mineral and Petroleum Resources (DMPR)	Mr	Rudzani	Mabogo	Head of Environment: Director for Compliance and Enforcement	Free State
National Government	Department of Mineral and Petroleum Resources (DMPR)	Mr	Siyabonga	Vezi	Acting Gauteng Regional Director	Free State
National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Khumbulani	Thobani	Town Planning Services	Free State
National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Lutendo	Neduvhuledza	Town Planning Services (HO)	Free State
National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Zakhele	Ndebele	Real Estate Management Services	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Public Works and Infrastructure (DPWI)	Ms	Jabulile	Mabaso	Acting Regional Manager	Free State
National Government	Department of Public Works and Infrastructure (DPWI)	Ms	Thobile	Zulu	Official	Free State
National Government	Department of Water and Sanitation (DWS)	Mr	Luvuyo	Nqelenga	Compliance Monitoring &Enforcement (BloemWater)	Free State
National Government	Department of Water and Sanitation (DWS)	Mr	Pieter	Ackerman	Chief Landscape Architect	Free State
National Government	Department of Water and Sanitation (DWS)	Mr	Roets	Wietsche	Specialist Scientist	Free State
National Government	Departmentof Water and Sanitation (DWS)	Mr	C	Schrader	Dam Safety: Free State Region Representative	Free State
National Government	Departmentof Water and Sanitation (DWS)	Ms	Vernon	Blair		Free State
National Government	Minerals Council South Africa: National	Mr	Babalwa	Matiwane	Environment Department: National	Free State
National Government	Minerals Council South Africa: National	Mr	Matome	Makwela	Environmental Advisor	Free State
National Government	Minerals Council South Africa: National	Ms	Jeannette	Hofsajer	Environment Department: National Administration	Free State
National Government	Minerals Council South Africa: National	Ms	Mpho	Thobye	Health	Free State
National Government	Minerals Council South Africa: National	Ms	Stephinah	Mudau	Head: Environmental Advisor	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	National Nuclear Regulator (NNR)	Mr	Patle	Mohajane	Programme Manager: NORM	Free State
National Government (Provincial Office)	Department of Agriculture and Rural Development (DARD): Free State	Mr	Hennie	Grobler	Acting Director: Rural Infrastructure Development	Free State
National Government (Provincial Office)	Department of Community Safety, Roads and Transport (DCSRT): Free State	Mr	Bennit	Ramotseoa	Road Superintendent (Lejweleputswa)	Free State
National Government (Provincial Office)	Department of Community Safety, Roads and Transport (DCSRT): Free State	Mr	Theuns	Shields	Chief Road Superintendent (Lejweleputswa)	Free State
National Government (Provincial Office)	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Mthokozese	Nsizwane	Environmental Office	Free State
National Government (Provincial Office)	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Qaphela	Ndabankulu	Forestry Regulation	Free State
National Government (Provincial Office)	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Shumani	Dzivhani	Deputy Director: Forestry Regulation	Free State
National Government (Provincial Office)	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Khuliso	Khomari	Environmental Officer	Free State
National Government (Provincial Office)	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Nompumelelo	Lekalakala	Biodiversity	Free State
National Government (Provincial Office)	Department of Health (DOH): Free State	Mr	Johannes	Mokgatle	Director	Free State
National Government (Provincial Office)	Department of Health (DOH): Free State	Mr	Lucky	Leshabane	Environmental Health Manager	Free State
National Government (Provincial Office)	Department of Land Reform and Rural Development (DLRRD)	Mr	Rowan	Harris	Senior Data Capture	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government (Provincial Office)	Department of Land Reform and Rural Development (DLRRD)	Ms	Estelle	Sello	Official	Free State
National Government (Provincial Office)	Department of Mineral and Petroleum Recourses (DMPR): Free State	Ms	Matodzi	Ramboho	Regional Manager: Case Officer	Free State
National Government (Provincial Office)	Department of Mineral and Petroleum Resources (DMPR): Free State	Mr	Cedrick	Fhedzisani	Deputy Director: Mine Environmental Management	Free State
National Government (Provincial Office)	Department of Mineral and Petroleum Resources (DMPR): Free State	Mr	Tuwani	Monyai	Assistant Director: Mine Environmental Management	Free State
National Government (Provincial Office)	Department of Mineral and Petroleum Resources (DMPR): Free State	Ms	Tshifhiwa	Makhokha	Mine Environmental Management	Free State
National Government (Provincial Office)	Department of Minerals and Petroleum Resources (DMPR): Free State	Mr	Matodzi	Ramoho		Free State
National Government (Provincial Office)	Department of Minerals and Petroleum Resources (DMPR): Free State	Ms	Cecelia	Sedutla		Free State
National Government (Provincial Office)	Department of Minerals and Petroleum Resources (DMPR): Free State	Ms	Kalipa	Kewuti	Regional Manager: Free State	Free State
National Government (Provincial Office)	Department of Public Works and Infrastructure (DPWI): Free State	Mr	SP	Menye	Acting Chief Director: Property Management	Free State
National Government (Provincial Office)	Department of Public Works and Infrastructure (DPWI): Free State	Ms	A	Ntilane	Director: Strategic Immovable Asset Management	Free State
National Government (Provincial Office)	Department of Public Works and Infrastructure (DPWI): Free State	Ms	Anneke	Barnard	Infrastructure Services	Free State
National Government (Provincial Office)	Department of Public Works and Infrastructure (DPWI): Free State	Ms	Lebohang	Khumalo	Chief Director: Property Management	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government (Provincial Office)	Department of Rural Development and Land Reform (DRDLR): Free State	Dr	Wayne	Alexandra	Acting Chief Director	Free State
National Government (Provincial Office)	Department of Rural Development and Land Reform (DRDLR): Free State	Ms	Cynthia	Wessels	Chief Director	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS)	Mr	Mzukisi	Maneli	Case Officer	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS)	Mr	Terrence	Ngilande	Case Officer	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS)	Ms	Phuti	Mabotja	Environmental Officer	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Dr	Tseliso	Ntili	Provincial Manager	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Mr	Kereemang	Maseloane	Director: Water Services Infrastructure, Development, and Refurbishment Program	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Mr	Mfundi	Biyela	Bloemfontein Representative	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Mr	Pule	Liatile	Assessor	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Mr	Pule	Lenong	Secretary	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Ms	Barbara	Kalembo	(c) and (i) Water Use Specialist	Free State
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Ms	Maureen	Letloenyane	Deputy Director and Office Manager for the Provincial Head	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government (Provincial Office)	Department of Water and Sanitation (DWS): Free State	Ms	Thembekile	Dlamini	Assessor	Free State
National Government (Provincial Office)	Department of Water and Sanitation: Free State Region	Mr	Dywili Sam	Velile		Free State
National Government (Provincial Office)	Department of Water and Sanitation: Free State Region	Mr	Lahliwe	Mahlae		Free State
National Government (Provincial Office)	Department of Water and Sanitation: Free State Region	Mr	Werner	Du Preez	(BFN)	Free State
National Government (Provincial Office)	Department of Water and Sanitation: Free State Region	Ms	Lerato	Morake		Free State
Other Landowner	De Jager Boerdery	Mr	Frans	De Jager	Chairman	Free State
Other Landowner	De Jager Boerdery	Mr	Johan	De Jager	Landowner	Free State
Other Landowner	Grootspruit Familie Trust (De Jager Boerdery)	Mr	Tertius	De Jager	Landowner	Free State
Other Landowner	Private Landowner	Mr	Pieter	Haasbroek	Landowner	Free State
Parastatal	Eskom	Mr	Jason	Kasper	Land and Rights Manager	Free State
Parastatal	Eskom	Ms	Charmaine	Mare	Environmental Manager	Free State
Parastatal	Eskom (National Transmission Company South Africa)	Mr	Khululwa	Matshoba	Senior Environmental Advisor	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Parastatal	Eskom Transmission Land and Rights: Free State	Mr	Gerrie	van Schalkwyk	Senior Environmental Advisor	Free State
Parastatal	National Transmission Company South Africa (NTCSA)	Mr	Khululwa	Matshoba	Senior Environmental Advisor	Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Mr	Dudley	Mbambo	ER	Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Mr	Naashif	Mowzer		Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Mr	Sefako	Ngoasheng		Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Ms	Karabo	Mabyana	Statutory Control Officer	Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Ms	Khuliso	Nenguda	Statutory Controller Officer	Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Ms	Lungile	Sibanyoni	Environmental Assistant - (KZNP)	Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Ms	Nqobile	Mabaso	Statutory Control Administrator	Free State
Parastatal	South African National Roads Agency Limited (SANRAL)	Ms	Ntsepo	Mkhize	Environmental Co-ordinator	Free State
Parastatal	Transnet Freight Rail Ltd	Mr	Johannes	Jonkers	Infrastructure Worker	Free State
Parastatal	Transnet Freight Rail Ltd	Mr	Samuel	Fiff	Free State Environmental Manager	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Parastatal	Transnet Freight Rail Ltd	Ms	Keneuwe	Mabe	Geo-Spatial, Transnet Property	Free State
Parastatal	Transnet Freight Rail Ltd	Ms	Yolanda	Potgieter		Free State
Parastatal	Transnet Freight Rail Ltd	Ms	Zanele	Manyathi	Environmental Manager	Free State
Parastatal	Transnet Freight Rail Ltd: Gauteng	Ms	Annalize	Harmse	Chief Admin Official	Free State
Provincial Government	Department of Agriculture and Rural Development (DARD): Free State	Dr	Nhlonipho	Nhlabatsi	Manager: Agricultural Support and Livelihoods	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Dr	Sandile	Fuku	Environmental Affairs and Conservation	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Mr	DJ	Hagen	Director: Strategic	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Mr	Pule	Motsoetla	Biodiversity Manager	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Mr	T	Makhele	Integrated Economic Development	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Ms	BJ	Molefe	Environmental Officer	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Ms	Gontse	Sebetlele		Free State
Provincial Government	Department of Economic (DESTEA): Free State	Ms	Grace	Mkhosana		Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Provincial Government	Department of Economic (DESTEA): Free State	Ms	Lerato	Kelly	Olievenkloof Private Nature Reserve	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Ms	Nomasomi	Tshingo		Free State
Provincial Government	Department of Economic (DESTEA): Free State	Ms	Nozi	Nkwe	Environmental Manager	Free State
Provincial Government	Department of Economic (DESTEA): Free State	Ms	RP	Likholele	Control Environmental	Free State
Provincial Government	Free State Provincial Heritage Resources Authority (FSPHRA)	Ms	Ntando PZ	Mbatha	Heritage Coordinator	Free State
Ward Committee Member	Matjhabeng Local Municipality	Mr	Isaac	Velebayi	Ward 36	Free State
Ward Committee Member	Matjhabeng Local Municipality	Mr	Mildred	Faro	Ward 35	Free State
Ward Councillor	Matjhabeng Local Municipality	Mr	Clement	Hanisi	Ward 36	Free State
Ward Councillor	Matjhabeng Local Municipality	Mr	Paseka Thomas	Ramatisa	Ward 19	Free State
Ward Councillor	Matjhabeng Local Municipality	Ms	Estelle	Dansey	Ward 35	Free State
Water Bodies -Institution	Sand-Vet Water Users Association	Mr	Andries	Labuscagne	CEO	Free State
Water Bodies -Institution	Sand-Vet Water Users Association	Ms	Moipone	Maoba	P.A to the CEO	Free State

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Water Bodies -Institution	Vaal Central Water (formerly Bloem Water)	Mr	Aphumle	Mnyaka	Executive & Project	Free State
Water Bodies -Institution	Vaal Central Water (formerly Bloem Water)	Mr	Maruping	Rapudungoane	Operations and Maintenance	Free State
Water Bodies -Institution	Vaal Central Water (formerly Bloem Water)	Ms	Charmaine	Dladla	Project Coordinator	Free State
Water Bodies -Institution	Vaal Central Water (formerly Bloem Water)	Ms	NP	Silevu	Secretary	Free State
Water Bodies -Institution	Vaal-Orange Catchment Management Agency (VOCMA)	Mrs	Nametso	Sithole	Scientist Production	Free State
Water Bodies -Institution	Water Research Commission	Dr	Shafick	Adams	Senior Research Manager	Free State
Water Bodies -Institution	Water Research Commission	Mr	Bennie	Mokgonyana	Water Use & Waste Management	Free State
Water Bodies -Institution	Water Research Commission	Mr	Jay	Bhagwan	Research Manager	Free State
Water Bodies -Institution	Water Research Commission	Ms	Penny	Jaca	Water Resource Management	Free State
Water Bodies -Institution	Water Research Commission	Ms	Shirley	Machelisi	Water Use & Waste Management	Free State

Environmental Authorisation for the Jelani Joint Venture (JV) Area Underground Mining Project, in the Matjhabeng Local Municipality, Free State Province

Landowners Database

Directly Affected Landowners

Farm Name & Number	Farm ID	Farm Portion	Owner-Windeed	Farm owner	Contact Person
Welvaart 63	RD	0(RE)	Blaauwklip Trust	Blaauwklip Trust	Mr Eduard Steyn
Welvaart 63	RD	1	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Welvaart 63	RD	2	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Diamant 37	RD	0	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Graspan 40	RD	0(RE)	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Graspan 40	RD	1	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Swartpan 436	RD	0(RE)	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard

Indirectly Affected Landowners

Farm Name & Number	Farm ID	Farm Portion	Owner-Windeed	Farm owner	Contact Person
Onrust 377	RD	0	Jaco Grobbelaar Trust	Jaco Grobbelaar Trust	Mr Jaco Grobbelaar
Nooitgedacht 378	RD	0(RE)	EDU-HAN Trust	EDU-HAN Trust	Mr Eduard Steyn
Kromdraai 386	RD	0(RE)	Avgold Limited	Avgold Limited (Harmony Gold)	Mr Assan Ralebona
Kromdraai 386	RD	1	Matjhabeng Local Municipality	Matjhabeng Local Municipality	Mr Eric Sello Senoge
Kromdraai 386	RD	3	Free State Provincial Government	Department of Public Works and Infrastructure (DPWI)	Ms Thobile Zulu
Allanridge 425	RD	4	Matjhabeng Local Municipality	Matjhabeng Local Municipality	Mr Eric Sello Senoge
Welgeluk 214	RD	0	Blaauwklip Trust	Blaauwklip Trust	Mr Eduard Steyn
Swartpan 436	RD	0(RE)	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Elim 336	RD	0	Goldstein Samuel Trustees	Goldstein Samuel Trustees	Mr Christo Nel
Genoeg 330	RD	0(RE)	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard
Genoeg 330	RD	1	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard

Farm Name & Number	Farm ID	Farm Portion	Owner-Windeed	Farm owner	Contact Person
Welgevonden 183	RD	1	Willem Hendrik Taljaard	Willem Hendrik Taljaard	Mr Willem Taljaard

Appendix C2: Land Claims

Vanessa Viljoen

From: Vanessa Viljoen
Sent: Thursday, 14 May 2026 09:50
To: nozipho.dlamini@dalrrd.gov.za; khomotso.mahlatji@dlrrd.gov.za
Cc: Jean-Mari Williams
Subject: Land Claims Enquiry: EA and IWUL Application for the Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province
Attachments: JELA#001_LC_Final_2.pdf

Dear Mr Khomotso Mahlatji

Kongiwe Environmental (Pty) Ltd ("Kongiwe") has been appointed to undertake the Environmental Authorisation and Integrated Water Use Licence for the Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province.

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

We would appreciate it, if you could assist us with the attached Land Claims enquiry.

Much appreciated.

Kind Regards,

Vanessa Viljoen | Principal Stakeholder Engagement Consultant | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 1725 | Cell: +27 (71) 485 5388 | Fax: +27 (86) 476 6438 | Email: vviljoen@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.

www.kongiwe.com

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Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

DMPR reference number: FS30/5/1/2/3/2/1(10098) EM
DWS reference number: WU50090

Date	Thursday, 14 May 2026
Attention	Mr Khomotso Mahlatji
Government Body	Free State Department of Land Reform and Rural Development (DLRRD) Office of the Regional Land Claims Commissioner
Email	nozipho.dlamini@dalrrd.gov.za; khomotso.mahlatji@dlrrd.gov.za

Notice is hereby given that Jelani Resources (Pty) Ltd ("Jelani"), a joint venture (JV) between White Rivers Exploration (WRE) and Harmony Gold, proposes to develop and commence underground mining activities within the joint venture (JV) area. This area is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution).

The primary mineral resource targeted is gold, with additional potential resources including silver, uranium, sulphur, platinum group metals, rare earth elements, diamonds (alluvial), and a range of base and ferrous metals such as copper, cobalt, manganese, molybdenum, nickel, lead, tungsten, zinc, and iron.

Kongiwe Environmental (Kongiwe) has been tasked with conducting the Scoping and Environmental Impact Assessment (S& EIA) and the Integrated Water Use Licence application (IWULA) process which is aimed at critically evaluating the potential environmental and social impacts of the Project.

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

The Project area impacts the farm portions listed in the table below:

Farm Name and Number	Farm ID	Farm Portion	Landowner
Welvaart No. 63	RD	0 (RE)	Blaauwklip Trust
Welvaart No. 63	RD	1	Willem Hendrik Taljaard
Welvaart No. 63	RD	2	Willem Hendrik Taljaard
Diamant No. 37	RD	0	Willem Hendrik Taljaard
Graspan No. 40	RD	0 (RE)	Willem Hendrik Taljaard

Kongiwe Environmental (Pty) Ltd
Registration Number 2016/135562/07
Telephone: +27 (10) 140 6508, Email: info@kongiwe.com
Registered Address: 150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address: PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
www.kongiwe.com

Farm Name and Number	Farm ID	Farm Portion	Landowner
Graspan No. 40	RD	1	Willem Hendrik Taljaard
Swartpan No. 436	RD	0 (RE)	Willem Hendrik Taljaard

Kongiwe wishes to enquire if there are any land claims on any of the farms listed above.

Please could you revert to us as a matter of urgency.

Yours faithfully,



Vanessa Viljoen
Stakeholder Engagement Consultant

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COMMISSION ON RESTITUTION OF LAND RIGHTS

OFFICE OF THE REGIONAL LAND CLAIMS COMMISSIONER: FREE STATE
Ground floor, Post Bank Building, cnr Selbourne and East Burger Street, Bloemfontein, 9300
Tel: (051) 430 0423/25/29

Enquiries: Rowan Harris 10 June 2026

You Ref: FS30/5/1/2/3/2/1(10098) EM

KONGIWE ENVIRONMENTAL (PTY) LTD
150 BRYANSTON DRIVE,
BRYANSTON
SANDTON
2191

Tel : +27 (10) 140 6508

Email: info@kongiwe.com

Dear Sir/Madam

We refer to your letter dated 14 May 2026.

LAND CLAIMS ENQUIRY:

1. **THE FARM WELVAART NO.63, LEJWELEPUTSWA DISTRICT, MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE.**

2. **PORTION 1 OF THE FARM WELVAART NO.63, LEJWELEPUTSWA DISTRICT, MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE.**

3. **PORTION 2 OF THE FARM WELVAART NO.63, LEJWELEPUTSWA DISTRICT, MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE.**

4. **THE FARM DIAMANT NO. 37, LEJWELEPUTSWA DISTRICT, MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE.**

5. **THE FARM GRASPAN NO. 40, LEJWELEPUTSWA DISTRICT, MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE.**

6. **PORTION 1 OF THE FARM GRASPAN NO. 40, LEJWELEPUTSWA DISTRICT, MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE.**

We confirm that as at the date of this letter no land claims appear on our database in respect of the Property(ies). This includes the database for claims lodged by 31 December 1998; and those lodged between 1 July 2014 and 27 July 2016 in terms of the Restitution of Land Rights Amendment Act, 2014.

Whilst the Commission takes reasonable care to ensure the accuracy of the information it provides, there are various factors that are beyond the Commission's control, particularly relating to claims that have lodged but not yet been gazetted such as:

1. Some Claimants referred to properties they claim dispossession of rights in land against using historical property descriptions which may not match the current property description; and
2. Some Claimants provided the geographic descriptions of the land they claim without mentioning the particular actual property description they claim dispossession of rights in land against.

The Commission therefore does not accept any liability whatsoever if through the process of further investigation of claims it is found that there is in fact a land claim in respect of the above property.

If you are aware of any change in the description of the above property after 19 June 1913 kindly supply us with such description so as to enable us to do a further search.

Yours faithfully

pp. 

DR WAYNE ALEXANDER
ACTING CHIEF DIRECTOR: LAND RESTITUTION SUPPORT
OFFICE OF THE REGIONAL LAND CLAIMS COMMISSIONER: FREE STATE
DATE:10/06/2026

Appendix C3: Consultation Materials

Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

Background Information Document

DMPR reference number: FS30/5/1/2/3/2/1(10098) EM
DWS reference number: WU50090

Purpose of the Document

This Background Information Document aims to provide you with important information regarding:

- Project background of the Jelani Joint Venture (JV) Underground Mining Project ("Project"), located in the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality, Free State Province.
- The independent Environmental Impact Assessment (EIA) and the Public Participation Process (PPP) to be undertaken as part of the Environmental Authorisation process.
- Integrated Water Use Licence (IWUL) approval requirements.
- The Public Participation Process (PPP) that will be undertaken as part of the IWULA process.
- How can you register as an Interested and Affected Party (I&AP) and be kept informed about the Project's developments?
- Public review and comment period for the Draft Scoping Report.

Project Background

Jelani Resources (Pty) Ltd is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

The Proposed Project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

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Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1 200 mbs). As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

Conventional Breast Mining

Where the orebody dips below 55°, conventional breast mining will be used. Footwall drives will be developed in the strike direction, between 40 to 48m below the mining horizon. Crosscuts will subsequently be developed perpendicularly to the footwall drives, towards the reef horizon. Access to the reef horizon will be by travelling way, developed from the crosscut. Ore passes will be developed between the reef horizon and the crosscut for the removal of blasted ore from the stope. On the stope horizon, a raise or centre gully will be developed between levels up the centre of the mining block. Breast mining panels will be established off the centre gully. The panels will be mined approximately in the strike direction away from the centre gully to the stope block limit. An advanced strike gully (ASG) will be carried on the down dip side of each mining panel for access to the stope face and for clearing of blasted ore from the face. Typically, two stope ore passes will be situated in the centre gully which will connect the stoping areas to the footwall infrastructure. All ore produced in the stopes will be scraped into the ore passes for loading in the crosscut. Figure 1 shows a plan of a typical stope block.

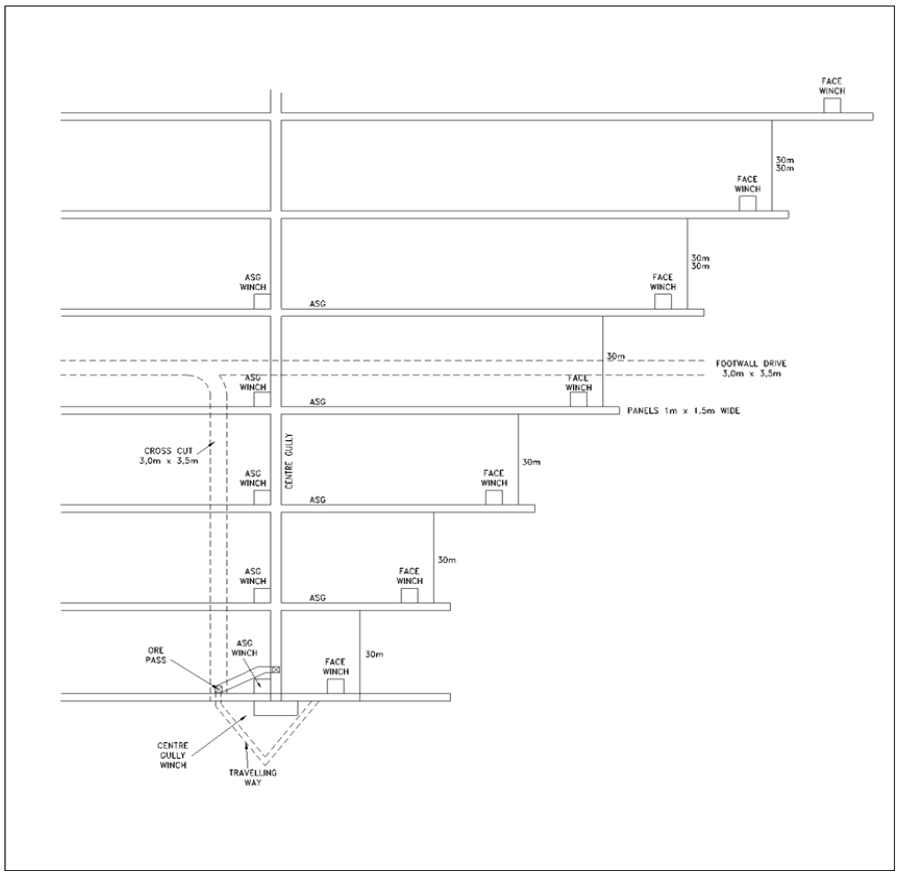


Figure 1: Schematic plan view of a conventional stope block

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The breast faces will be drilled using hand-held, hydro-powered rock drills and airlegs. Blast holes will be charged with packaged emulsion explosives. Scraper cleaning will be used in the stope horizon. Ore will be scraped from the face, into the ASG and then into the centre gully. From the centre gully the rock is scraped over a stope grizzly into the ore pass. The bottom of the ore pass is equipped with a boxfront with a hydraulically operated gate.

Where multiple reefs occur, and both are payable and are planned to be mined, the order of mining will be to extract the uppermost reef first, working downwards.

Shrinkage Stoping

Shrinkage stoping is an overhand mining method that relies on broken material being left in the stope to be used as the "working floor" and to support the walls. The shrinkage stope is accessed via a travelling way. The stope is established and accessed by the development of two raises, one on each end of the stope panel.

Two drives, separated by a sill pillar, are established at the bottom of the stope. Draw points are developed between the two drives for loading ore from the stope. Once the stope preparation development and equipping has been completed stoping commences by advancing the stope face up-dip from the sill drive. After each blast sufficient ore is drawn out to allow access between the new stope face and the top of the muckpile. Once the stope face reaches the upper limit, which is normally defined by a crown pillar, all men and equipment are withdrawn from the stope and the remaining ore is drawn from the stope. Ore is drawn out of the stope by operating the scraper winch in the reef drive. This clears rock from the draw points and allows the ore to continue to flow.

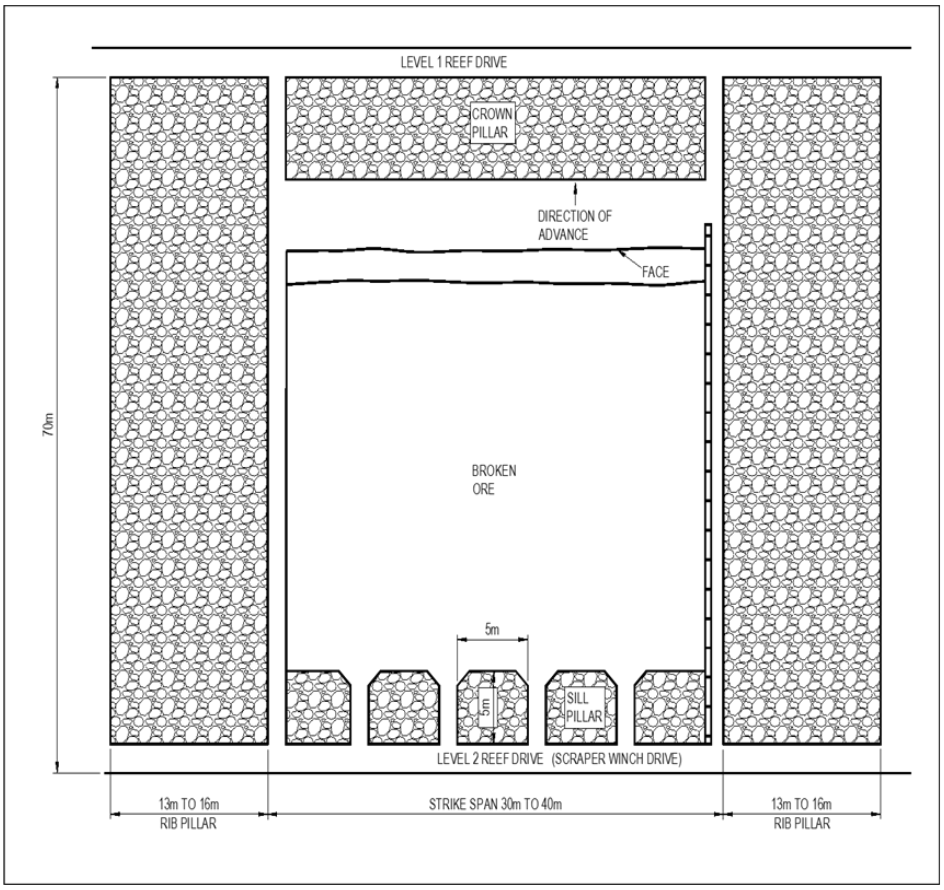


Figure 2: Schematic long section illustrating a typical shrinkage stope

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Ore will be transported to the shaft ore pass system using a conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mine's life, be used for the movement of men, material and rock depending on which phase the mine is in.

Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4 and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations/targets. A layout of the proposed Target 3 shaft surface infrastructure which either needs to be refurbished or constructed is presented in Figure 3. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished. Mining activities during this phase will take place between 57 Level and 48 Level (Figure 4).



Figure 3: Target No 3 shaft surface infrastructure layout

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The No 3 shaft surface infrastructure will compromise of the following (as numbered):

1. No 3 shaft
2. Shaft facilities
   (a) Lamp repair
   (b) Proto room
   (c) Lamp room
3. Change house facilities
   (a) Main laundry
   (b) Main change house
4. Compressor house
5. Waste rock dump
6. Surface rock handling
7. Main substation
8. Parking area
9. Offices
   (a) Management, administration and technical services
   (b) Mining
   (c) Engineering
10. Man winder
11. Barlow winder
12. Rock winder
13. Fridge plant
14. Store building
15. Services/fitting workshops
16. Dirty water dam & pump station
17. Sewerage plant
18. Evaporation plant
19. Change house
20. No 4 shaft ventilation fans
21. Security office
22. Explosives store
23. Conveyors
24. Laydown area and salvage yard
25. Walkway
26. Marshalling yard
27. Drop off area
28. Ablution block
29. Laundry
30. Change houses
31. Offices
32. Lapa
33. Parking
34. Parking
35. Turnstiles
36. Waiting area
37. Lean to roof
38. Underground store
39. Pump house
40. Service boiler shop
41. Services boiler store
42. Rail line
43. Pipeline
44. Security
45. Timber yard
46. Electrical workshop
47. Flammable store
48. Old oil store

An overview of the Target 3 Shaft with level elevations, is shown in Figure 4.

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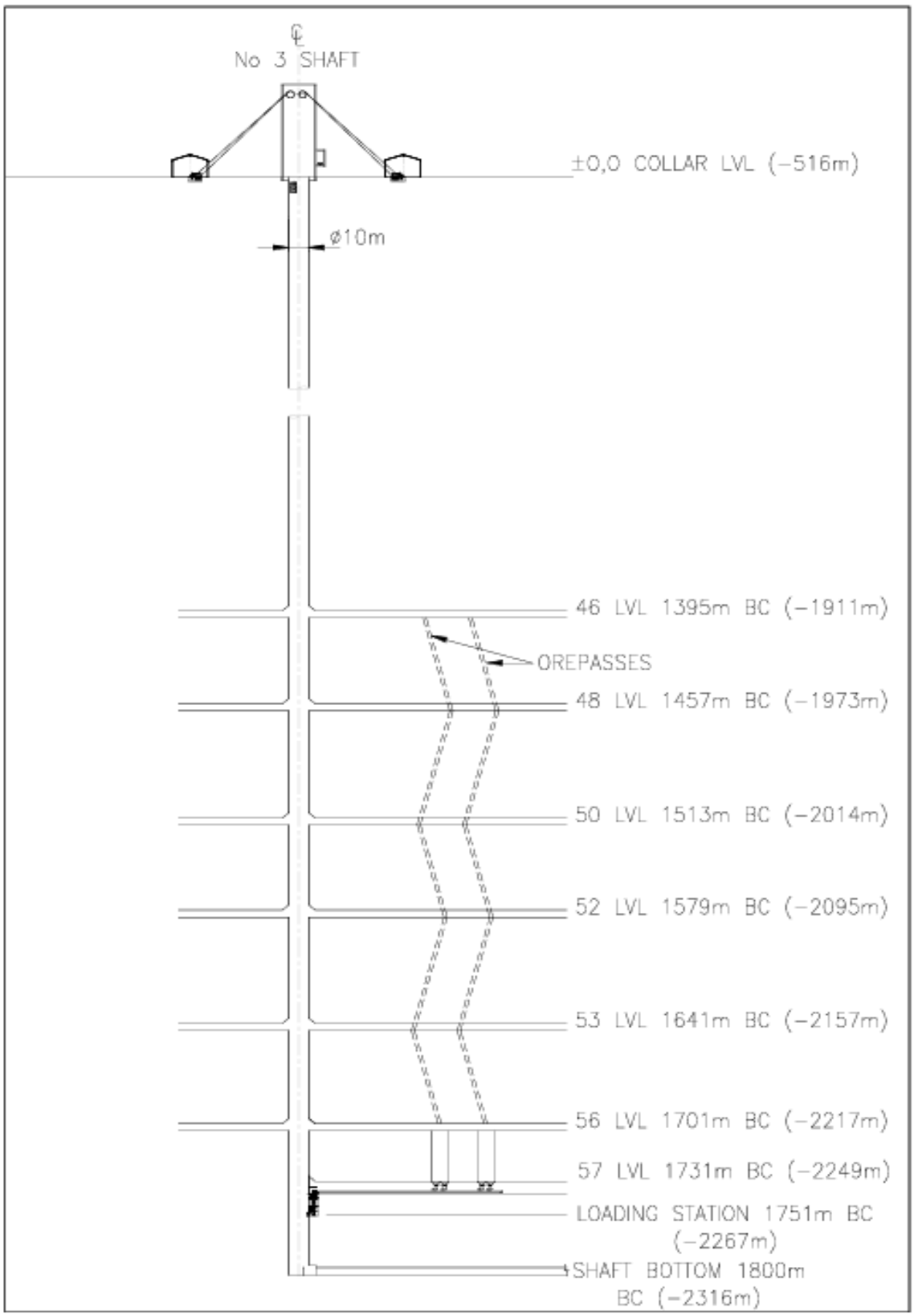


Figure 4: Target 3 shaft longitudinal arrangement

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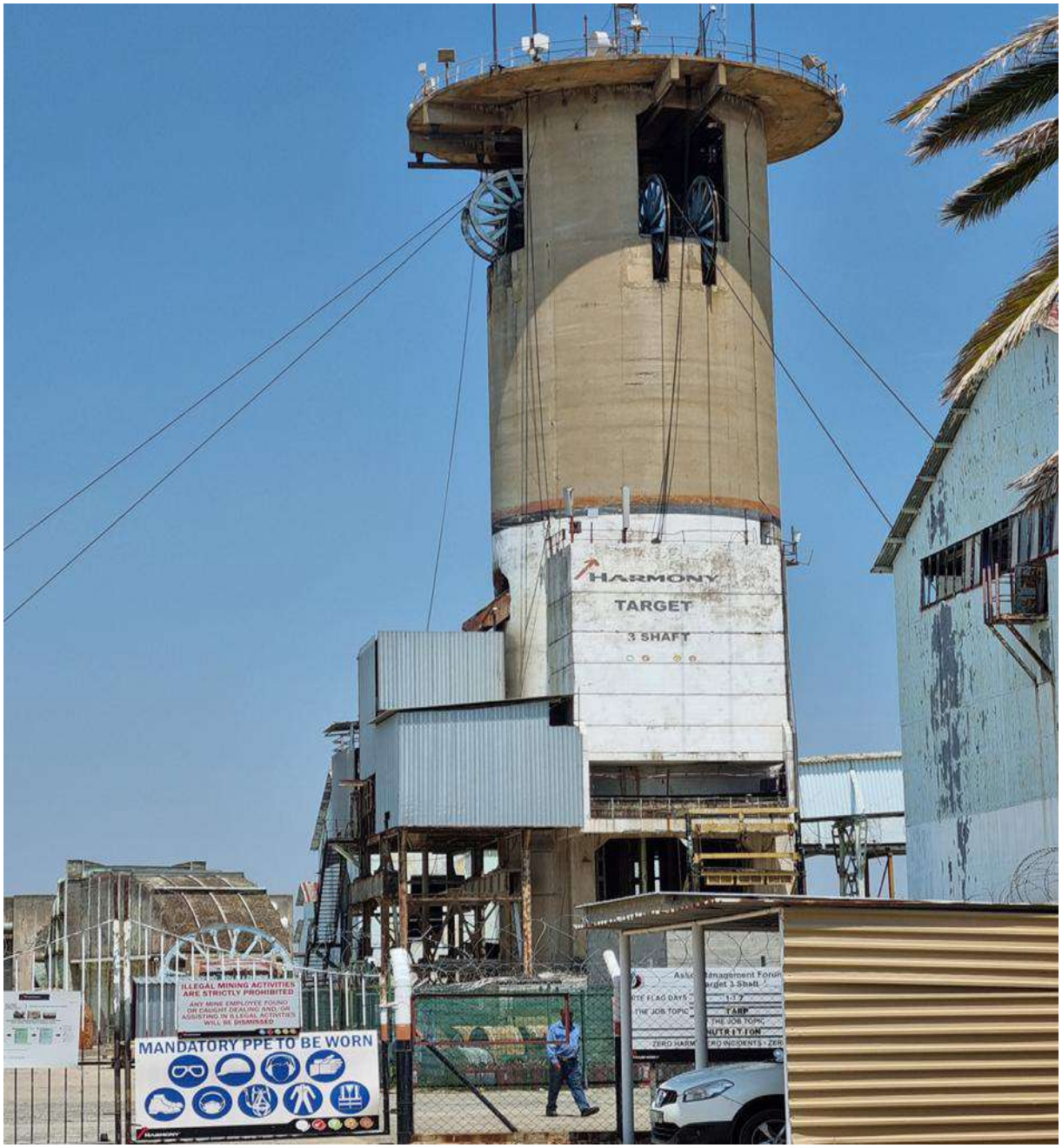


Figure 5: Harmony Target No 3 Shaft

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet. Mining activities in this phase are planned to occur above 48 Level and below 57 Level.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated with the Proposed Project will be relocated to this shaft.

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Figure 6: Harmony Target No 2 Shaft

A layout of the current Target No 2 Shaft surface infrastructure as well as the proposed new infrastructures which are required to be constructed are presented in Figure 7.

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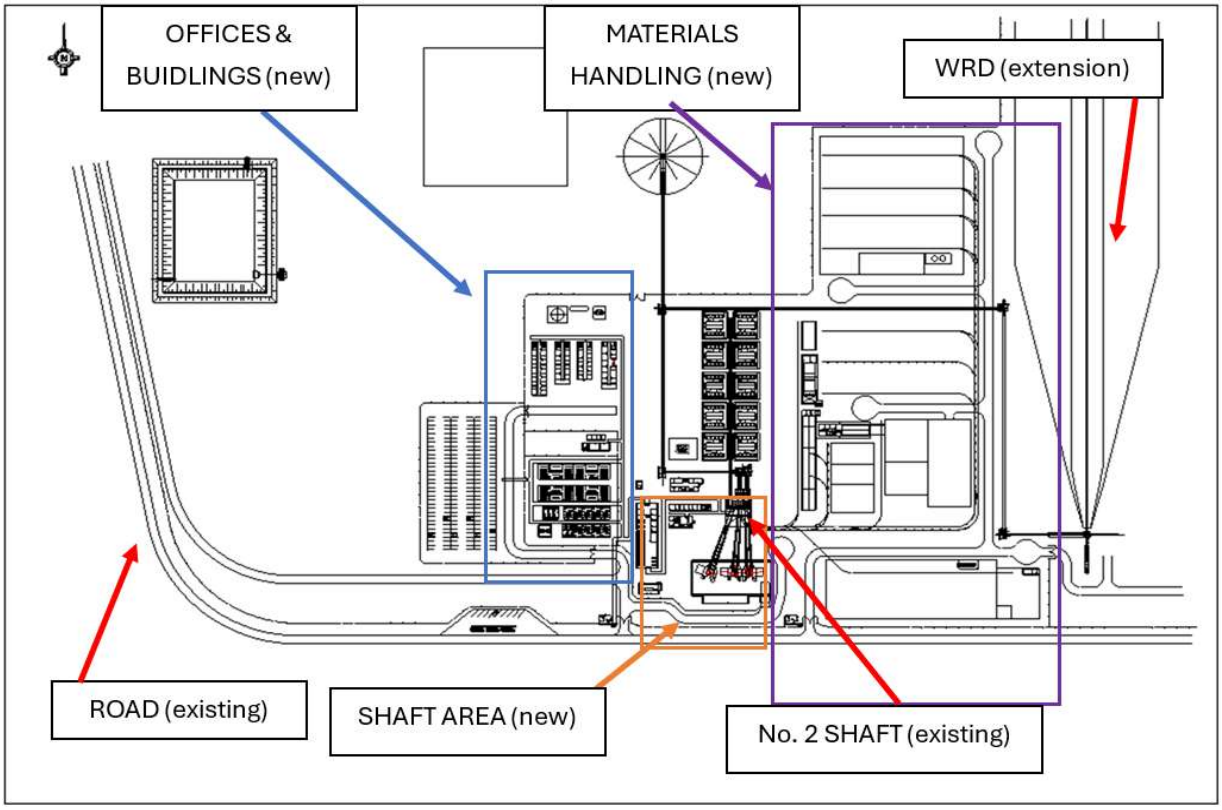


Figure 7: Target No 2 Shaft new and existing infrastructure

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, with short gravel access tracks provided for each station. These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

Project Location

The Proposed Project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 1,5km west of Allanridge town, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality. Refer to Figure 8 for the Proposed Project local orientation. Below is a summary of the location of the Project Site (Table 1).

Table 1: Summary of the Location of the Project Site

Province	Free State Province
Municipality	Matjhabeng Local Municipality
Ward Number	36
Nearest Town	Allanridge

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Table 2 below shows the properties that are directly affected by the Proposed Project.

Table 2: Description of Directly Affected Properties

Farm Name	Farm ID	Farm Portion	SG Code
Welvaart No. 63	RD	0 (RE)	F02400000000006300000
Welvaart No. 63	RD	1	F02400000000006300001
Welvaart No. 63	RD	2	F02400000000006300002
Diamant No. 37	RD	0	F02400000000003700000
Graspan No. 40	RD	0 (RE)	F02400000000004000000
Graspan No. 40	RD	1	F02400000000004000001
Swartpan No. 436	RD	0 (RE)	F02400000000043600000

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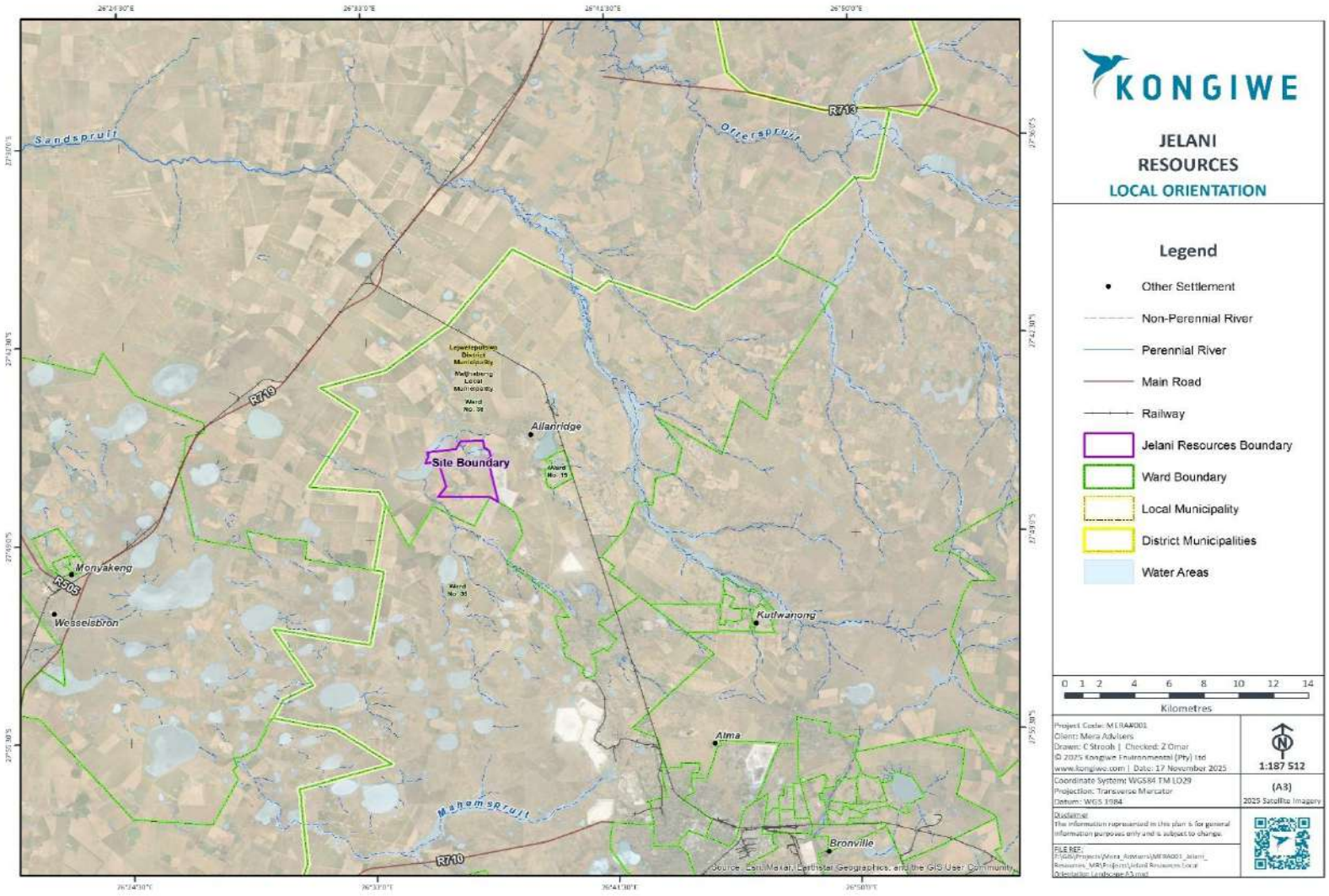


Figure 8: Local Orientation of the proposed JV Area Underground Mining Project

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Area Extent

The total extent of the application area is 956.76 hectares (ha).

Depth of Mineral below Surface

The orebodies extend between 1 500m and 2 600m below surface.

Proposed Beneficiation Process

All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

Life of Operation

10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years.

Project Schedule

Prior to the initiation of mine implementation and construction activities, various stages of design work will be required to be undertaken. It is expected that these activities will take approximately four years before implementation can be initiated. Active mining can commence during year 7. The key timelines are listed in Table below:

Table 3: Project timelines

Period	Description
Year 1 - 3	Site data gathering and feasibility studies
Year 4	Detailed engineering design
Year 5 - 8	Implementation and construction activities
Year 7	Hiring of employees
Year 7	Initiation of mining activities underground

The production build-up is planned to occur in two phases:

In Phase 1, which is planned to last for four years starting in Year 5, with construction and refurbishment with mining starting in Year 7. The first two years are required for level access and refurbishment, after which Target No 3 shaft will be used for hoisting of men, material and rock.

Phase 2 commences in Year 9, whereby access to the underground workings is via Target No 2 shaft, with Target No 3 shaft being reserved as a second outlet.

As mine development progresses over the first four years, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of ore per month, which is achieved in Year 10.

10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years.

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Access, Access Control and Security

The Proposed Project is located within an area served by an established road network. Public routes in close proximity to the site include existing roads currently used for Harmony Target Mine operations as well as gravel roads used by the local farmers.

Only the development of gravel access tracks to facilitate the monitoring of potential mining-induced seismicity and boundary interactions is anticipated at the project site.

Vehicle access to the shaft site is via the R30 public road, connecting to the existing mine access roads, that will continue to be used. No additional refurbishments are required on these roads other than possibly cutting back the overhanging branches of the two rows of trees that run along the entire length of the road.

The shaft site perimeter is already fenced and assumed to be according to the Harmony Standard, as no other security measures or devices were observed. Access to the shaft complex is controlled through the main access security gate. Provision has been made to refurbish the system.

Legislative Requirements and Good-Practice Guidelines

Applicable Legislation and International Best Practice

The Public Participation Process (PPP), as required by the environmental law and regulations specified therein, is being undertaken in line with the statutory requirements for public participation. The following legislation was considered when developing and implementing the PPP:

- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) (EIA 2014 Regulations).
- Public Participation guideline in terms of NEMA.
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA).
- National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEM:WA) and the List of Waste Management Activities (GN R921 of 29 November 2013, as amended).
- Protection of Personal Information Act, 2013 (Act No. 4 of 2013) (POPIA).
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000) (PAIA).

NEMA mandates public participation for environmental decision-making, ensuring affected communities have a voice in development projects through the EIA Regulations, 2014. The NEMA Public Participation Guideline (in terms of the EIA Regulations) is a mandatory part of the (EA process, aiming for transparent, informed decisions that promote sustainable development by integrating social, economic, and environmental factors.

The POPIA regulates the processing of personal information by both public and private bodies, aiming to protect individuals' constitutional right to privacy.

The PAIA gives effect to the constitutional right to access information held by both the state and private bodies. The Act establishes procedures for individuals to request information for the protection or exercise of their rights

In addition to the above legislation, the PPP needs to be aligned to International good-practice guidelines for public participation, particularly in regard to the following Core Values of the International Association for Public Participation (IAP2):

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- Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
- Public participation includes the promise that the public's contribution will influence the decision.
- Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
- Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
- Public participation seeks input from participants in designing how they participate.
- Public participation provides participants with the information they need to participate in a meaningful way.
- Public participation communicates to participants how their input affected the decision.

POPIA: Safeguarding Registered Person's Personal Information
In terms of section 19 of the Protection of Personal Information Act, 2013 (Act No. 4 of 2013) (POPIA), a responsible party must, subject to Sections 9 and 11 of the Act, ensure the integrity and confidentiality of personal information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss of, damage to or unauthorised destruction of personal information, unlawful access to or processing of personal information. POPIA requires that personal information should be adequately protected to avoid unauthorised access. Therefore, Kongiwe continuously reviews security controls and procedures to ensure that personal information is secured. It should be noted that in terms of Section 11, personal information may be processed to the extent that this is necessary for pursuing the legitimate interests of the responsible party or parties to whom the information is supplied.

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

Kongiwe Environmental (Kongiwe) has been tasked with conducting the Scoping and Environmental Impact Assessment (S&EIA)/Integrated Water Use Licence application (IWULA) process which is aimed at critically evaluating the potential environmental and social impacts of the Project.

The steps involved in the EIA process are outlined in Figure 9.

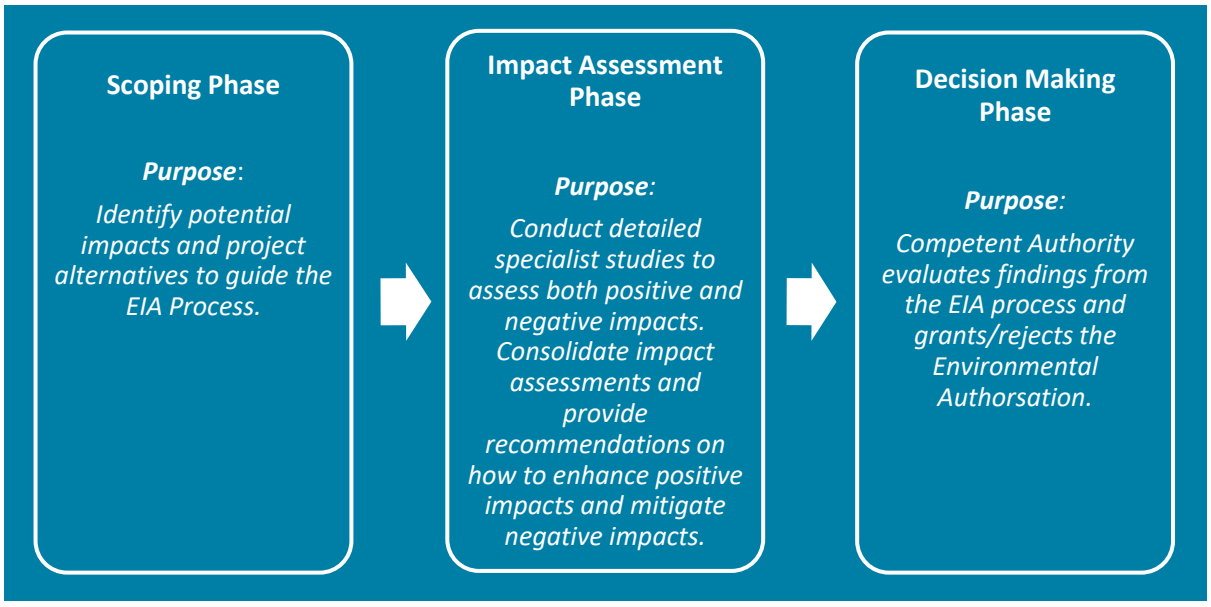


Figure 9: S&EIA Process

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INTEGRATED WATER USE LICENCE

An IWULA will be undertaken for water uses associated with Section 21 of the National Water Act, 1998 (Act No.36 of 1998) (NWA). Section 21 (c) and (i) activities are activities that impede or divert the flow of water in a watercourse; or which alter the bed, banks, course or characteristics of a watercourse.

Specialist Studies

Various specialist studies are being undertaken as part of the S&EIA/IWULA process to assess the potential impacts associated with the proposed project. Specialist studies being undertaken include:

- Social Impact Assessment
- Desktop Heritage/Cultural and Palaeontology Assessments
- Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential
- Air Quality Impact Assessment
- Climate Change Impact Assessment
- Financial Provision Calculation, Environmental Risk and Final Rehabilitation and Closure Plan
- Hydrological Assessment
- Hydrogeological Assessment
- Blasting and Vibrations

The findings of the specialist studies will be incorporated into the EIA/EMPr and the IWWMP.

Public Participation Process

The Public Participation Process (PPP) will form part of the EIA/EMPr and IWULA process. The PPP offers stakeholders an opportunity to be informed about the Project, to raise issues and to make suggestions for enhanced Project benefits. It also outlines the ways in which the Project team will communicate with stakeholders.

The PPP has been developed to ensure compliance with the relevant legislation and facilitate meaningful stakeholder engagement for the EIA/EMPr and IWULA process.

Availability of the Draft Scoping Report for Public Review and Comment

As part of the Scoping Process, the applicant is required to compile a **Draft Scoping Report (DSR)** for mining-related activities. The DSR will be available for public review and comment for a period of 30 days from **Thursday, 21 May 2026 to Monday, 22 June 2026.**

A notification of the availability of the DSR for public review and comment was distributed on **Thursday, 14 May 2026,** to all stakeholders on the database.

The DSR will be made available as follows:

- An electronic copy on Kongiwe's website: https://kongiwe.com/projects/.
- A hard copy at the **Allanridge Public Library**. Contact details are shown in Table 4.

The non-technical summaries of the **DSR** will be available electronically to all stakeholders on the stakeholder database and distributed in hard copy at the Open Day (discussed below).

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Table 4: Libraries with Hard Copies of the Draft Scoping Report

Location	Physical Address	Contact Person
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063) Monday - Friday Open: 08:00 Close: 15:30

Availability of the EIA/EMPr and IWWMP for Public Review and Comment

During the EIA phase of the project, the Draft Environmental Impact Assessment and Draft Environmental Management Programme (DEIA/EMPr) will be made available for public review for **30 days.**

Once the information required for the IWULA has been finalised, a technical report, in support of the IWULA process, will be made available for a public review and commenting period of **60 days**. It is anticipated that the IWULA report will be made available during the impact assessment phase. Information regarding the availability of the IWULA technical report and how stakeholders can provide their comments will be communicated to all stakeholders.

Stakeholder Engagement Meetings

Stakeholders are invited to participate through online and in-person engagements. Consultation meetings will be held using platforms like Microsoft Teams, and Open Days. The purpose of these meetings is to discuss the Project and the contents of the Draft Scoping Report, and to provide Interested and Affected Parties (I&APs) with the opportunity to raise their comments and to interact with the project team.

Table 5 provides details of the proposed stakeholder meetings. Please confirm your attendance for the meeting *(Confirmation of attendance may be submitted via the stakeholder's email address or telephonically*).

Table 5: Schedule of Stakeholder Meeting

Proposed Dates	Available Time Slots	Method of Engagement
Online Meeting		
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams
In-Person Meetings: Open Day		
Saturday, 30 May 2026	11H00 – 13H00	S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490

Invitation to be Involved as a Stakeholder

Kongiwe has put measures in place to ensure that all stakeholders are meaningfully consulted by using a wide range of media, documents and online tools. The proposed methods of engagement for the Project are as follows:

- Telephonic consultations.
- Short Message Services (SMSes).

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- Email correspondence:
  - Stakeholders with access to emails are requested to send their comments/queries via email.
  - Stakeholders can email their Registration and Comment Forms.
- Online engagements:
  - Project information will be timeously uploaded on Kongiwe's website.
  - Microsoft Teams meetings.
- In-person Engagements:
  - One-on-one consultation meetings.
  - Open Day.

The purpose of the above-mentioned methods of engagement is to encourage dialogue with stakeholders and provide stakeholders with opportunities to raise their comments. Minutes of all meetings with stakeholders will be compiled and recorded in the Comments and Responses Report (CRR). Stakeholders are encouraged to indicate their preferred method of engagement on the Registration Form below the BID.

For consultation to be Inclusive, it is the Responsibility of Stakeholders to

- Register or ensure you are registered as an I&AP.
- Inform others whom you think may be interested and/or affected by the Project.
- Provide comments on the Project.
- Ensure comments are submitted within the allowed timeframes and received by the Stakeholder Engagement office.
- Contribute information and/or knowledge of the Project area's environment.
- Attend meetings that are scheduled throughout the process to participate and access information.

Comments and Queries

Any person affected by or who may be interested in the Project are encouraged to complete the Registration and Comments Form provided below this document (BID) should they have any comments / queries.

Contact Details		
Ms Jean-Mari Williams	+27 (10) 140 1726	stakeholders@kongiwe.com
Ms Vanessa Viljoen	+27 (10) 140 1725	stakeholders@kongiwe.com

Our team welcomes your participation and looks forward to your involvement throughout this process

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Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

DMPR reference number: FS30/5/1/2/3/2/1(10098) EM

DWS reference number: WU50090

Stakeholder Registration and Comment Form

Please return a completed registration form to the Stakeholder Engagement Team:

Ms Jean-Mari Williams / Phone: (010) 140 1726 / Ms Vanessa Viljoen / Phone: (010) 140 1725 or E-mail: stakeholders@kongiwe.com

Postal Address: PostNet Suite No 163, Private Bag X21, Bryanston, 2021

Please provide your complete contact details:												
Landowner	Property											
Land Occupier	Property						Property Owner					
Title	Mr		Mrs		Ms		Dr		Prof		Other	
First Name												
Surname												
Organisation												
Position in Organisation												
Contact Details	Cell						Tel					
Email Address												
Postal Address												
Please indicate your preferred method of communication	Email			SMS			Post					

I intend attending the stakeholders' meeting (Please indicate your preference)

Meeting Dates	Available Time Slots	Method of Engagement	Yes	No
Online Meeting:				
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams	Yes	No
In-Person Meeting: Open Day				
Saturday, 30 May 2026	11H00 – 13H00	S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490	Yes	No

Do you have any comments/suggestions regarding the proposed project? If so, please complete the section below/ send your comments to the stakeholder engagement team- please see details above.

Comments/Suggestions

Please provide contact details of any other stakeholders we should consult:							
Title	Mr	Mrs	Ms	Dr	Prof	Other	
First Name							
Surname							
Organisation/ Property / Business							
Cell Phone							
Email							
Title	Mr	Mrs	Ms	Dr	Prof	Other	
First Name							
Surname							
Organisation/ Farm / Business							
Cell Phone							
Email							

Please note that the information supplied herein constitutes Personal Information as contemplated in Protection of Personal Information Act, 2013 (POPIA). All your rights as set out in the Act will continue to be protected and Kongiwe will be accountable to ensure that all conditions for lawful processing are met. Your signature will be regarded as granting consent for the processing of the information strictly in accordance with the provisions of the Act. It must be noted that POPIA does not prevent any private body from exercising or performing its powers, duties and functions in terms of the law and accordingly the EAP and any appellant may perform its duties under the National Appeal Regulations provided the processing is in accordance with POPIA and meets the requirements of the National Appeal Regulations.

Signature		**Date**	

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Appendix C4: Newspaper Advertisement

Time trials

The runners Thapelo Khanali and Raboroko Mojalefa recorded the fastest times in the 8 km Harmony Striders time trials on 13 May. Khanali clocked 33:22, while Mojalefa finished in 33:50. Junior Tholobi completed the trials in a time of 40:30.

8 KM RESULTS

Thapelo Khanali 33:22, Raboroko Mojalefa 33:50, Junior Tholobi 40:30, Kananelo 41:44, Johan Rheeder 45:04, Daemane Makhate 49:31, Amelia du Plessis 54:24, Arthur Penny 56:45, Nico Dicks 64:01, Johan Pretorius 65:19, Deleen van Rooyen 67:00 and Yvonne Visagie 67:00.

4 KM RESULTS

Monyane Raliengoane 14:36, Kananelo Sejentu 14:51, Makhaya Mzwakie 15:27, Jacob Tseko 15:30, Kamohelo Nyamane 16:03, Skosana 18:20, Andre van Niekerk 19:22, Reggie Mokhosi 20:21, Thoriso Mokhanedi 21:15, Jaco Potgieter 21:01, Ramongalo Ntsoari 21:51, Morne Nel 22:58, Deon Lodder 23:07, Rudolph Rabie 24:14, Rina Nel 24:32, Kershney Noortman 26:01, Lientjie Blom 30:55, Zama Fixane 31:58, Clayton Anderson 32:35, Twane Anderson 33:25, Manyeza B 41:30 and Ishmael Dhlamini 49:50.

• The Engen Toy Run of 30 May has been cancelled due to the withdrawal of the sponsor.

Ingesluit in rugbyspanne

Agt leerders van die Welkom-Volkskool is in die onderskeie o.12- en o.13-Griffon-rugbyspanne ingesluit. Van links is, voor: Neymar Swartz, Marnus Haasbroek en Ben Swart; agter: George Ferreira, Oratile Thomas, Nicolas Goosen, Quillan Kleinkie en Renier Taute.
FOTO: Verskaf



TSEBISO MABAPI LE MONYETLA OA HO NKA KAROLO TS'EBETSONG EA TUMELLO EA TIKOLOHO BAKENG SA PROJEKE E RERILOENG EA HARMONY NOOITGEDACHT TAILINGS STORAGE FACILITY, ASSOCIATED PIPELINES AND LOW PRESSURE WATER SYSTEM, MASEPALENG OA LEHAE OA MATJHABENG, PROFINSENG EA FREE STATE, AFRIKA BOROA.

Joaloka motho ea ngolisitsoeng ea nang le thahasello le ea amehang (I&AP) bakeng sa projeke e boletsoeng kaholimo, o tsebisoa ka monyetla o latelang oa ho nka karolo sechabeng:

Tlhaloso ea ketsahalo:
Ho fumaneha ha Tlaleho ea Tlhahlobo ea Tšusumetso ea Tikoloho bakeng sa Tlhahlobo ea Sechaba le Maikutlo

Hokae:
Kopi e thata ea tlaleho e ka bonoa ho:
Laeborari ea Sechaba ea Welkom (Cnr Reinet le Seterata sa Tulbagh, Welkom Central, Free State)
Kopi ea elektroniki e ka kopitsoa webosaeteng ea EIMS:
https://www.eims.co.za/public-participation/

Neng:
Nako ea ho fana ka maikutlo le tlhahlobo ea Tlaleho e tla nka matsatsi a **30 ho tloha** ka la **22 Motsheanong 2026 ho isa ho la 22 Phupjane 2026**

Ntle le moo, o tla tsebisoa ka monyetla o ka tlase:

Tlhaloso ea ketsahalo:
Seboka sa Sechaba sa Karolo ea EIA

Hokae:
Welkom Inn (Corner Stateway le, Tempest Rd, Welkom, Free State)

Neng:
La 11 Phupjane 2026, ho tloha ka 12:00 ho isa ho 14:00

Ditlatsetso tsohle tse fumanoeng ke EIMS di tla kenyelletsoa ditlhahisong tse latelang ho ba boholong ba amehang ba nang le bokhoni bakeng sa ho hlahlojwa ts'ebetsong ya bona ya ho etsa diqeto.

Ngoliso ea I&AP, kapa lipotso leha e le life, litlhaloso, kapa matšoenyeho mabapi le kopo ena, li ka lebisoa ho EIMS ho:
Motho yo go ka Buisanwang le ene ke: Mbali Tshabalala
Nomoro ea Tshupiso ea EIMS: 1565
Aterese ea poso: PO Box 2083; Pinegowrie; 2123
Mohala: (011) 789 7170
Fekse: (086) 571 9047
Emeile: nooitgedacht@eims.co.za
Ka kopo kenyelletsa nomoro ea referense ea projeke ea **1565** mangolo ohle.

EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

NW10059014-VI210526

NOTIFICATION REGARDING OPPORTUNITY TO PARTICIPATE IN THE ENVIRONMENTAL APPROVAL PROCESS FOR THE PROPOSED HARMONY NOOITGEDACHT TAILINGS STORAGE FACILITY PROJECT, ASSOCIATED PIPELINES AND LOW PRESSURE WATER SYSTEM, IN THE MATJHABENG LOCAL MUNICIPALITY, FREE STATE PROVINCE, SOUTH AFRICA.

As a registered Interested and Affected Party (I&AP) for the above mentioned project, you are hereby notified of the following opportunity for public participation:

Description of event:
Availability of the Environmental Impact Assessment Report for public Review and Comment

Where:
A **hard copy** of the report can be viewed at:
Welkom Public Library (Cnr Reinet and Tulbagh Street, Welkom Central, Free State)
An electronic **copy** can be downloaded from the EIMS website:
https://www.eims.co.za/public-participation/

When:
The comment and review period for the Report will last for **30 days** from **22 May 2026 to 22 June 2026**
Additionally, you are also notified of the opportunity below:

Description of event:
EIA Phase Public Meeting

Where:
Welkom Inn (Corner Stateway and, Tempest Rd, Welkom, Free State)

When:
11 June 2026, from 12:00 to 14:00

All inputs received by EIMS will be included in subsequent submissions to the relevant competent authorities for consideration in their decision making process.

I&AP registrations, or any queries, comments, or concerns with regards to this application, can be directed to EIMS at:
Contact Person: Mbali Tshabalala
EIMS Reference Number: 1565
Postal Address: P.O. Box 2083; Pinegowrie; 2123
Telephone: (011) 789 7170
Fax: (086) 571 9047
E-mail: nooitgedacht@eims.co.za
Please include the project reference number **1565** in all correspondence.

EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

NW10059016-VI210526

Environmental Authorisation and Integrated Water Use Licence Application for the Jelani Joint Venture (JV) Underground Mining Project, Free State Province

DMPR reference number: FS30/5/1/2/3/2/1(10098) EM • DWS reference number: WU50090

Applicant: **Jelani Resources (Pty) Ltd**
Project Name: **Jelani Joint Venture (JV) Underground Mining Project), Free State Province**

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) between White Rivers Exploration (WRE) and Harmony Gold, formed to conduct underground mining operations within the JV area in the Free State Province of South Africa. The joint venture area includes portions of Harmony Gold's existing Target Mine mining right area (Harmony contribution) and prospecting right areas located west of the Target Mine (WRE contribution).

Jelani is proposing to develop and to commence with underground mining within the same area (the Proposed Project). The primary mineral resource targeted is gold, with additional potential resources including silver, uranium, sulphur, platinum group metals, rare earth elements, diamonds (alluvial), and a range of base and ferrous metals such as copper, cobalt, manganese, molybdenum, nickel, lead, tungsten, zinc, and iron.

Mining will initially focus on shallower ore bodies at approximately 1,200 metres below surface. As mine development progresses, further mining areas will be opened, allowing production to gradually increase to a planned steady-state rate of 60,000 tonnes of ore per month.

Two underground mining methods have been identified as most suitable: conventional breast mining and shrinkage stoping. The selection of method is primarily determined by the dip of the mineralised reef, with shrinkage stoping applied to steeper reef sections, representing approximately 3% of the total stope tonnage. Where the orebody dips below 55°, conventional breast mining will be used.

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area. Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, with short gravel access tracks provided for each station. These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

Availability of the Draft Scoping Report (DSR) for Public Review and Comment: The DSR for the Project will be made available for public review and comment for **30 days**, from **Thursday, 21 May 2026 to Monday, 22 June 2026.**

The DSR will be made available on Kongiwe's website **https://kongiwe.com/projects/**, and an electronic copy will be made available upon request. In addition, non-technical summaries of the DSR will also be available electronically.

A hard copy of the DSR will be made available at the following public place: **Allanridge Public Library** (53 Caledon St, Allanridge), Contact: Ms Anna Matjelo, Librarian - (078) 713 2063.

Stakeholder Meetings: Consultation meetings will be held using platforms like Microsoft Teams (Online Meeting) and an Open Day. The purpose of these meetings is to discuss the Project and the contents of the DSR, and to provide Interested and Affected Parties (I&APs) with the opportunity to raise their comments and interact with the Project team. Please see below the proposed stakeholder meeting details:

Proposed dates	Available time slots	Method of Engagement/Venue
Online Meeting		
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams
In-Person Meeting: Open Day		
Saturday, 30 May 2026	11H00 – 13H00	S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge, 9490

To register as an I&AP please contact: Kongiwe Environmental Stakeholder Engagement Team
Ms Jean-Mari Williams - Phone: (010) 140 1726 / Ms Vanessa Viljoen - Phone: (010) 140 1725 or
E-mail: stakeholders@kongiwe.com
Our team welcomes your participation and looks forward to your involvement throughout this process.

KONGIWE

KENNISGEWING OOR GELEENTHEID OM DEEL TE NEEM AAN DIE OMGEWINGSGOEDKEURINGSPROSES VIR DIE VOORGESTELDE HARMONY NOOITGEDACHT AFVALBERGINGSFASILITEITPROJEK, GEASSOSIEERDE PYPLEIDINGS EN LAEDRUKWATERSTELSEL, IN DIE MATJHABENG PLAASLIKE MUNISIPALITEIT, VRYSTAATPROVINSIE, SUID-AFRIKA.

As 'n geregistreerde Belangstellende en Geraakte Party (BI&AP) vir bogenoemde projek, word jy hiermee in kennis gestel van die volgende geleentheid vir openbare deelname:

Beskrywing van die geleentheidgebeurtenis:
Beskikbaarheid van die Omgewingsimpakbepalingsverslag vir publieke openbare hersiening en kommentaar

Waar:
'n **Hardekopie** van die verslag kan besigtig word by:
Welkom Openbare Biblioteek (Cnr Reinet en Tulbaghstraat, Welkom Sentraal, Vrystaat)
'n Elektroniese **kopie** kan van die EIMS-webwerf afgelaai word:
https://www.eims.co.za/public-participation/

Wanneer:
Die kommentaar- en hersieningsperiode vir die verslag duur **30 dae van 22 Mei 2026 tot 22 Junie 2026**

Daarbenewens word jy ook van die geleentheid hieronder in kennis gestel:

Beskrywing van die gebeurtenis:
OIBEIA-fase Publieke Openbare Vergadering

Waar:
Welkom Inn (Hoek van Stateway en, Tempest Rd, Welkom, Vrystaat)

Wanneer:
11 Junie 2026, van 12:00 tot 14:00

Alle insette wat deur EIMS ontvang word, sal ingesluit word in daaropvolgende voorleggings aan die relevante bevoegde owerhede vir oorweging in hul besluitnemingsproses.

I&AP-registrasies, of enige navrae, kommentaar of bekommernisse rakende hierdie aansoek, kan aan EIMS gerig word by:
Kontakpersoon: Mbali Tshabalala
EIMS Verwysingsnommer: 1565
Posadres: Posbus 2083; Pinegowrie; 2123
Telefoon: (011) 789 7170
Faks: (086) 571 9047
E-pos: nooitgedacht@eims.co.za
Sluit asseblief die projekverwysingsnommer **1565** in alle korrespondensie in.

EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

NW10059013-VI210526

Appendix C5: Site Notice

Environmental Authorisation and Integrated Water Use Licence Application for the Jelani Joint Venture (JV) Underground Mining Project, Free State Province

DMPR reference number: FS30/5/1/2/3/2/1(10098) EM

DWS reference number: WU50090

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture between White Rivers Exploration (WRE) and Harmony Gold, formed to conduct underground mining operations in the Free State Province of South Africa. The joint venture area includes portions of Harmony Gold's existing Target Mine mining right area (Harmony contribution) and prospecting right areas located west of the Target Mine (WRE contribution).

Jelani is proposing to develop and to commence underground mining within the same area (the Project). The primary mineral resource targeted is gold, with additional potential resources including silver, uranium, sulphur, platinum group metals, rare earth elements, diamonds (alluvial), and a range of base and ferrous metals such as copper, cobalt, manganese, molybdenum, nickel, lead, tungsten, zinc, and iron.

Mining will initially focus on shallower ore bodies at approximately 1,200 metres below surface. As mine development progresses, further mining areas will be opened, allowing production to gradually increase to a planned steady-state rate of 60,000 tonnes of ore per month.

Two underground mining methods have been identified as most suitable: conventional breast mining and shrinkage stoping. The selection of method is primarily determined by the dip of the mineralised reef, with shrinkage stoping applied to steeper reef sections, representing approximately 3% of the total stope tonnage. Where the orebody dips below 55°, conventional breast mining will be used.

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area. Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, with short gravel access tracks provided for each station. These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

Availability of the Draft Scoping Report (DSR) for Public Review and Comment:

The **DSR** for the Project will be made available for public review and comment for 30 days, from **Thursday, 21 May 2026 to Monday, 22 June 2026.**

The **DSR** will be made available on Kongiwe's website https://kongiwe.com/projects/, and an electronic copy will be made available upon request. In addition, non-technical summaries of the **DSR** will also be available electronically.

A hard copy of the **DSR** will be made available at the following public place: **Allanridge Public Library** (53 Caledon St, Allanridge, Contact: Ms Anna Matjelo, Librarian - (078) 713 2063).

Stakeholder Meetings:

Consultation meetings will be held using platforms like Microsoft Teams (online meetings) and Open Days. The purpose of these meetings is to discuss the Project and the contents of the **DSR,** and to provide Interested and Affected Parties (I&APs) with the opportunity to raise their comments and to interact with the Project team. Please see below the proposed stakeholder meeting details:

Proposed Dates	Available Time Slots	Method of Engagement / Venue
Online Meeting		
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams
In-Person Meeting: Open Day		
Saturday, 30 May 2026	11H00 – 13H00	S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge, 9490

To register as an I&AP, contact:
Kongiwe Environmental Stakeholder Engagement Team
Ms Jean-Mari Williams - Phone: (010) 140 1726
Ms Vanessa Viljoen - Phone: (010) 140 1725
E-mail: stakeholders@kongiwe.com

Our team welcomes your participation and looks forward to your involvement throughout this process.

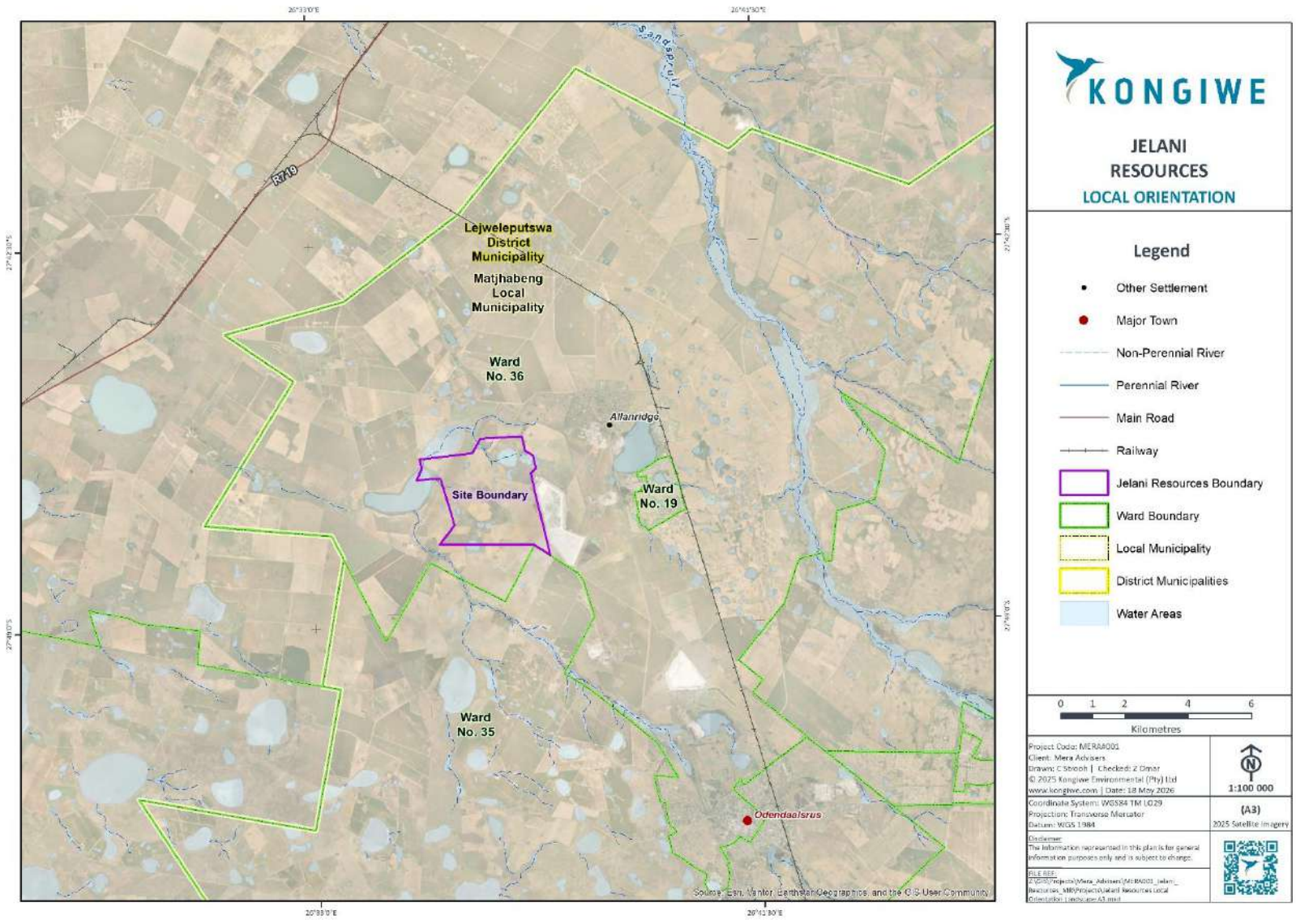
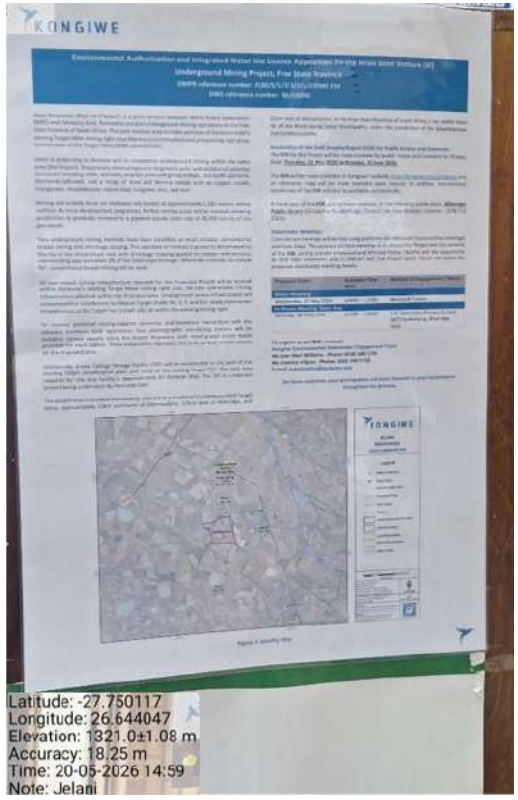


Figure 1: Locality Map

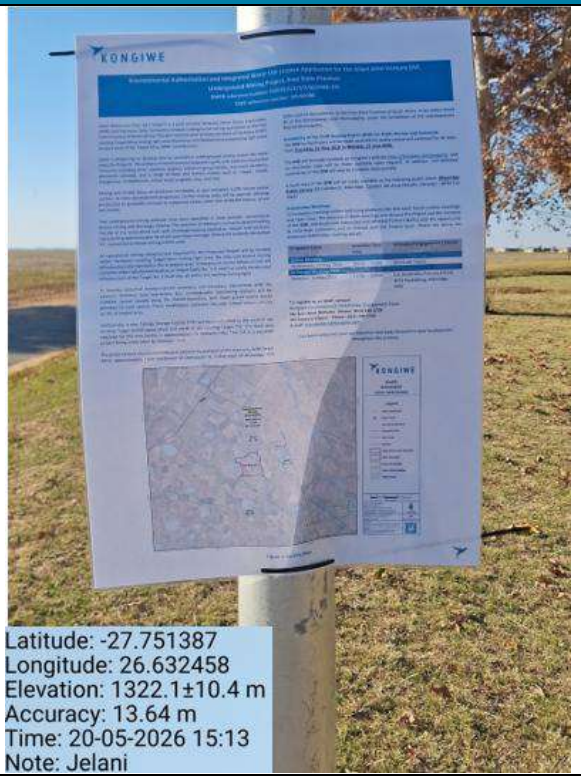
© 2026 Kongiwe Environmental (Pty) Ltd

Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province.

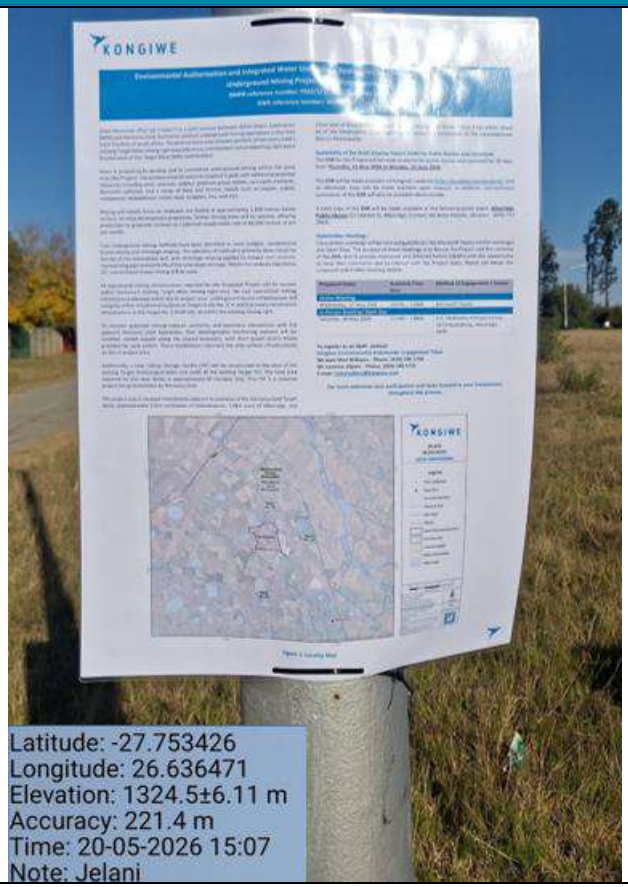
Site Notice Placement Report on Wednesday, 20 May 2026

Site Notice Number	Location	Co-ordinates	Photo
1.	Inside the Allanridge Public Library.	27°45' 00.42" S 26°38' 38.57" E	

© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
2.	Lamppost on the corner of Kildare Street and Caledon Street.	27°45' 04.99" S 26°37' 56.85" E	

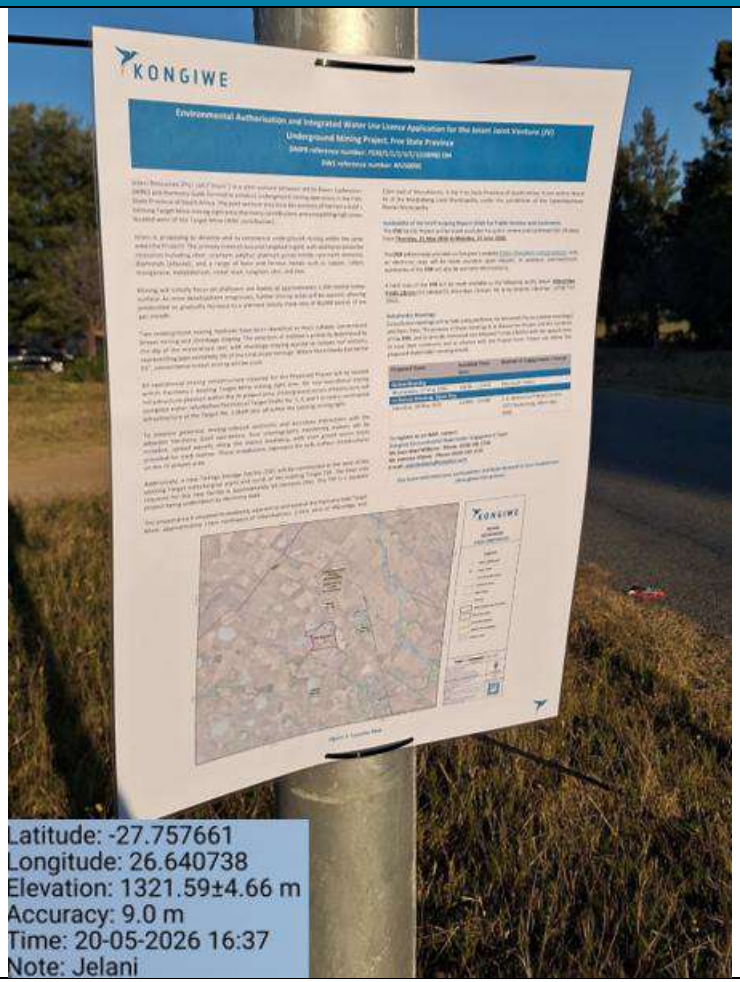
© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
3.	Lamppost on the corner of Assegaai Street and Mazeppa Street.	27°45' 12.33" S 26°38' 11.30" E	

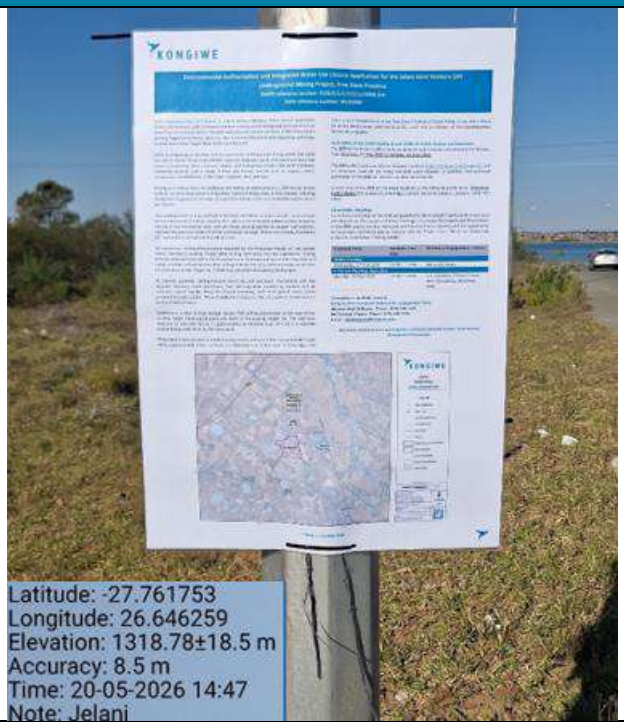
© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
4.	Lamppost across from Target Gold Mine – 1 Shaft on Buffalo Road.	27°45' 34.47" S 26°38' 35.52" E	

© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
5.	Lamppost across from Target Gold Mine – 1 Shaft on Buffalo Road.	27°45' 27.58" S 26°38' 26.66" E	

© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
6.	Lamppost across from Target Gold Mine – 1 Shaft on Buffalo Road, just off the R30.	27°45' 42.31" S 26°38' 46.53" E	

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Site Notice Number	Location	Co-ordinates	Photo
7.	Lamppost off the R30, at the entrance of the Nyakallong community.	27°46' 40.43" S 26°38' 53.08" E	

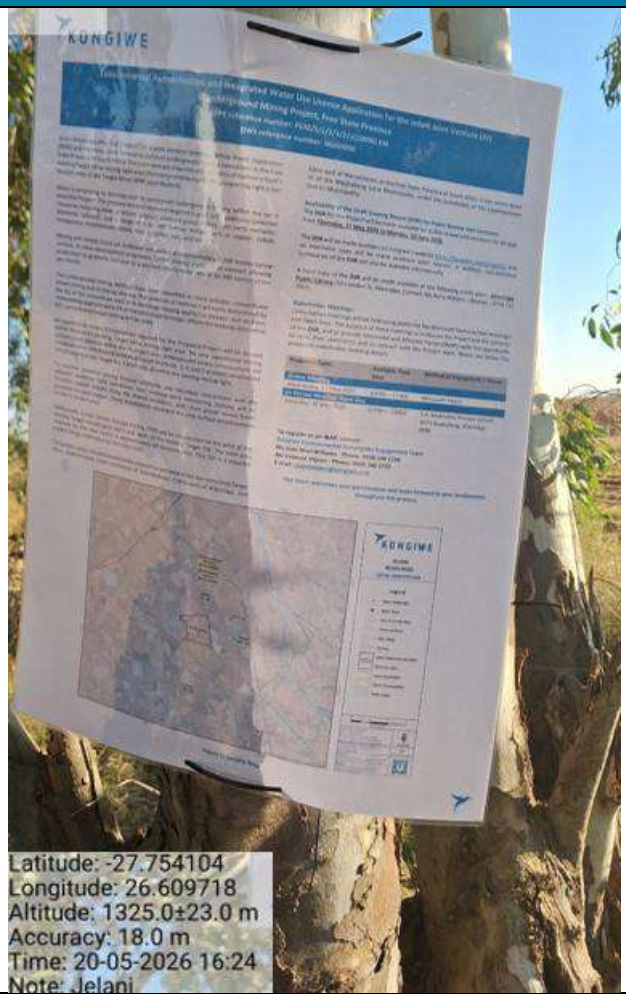
© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
8.	Telephone pole along the R30, next to Target Mine 2 entrance sign.	27°47' 03.80" S 26°38' 56.82" E	

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Site Notice Number	Location	Co-ordinates	Photo
9.	Telephone pole along the R30, across from Target 3 Shaft.	27°48' 56.83" S 26°39' 24.40" E	

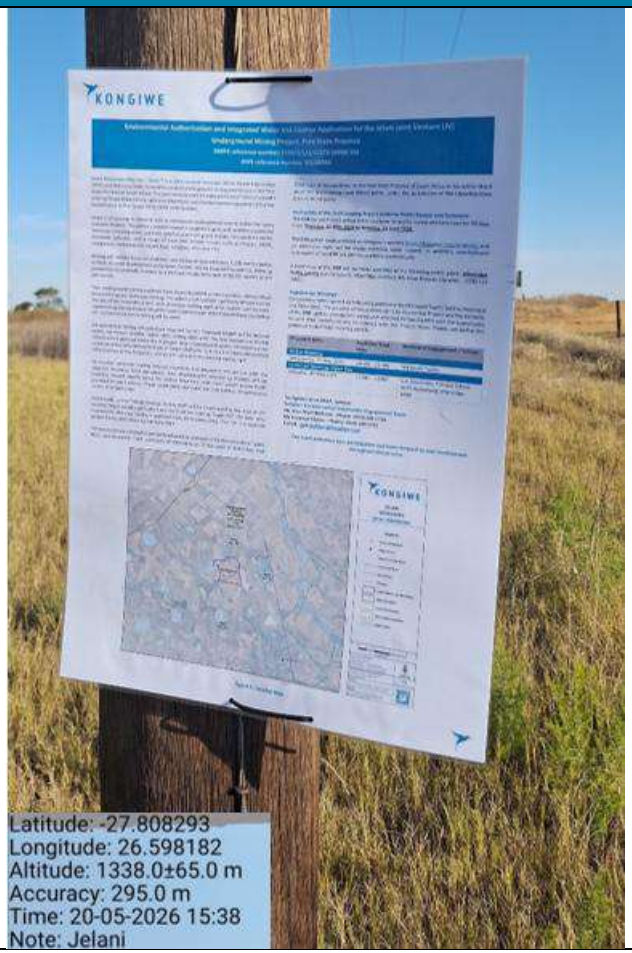
© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
10.	On a tree at the T-Junction along Caledon Street.	27°45' 14.77" S 26°36' 34.98" E	

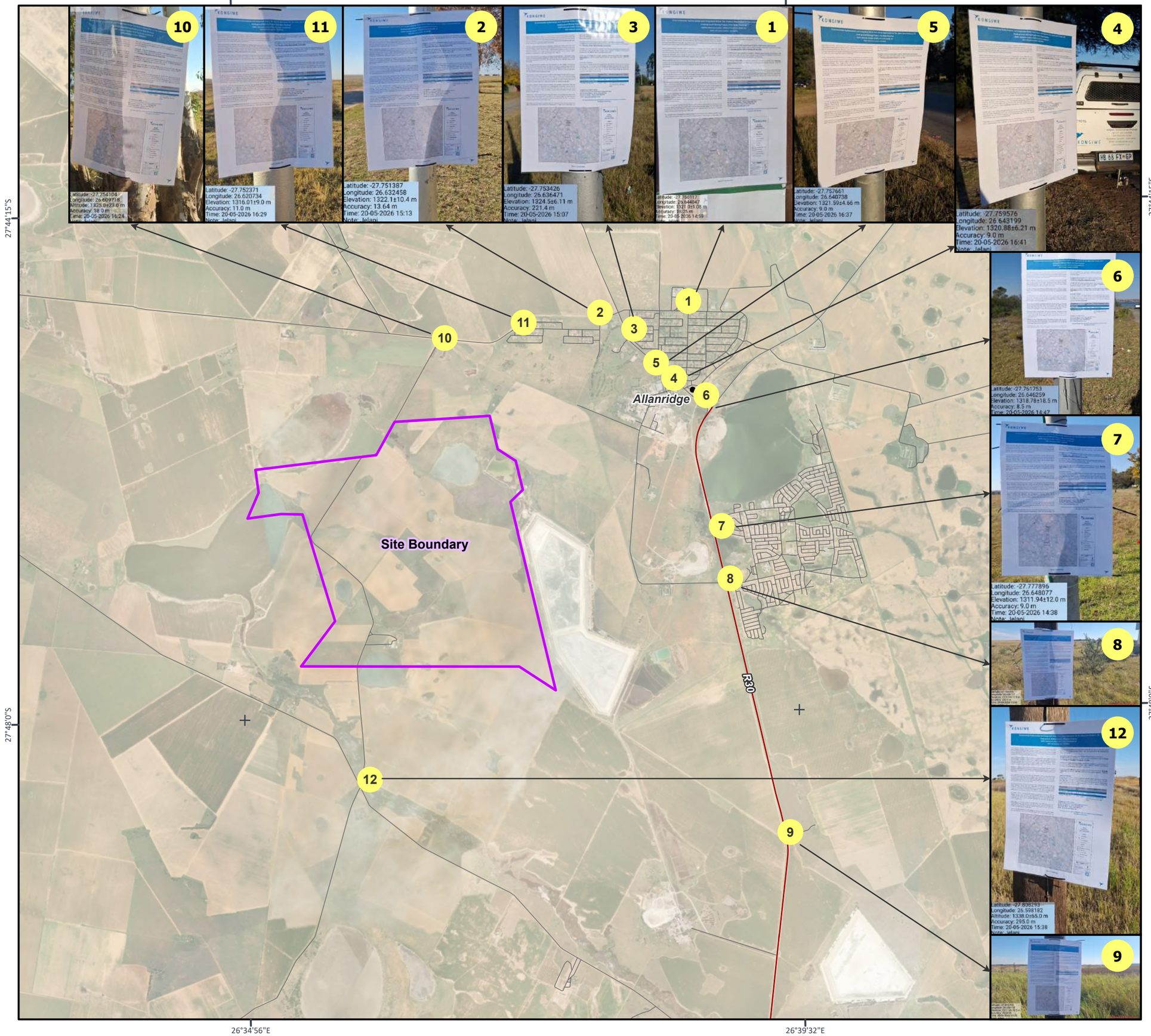
© 2026 Kongiwe Environmental (Pty) Ltd

Site Notice Number	Location	Co-ordinates	Photo
11.	Lamppost on the corner of Blarney Street.	27°45' 08.54" S 26°37' 14.64" E	

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Site Notice Number	Location	Co-ordinates	Photo
12.	Telephone pole at the crossroad of two main farm roads.	27°48' 29.85" S 26°35' 53.46" E	

26°34'56"E
26°39'32"E
27°44'15"S
27°48'0"S



JELANI RESOURCES

SITE NOTICES

Legend

- Other Settlement
- Local Roads
- Main Road
- Jelani Resources Boundary

0 0.5 1 2 3

Kilometres

Project Code: JELA#001 Client: Jelani Resources (Pty) Ltd Drawn: C Strooh - Checked: B Thornton © 2026 Kongiwe Environmental (Pty) Ltd www.kongiwe.com | Date: 25/05/2026	1:50 000
Coordinate System: WGS84 TM LO29 Projection: Transverse Mercator Datum: WGS 1984	A3 2026 Satellite Imagery
The information represented in this plan is for general information purposes only and is subject to change.	
File ref: ArcGIS\Projects\Jelani_Resources\JELA#001\PPP\PPP.aprx\Project_Site_Notices_A3L	

Appendix C6: Correspondence

Vanessa Viljoen

From: Kongiwe Stakeholder Engagement
Sent: Thursday, 14 May 2026 09:12
To: Vanessa Viljoen
Subject: Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province
Attachments: JELA_001_BID_13052026.pdf; JELA_001_REG_FRM_V1.pdf

Dear Stakeholder

Kongiwe Environmental (Pty) Ltd ("Kongiwe") hereby gives notice that the **Draft Scoping Report (DSR)** for the Environmental Authorisation and Integrated Water Use Licence (IWULA) of the Jelani Joint Venture (JV) Underground Mining Project ("Proposed Project"), located in the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality, Free State Province, is available for public review and comment.

Availability of the Draft DSR for Public Review and Comment
The **DSR** for the Proposed Project will be made available for public review and comment for **30 days**, from **Thursday, 21 May 2026 to Monday, 22 June 2026**.

The DSR will be made available as follows:

- An electronic copy on Kongiwe's website: https://kongiwe.com/projects/.
- A hard copy at the **Allenridge Public Library (please see details in table below).**

Location	Physical Address	Contact Person
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063) Monday - Friday Open: 08:00 Close: 15:30

Invitation to Online Meeting and Open Day:
Interested and Affected Parties (I&APS) are invited to attend an **Online Meeting and Open Day** as per indicated in the table below:

Proposed Dates	Available Time Slot	Method of Engagement
Online Meeting		
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams (once stakeholders have registered a Microsoft Teams link will be sent)
Open Day		
Saterday, 30 May 2026	11H00 -13H00	S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490

The purpose of the meeting is to discuss the Proposed Project and the contents of the **DSR** and to provide I&APs with the opportunity to raise their comments and to interact with the Project Team.

Please do not hesitate to contact us if you have any queries.

Kind Regards,

Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 1725 | Email: stakeholders@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.
www.kongiwe.com

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Jean-Mari Williams

From: Jean-Mari Williams
Sent: 2026/05/25 10:07:03
To: Kongiwe Stakeholder Engagement; Umeshree Naicker; Vanessa Viljoen; Ripfumelo Macevele
Subject: REMINDER: Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

---

Dear Stakeholder

Kongiwe Environmental (Pty) Ltd ("Kongiwe") hereby gives notice to **remind** you that the **Draft Scoping Report (DSR)** for the Environmental Authorisation and Integrated Water Use Licence (IWULA) of the Jelani Joint Venture (JV) Underground Mining Project ("Proposed Project"), located in the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality, Free State Province, is available for public review and comment.

Availability of the Draft DSR for Public Review and Comment
The **DSR** for the Proposed Project is available for public review and comment for **30 days**, from **Thursday, 21 May 2026 to Monday, 22 June 2026**.

Attached please find the summary of the Draft Scoping Report (DSR) for your perusal.

The DSR is available as follows:

- An electronic copy on Kongiwe's website: https://kongiwe.com/projects/.
- A hard copy at the **Allenridge Public Library (please see details in table below).**

Location	Physical Address	Contact Person
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063) Monday - Friday Open: 08:00 Close: 15:30

Invitation to Online Meeting and Open Day:
Interested and Affected Parties (I&APS) are invited to attend an **Online Meeting and Open Day** as per indicated in the table below:

Proposed Dates	Available Time Slot	Method of Engagement
Online Meeting		
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams (once stakeholders have registered a Microsoft Teams link will be sent)
Open Day		
Saterday, 30 May 2026	11H00 -13H00	S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490

The purpose of the meeting is to discuss the Proposed Project and the contents of the **DSR** and to provide I&APs with the opportunity to raise their comments and to interact with the Project Team.

Please do not hesitate to contact us if you have any queries.

Kind Regards,



Jean-Mari Williams| Project Co-ordinator | Kongiwe Environmental (Pty) Ltd
Tel: +27 (10) 140 6508 | Cell: +27 (74) 877 3436 |Fax: +27 (86) 476 6438 | Email: jwilliams@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa. www.kongiwe.com

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Vanessa Viljoen

From: Kongiwe Stakeholder Engagement
Sent: Tuesday, 22 September 2026 09:53
To: Vanessa Viljoen; Ripfumelo Macevele
Subject: EA and IWULA for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province
Attachments: JELA#001_DEIR_Not_Let.pdf

Dear Stakeholder

Kongiwe Environmental (Pty) Ltd (Kongiwe) hereby gives notice that the **Draft Environmental Impact Assessment (EIA) including the Draft Environmental Management Programme Report (EMPr)** and the **Draft Integrated Water and Waste Management Plan (IWWMP)** for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province, will be available for review and comment.

Availability of the Draft EIA/EMPr Reports and the Draft IWWMP:
The Draft EIA/EMPr Reports has been compiled and will be made available for a **30-day** public review and comment period from **Tuesday, 29 September 2026** until **Wednesday, 28 October 2026**.

The Draft IWWMP will be made available for a **60-day** public review and comment period from **Tuesday, 29 September 2026** until **Friday, 27 November 2026**.

INVITATION TO STAKEHOLDER CONSULTATION MEETINGS:
The purpose of these Stakeholder Meetings is to discuss the Draft EIA/EMPr Reports and the Draft IWWMP, present findings from the specialist studies, provide stakeholders with a platform to raise comments and interact with the project team.

Meeting Dates	Stakeholders	Time Slots
In-Person Meeting		
Saturday, 10 October 2026	Broader stakeholder meeting (public meeting) will be held at S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge.	10H00 – 12H00
Online Meeting		
Tuesday, 6 October 2026	Microsoft Teams – Online Meeting	10H00 – 11H00

Please confirm your attendance by contacting the stakeholder engagement team below:

Contact Details:		
Ms Vanessa Viljoen	+27 (10) 140 1725	stakeholders@kongiwe.com
Ms Jean-Mari Williams	+27 (10) 140 1726	

Please see attached letter for more details.

Kind Regards,

Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 1725 | Email: stakeholders@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.
www.kongiwe.com

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Tuesday, 22 September 2026

Environmental Authorisation and Integrated Water Use Licence Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

DMPR reference number: FS30/5/1/2/3/2/1(10098) MR

DWS reference number: WU50090

Engagement on the Availability of the Draft Environmental Impact Assessment Report, Environmental Management Programme and the Draft Integrated Water and Waste Management Plan

Kongiwe Environmental (Pty) Ltd (Kongiwe) hereby gives notice that the Draft Environmental Impact Assessment (EIA) including the Draft Environmental Management Programme (EMPr) and the Draft Integrated Water and Waste Management Plan (IWWMP) for the Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province (the Project), will be available for review and comment.

The purpose of this notification is to provide you with important information regarding the following:

- The availability of the Draft EIA/EMPr Reports;
- The availability of the Draft IWWMP
- How you can provide comments on the Draft EIA/EMPr Reports and the Draft IWWMP; and
- Invitation to stakeholders to participate through online and in-person engagements.

Availability of the Draft EIA/EMPr Reports and the Draft IWWMP:

The **Draft EIA/EMPr Reports** has been compiled and will be made available for a 30-day public review and comment period from **Tuesday, 29 September 2026 until Wednesday, 28 October 2026**.

The **Draft IWWMP** will be made available for a 60-day public review and comment period from **Tuesday, 29 September 2026 until Friday, 27 November 2026.**

Copies of the reports will be made available as follows:

- Electronic copies on Kongiwe's website: https://kongiwe.com/projects/.
- The non-technical summary of the Draft EIA / EMPr Reports will be emailed to all stakeholders on the database.
- Hard copies of the non-technical summary will be distributed to the stakeholder meeting attendees.
- Hard copies of the Draft EIA/EMPr Reports and the Draft IWWMP will be available at the Allanridge Public Library and Nyakallong Public Library (shown in table below):

Kongiwe Environmental (Pty) Ltd
Registration Number 2016/135562/07
Telephone: +27 (10) 140 6508, Email: info@kongiwe.com
Registered Address: 150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address: PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa
www.kongiwe.com

Location	Physical Address	Contact Person / Times
Allanridge Public Library	53 Caledon St, Allanridge	Ms Anna Matjelo, Librarian (078) 713 2063) Monday - Friday Open: 08:00 Close: 15:30
Nyakallong Public Library	Nyakallong, Allanridge, 9492	Ms Vivian Dasheka (081) 761 1620 Monday - Friday Open: 08:00 Close: 16:00

You can comment on the Draft EIA/EMPr Reports and the Draft IWWMP in any of the following ways:

- By providing comments at the public meeting - please see details below;
- By writing a letter or sending an email to stakeholders@kongiwe.com ; and
- By contacting our stakeholder engagement team - please see details below.

Invitation to Stakeholder Consultation Meetings:

Stakeholders are invited to participate through online and in-person engagements. The purpose of these stakeholder meetings is to discuss the **Draft EIA/EMPr Reports** and the **Draft IWWMP**, present findings from the specialist studies, provide stakeholders with a platform to raise comments on the Draft EIA/EMPr Reports and the Draft IWWMP and interact with the project team.

Refer to table below for the schedule of stakeholder meetings.

Meeting Dates	Stakeholders	Time Slots
In-Person Meeting		
Saturday, 10 October 2026	Broader stakeholder meeting (public meeting) will be held at S.A. Mokhothu Primary School 3073 Nyakallong, Allanridge, 9490	10H00 – 12H00
Online Meeting		
Tuesday, 6 October 2026	Microsoft Teams – online meeting	10H00 – 11H00

Protection of Personal Information Act, 2013 (Act No. 4 of 2013) (POPIA) is taken into consideration.

Should you have any comments/queries, please contact the stakeholder engagement team below.

Contact Details:		
Ms Vanessa Viljoen	+27 (10) 140 1725	stakeholders@kongiwe.com
Ms Jean-Mari Williams	+27 (10) 140 1726	stakeholders@kongiwe.com

Our team welcomes your participation and looks forward to your involvement throughout this process.

Yours faithfully

Ms Vanessa Viljoen
Stakeholder Engagement Consultant

Appendix C7: Authority Correspondence

mineral &
petroleum resources
Department:
Mineral and Petroleum Resources
REPUBLIC OF SOUTH AFRICA

Private Bag X33, Welkom, 9460 | Tel: 057 391 1300 | Fax: 057 357 6003
The Strip Building, 314 Stateway Street, First & Second Floor, Welkom, 9459

Enquiries: Ms. M. Ramboho
Ref No: FS 30/5/1/2/3/2/1 (10098) EM
Email: Matodzi.Ramboho@dmpr.gov.za
Sub-Directorate: Mine Environmental Management
EAPASA Reg. No.: 2022/5386

The Directors

Jelani Resources (Pty) Ltd

HHK House North Corner Ruth Crescent

Northcliff (Johannesburg)

Gauteng

2115

Attention: Mr. Neels Hoek
Cell No: 076 254 2506
E-Mail: nhoek@mera.co.za

Cc: Umeshree Naicker
Cell No: 081 773 2625
E-Mail: unaicker@konglwe.com

EVALUATION OF AN APPLICATION FOR AN ENVIRONMENTAL AUTHORISATION FOR a mining RIGHT LODGED IN TERMS OF REGULATION 16 OF THE ENVIRONMENTAL IMPACT ASSESMENT REGULATIONS, 2014 (HEREIN REFERRED TO AS THE "EIA REGULATIONS") FOR VARIOUS MINERALS, ON PORTION 0 OF THE FARM WELVAART 63, PORTION 1 AND 2 OF THE FARM WELVAART 63, PORTION 0 OF THE FARM DIAMANT 37, PORTION 0 AND PORTION 1 OF THE FARM GRASPAN 40 AND PORTION 0 OF THE FARM SWARTPAM 436, SITUATED IN THE MAGISTERIAL DISTRICT OF WELKOM, FREE STATE REGION.

The application received on **21 April 2026** and acknowledged on **30 April 2026** refers.

1. Only the listed activities contained in the application will be considered. The applicant must ensure that the application is complete and complies with the requirements of Regulation 15(1)– (3) of the Environmental Impact Assessment Regulations, 2014 (as amended).

2. The application has been reviewed in terms of Regulation 17 and is found to comply with the requirements of Regulation 16 of the EIA Regulations, 2014 (as amended).

3. The application will be subjected to a Scoping and Environmental Impact Assessment (S&EIR) process in terms of the EIA Regulations, 2014 (as amended).

4. The acceptance of the Mining Right application was signed on **07 May 2026** and issued to the applicant on **18 May 2026.** For purposes of calculating the prescribed timeframe, the Scoping Phase commenced on **18 May 2026** in terms of Section 16(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). You are therefore required to submit the Scoping Report on or before **01 July 2026** as follows:
   - Three (3) hard copies and one (1) electronic copy (via SAMRAD) of the Scoping Report.
   - The Scoping Report must:
     - Comply with Regulation 21 and Appendix 2 of the EIA Regulations, 2014 (as amended).
     - Be subjected to a minimum thirty (30) day public participation process.
     - Include all comments received from Interested and Affected Parties (I&APs) and responses thereto
     - Include a Plan of Study for Environmental Impact Assessment.
   - Upon acceptance of the Scoping Report, the Environmental Impact Assessment Report (EIAR) must be submitted together with the following:
     - Specialist reports (where applicable).
     - Environmental Management Programme (EMPr).
     - Closure Plan (where applicable).
     - Financial Provisioning documentation (where required).
   - The EIAR must comply with Regulation 23 and Appendix 3 of the EIA Regulations, 2014 (as amended) and must include all comments received during the public participation process and responses thereto.

5. The Scoping Report, Environmental Impact Assessment Report and all supporting documentation must comply with the requirements of **Appendices 2, 3, 4 and 6** of the EIA Regulations, 2014 (as amended), as well as the relevant provisions of the **Financial Provisioning Regulations, 2015 (as amended).**

6. Public participation must comply with the requirements of Chapter 6 (Regulations 40–44) of the EIA Regulations, 2014 (as amended). Proof of consultation with all Interested and Affected Parties (I&APs), including relevant organs of state, must be included in the reports submitted to the Department.

7. The EAP must ensure that all required reports, including financial provisioning (Regulations 6 and 11 of the Financial Provisioning Regulations), are:

- Included in the public participation process.
- Submitted as part of the final application.

8. Financial provision must be determined in accordance with the **Financial Provisioning Regulations, 2015 (as amended)**.
9. Required specialist studies must be informed by the **Environmental Screening Tool Report** and site verification. These may include:
   - Heritage Impact Assessment (**SAHRA consultation with proof of payment required**).
   - Biodiversity/Ecological Assessment.
   - Wetland Delineation.

10. All reports must be subjected to a **30-day public participation process**, including consultation with all relevant state departments and including this Department.
11. Where applicable, consult:
    - Department of Land Affairs (state land), or
    - Commission on Restitution of Land Rights Proof must be included.
12. Please note that submission and evaluation of this application do not grant approval to commence with any listed activities. A recommendation will be submitted to the Minister or delegated authority, and the decision will be communicated in accordance with Regulation 4(1).
13. Commencement of listed activities without Environmental Authorisation constitutes an offence in terms of Section 24F (1) of NEMA and is punishable under Section 49A(1)(a) of the same Act.
14. Failure to meet prescribed timeframes will result in the application being **deemed lapsed** in terms of **Regulation 45**.
15. Provisions of **Regulation 19(1)(b)** and **Regulation 3(7)** may be invoked where necessary; however, no documentation submitted after lapsing will be considered.

Yours faithfully

pp.....

REGIONAL MANAGER: MINERAL REGULATION

FREE STATE REGION

DEPARTMENT OF MINERAL AND PETROLEUM RESOURCES

DATE 03/06/2026

mineral &
petroleum resources
Department:
Mineral and Petroleum Resources
REPUBLIC OF SOUTH AFRICA
Private Bag X 33, Welkom, 9460, **Tel:** 057 391 1300, **Fax:** 057 357 6003
The Strip Building, 314 Stateway Street, First & Second Floor, Welkom, 9459

Enquiries: Mr. M. Ramboho **Ref No:** FS 30/5/1/2/3/2/1 (10098) EM
E-Mail Address: Matodzi.Ramboho@dmpr.gov.za **Sub-Directorate:** Mine Environmental Management
Registered Environmental Assessment Practitioner: Number 2022/5386

The Directors

Jelani Resources (Pty) Ltd

HHK House North Corner Ruth Crescent

Northcliff (Johannesburg)

Gauteng

2115

Attention: Mr. Neels Hoek
Cell No: 076 254 2506
E-Mail: nhoek@mera.co.za

Cc: Umeshree Naicker
Cell No: 081 773 2625
E-Mail: unaicker@kongiwe.com

ACCEPTANCE OF THE SCOPING REPORT IN TERMS OF REGULATION 22(A) OF THE ENVIRONMENTAL IMPACT ASSESMENT REGULATIONS, 2014 AS AMENDED (HEREIN REFERRED TO AS THE "EIA REGULATIONS") IN RESPECT OF PORTION 0 OF THE FARM WELVAART 63, PORTION 1 AND 2 OF THE FARM WELVAART 63, PORTION 0 OF THE FARM DIAMANT 37, PORTION 0 AND PORTION 1 OF THE FARM GRASPAN 40 AND PORTION 0 OF THE FARM SWARTPAM 436, SITUATED IN THE MAGISTERIAL DISTRICT OF WELKOM, FREE STATE REGION.

The Scoping Report (SR) and Plan of Study for Environmental Impact Assessment physically received by the Department on **01 July 2026** refer.

1. The Department has evaluated the submitted SR and Plan of Study for Environmental Impact Assessment submitted to the Department on the afore mentioned date and is satisfied that the documents comply with the minimum requirements of Appendix 2(2) of National Environmental Management Act, 1998 (as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014. The SR is hereby accepted by the Department in terms of regulation 22(a) of the NEMA EIA Regulations, 2014.

2. You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the Plan of Study for undertaking Environmental Impact Assessment as required in terms of the NEMA EIA Regulations, 2014.

3. The environmental impact assessment process must consider the screening tool report generated for the proposed project to ensure that relevant specialist studies are conducted.

4. Section 23(1) (a) and (b) of the 2014 EIA Regulations as amended states that "*the applicant must within 106 days of the acceptance of the scoping report, or where regulation 21(2) applies within 106 days of receipt of an application by the competent authority, submit to the competent authority –*

   (a) An environmental impact assessment report inclusive of any specialist reports, an EMPr, a closure plan in case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial Provisioning Regulations, which must have been subjected to a public participation process of at least 30 days and which reflect incorporation of comments received, including any comments of the competent authority; or

   (b) *A notification in writing that the documents contemplated in subregulation 1(a) will be submitted within 156 days of acceptance of the scoping report by the competent authority or where regulation 21(2) applies, within 156 days of receipt of the application by the competent authority, as significant changes has been made or significant new information new information has been added to the documents, which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in subregulation (1)(a), and the revised documents contemplated in subregulation 1(a) will be subjected to another public participation process".*

5. Based on paragraph 3 above, you are hereby kindly requested to submit to the competent authority documents stipulated on section 23(1)(a) of the 2014 EIA Regulations as amended within 106 days of the acceptance of the scoping report. The applicant / EAP must ensure that these documents comply or conform with the annexures attached on the 2014 EIA Regulations as amended and the 2015 Financial Provisioning Regulations as amended. It is the responsibility of the applicant / EAP to familiarize themselves and ensure compliance with the Financial Provisioning Regulations as amended and the 2014 EIA Regulations as amended.

6. All comments raised by interested and affected parties during scoping phase must be addressed in the EIAR phase and proof of addressing such comments must be incorporated onto the EIAR.

7. Public participation process must be conducted in line with chapter 6 of the 2014 EIA Regulations as amended. The applicant and the EAP must ensure full compliance with Regulation 41 of the 2014 EIA Regulations as amended. Please ensure that comments from all relevant stakeholders are submitted to the Department with the Environmental Impact Assessment Report (EIAR). This includes but is not limited to the Provincial Heritage Resources Authority, the South African Heritage Resources Agency, Provincial Environmental Department, Department of Agriculture, Forestry and Fisheries (DAFF), Department of Water and Sanitation (DWS) and the local municipality. Proof of correspondence with the various stakeholders must be included in the EIAR. Should you be unable to obtain comments, proof of the attempts that were made to obtain comments should be submitted to the Department.

8. In addition, the following information are required for the EIR and EMPr:
   a) The total footprint of the proposed development should be indicated.
   b) Should a Water Use License be required, proof of application for a license needs to be submitted.
   c) Possible impacts and effects of the development on the vegetation ecology with regard to lowland-highland interface in the locality should be indicated.
   d) The impacts of the proposed facility on avifauna and bats must be assessed in the EIA phase.
   e) The impacts of the proposed activities on climate change must be investigated, and the results of such investigation must be incorporated onto the EIR&EMPr to be submitted for decision making.
   f) Information on services required on the site, e.g., sewage, refuse removal, water, and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained?
   g) A construction and operational phase EMPr to include mitigation and monitoring measures.
   h) Should blasting be required, appropriate mitigation measures should be provided.

9. The applicant is hereby reminded to comply with the requirements of regulation 3 of the EIA Regulations, 2014 with regards to the time frames allowed for complying with the requirements of the Regulations.

10. Please ensure that the EIAR includes the A3 size locality maps of the area and illustrates the exact location of the proposed development. The maps must be of acceptable quality and as a minimum, have the following attributes:
    - Maps are relatable to one another.
    - Co-ordinates.
    - Legible legends.
    - Indicate alternatives.
    - Scale and Vegetation types of the study area.

11. Further, it must be reiterated that, should an application for an Environmental Authorisation be subjected to any permits or authorisations in terms of the provisions of any Specific Environmental Management Acts (SEMAs), proof of such application will be required.

12. You are requested to submit three (3) hard copies of the documents stipulated on regulation 23(1) EIAR and EMPr and at least one electronic copy to this Regional Office as stipulated above.

13. You are also instructed to determine the financial provision for the proposed project in line with the 2015 Financial Provisioning Regulations read together with section 24P of the NEMA. Regulation 14(1) of the Financial Provisioning Regulations, 2015 stipulates that "the Minister responsible for Mineral Resources may only grant environmental authorisation in terms of the Act after compliance by the applicant with regulation 10".

14. Regulation 10 of the 2015 Financial provisioning Regulations stipulates that "*An applicant must – (a) ensure that a determination is made of the financial provision and the plans contemplated in regulation 6 are submitted as part of the information submitted for consideration by the Minister responsible for mineral resources of an application for environmental authorisation, the associated environmental management programme and the associated right or permit in terms of the Mineral and Petroleum Resources Development Act, 2002*".

15. The provisions of the 2015 Financial Provisioning Regulations must be met in all applications for an EA relating to prospecting, exploration, mining, or productions operations.

16. Your attention is brought to Section 24F of the NEMA which stipulates "that no activity may commence prior to an environmental authorisation being granted by the competent authority".

Yours faithfully

.....

K. KEWUTI
REGIONAL MANAGER: MINERAL REGULATION
FREE STATE REGION
DEPARTMENT OF MINERAL AND PETROLEUM RESOURCES
DATE: 30/07/2026

Please quote this office file number as reference for any correspondence regarding this application.

Appendix C8: Meeting Minutes

Environmental Authorisation Application for Jelani Joint Venture (JV) Underground Mining in Matjhabeng Local Municipality, Free State Province

Stakeholder Meeting Schedule – Draft Impact Assessment Phase

Date of the meeting	Time	Meeting Type / Format	Organisation / Address	Invited / Attended / Apologies	Resources Used	Who Presented (EAP / Jelani)	Project Team Attendance (Jelani and Kongiwe)
Tuesday, 25 November 2025	**10H00 – 11H00**	**Pre – Application Meeting: Social and Labour Plan (SLP)** **Online Meeting (Microsoft Teams)**	**Competent Authority Free State:** ❖ Department of Mineral and Petroleum Resources (DMPR)	**Invited:** ❖ Ms Cecelia Sedutla, Officer for Promotion of Access to Information Act (PAIA), DMPR ❖ Mr Mphatheleni Khomola, Social and Labour Plan Officer, DMPR **Attended:** ❖ Ms Cecelia Sedutla, Officer for Promotion of Access to Information Act (PAIA), DMPR ❖ Mr Mphatheleni Khomola, Social and Labour Plan Officer, DMPR **Apologies:** None	❖ Presentation ❖ Attendance Register	Mr Bradly Thornton, Kongiwe	Mr Neels Hoek, Jelani Mr Andrew Hamlet, Kongiwe Ms Thuli Phakathi, Kongiwe
Monday, 15 December 2025	**10H00 – 11H00**	**Landowner Consent Meeting** **Online Meeting (Microsoft Teams)**	**Indirectly Affected Landowners**	**Invited:** ❖ Mr Tertius De Jager, Landowner ❖ Mr Christo Nel, Landowner ❖ Mr Trompie Fouche, Landowner ❖ Mr Jaco Grobbelaar, Landowner **Attended:** ❖ Mr Tertius De Jager, Landowner	❖ Presentation ❖ Attendance Register	Mr Ripfumelo Macevele, Kongiwe	Ms Vanessa Viljoen, Kongiwe Ms Umeshree Naicker, Kongiwe Ms Jean-Mari Williams, Kongiwe

Date of the meeting	Time	Meeting Type / Format	Organisation / Address	Invited / Attended / Apologies	Resources Used	Who Presented (EAP / Jelani)	Project Team Attendance (Jelani and Kongiwe)
				❖ Mr Johan De Jager, Landowner **Apologies:** ❖ Mr Christo Nel, Landowner ❖ Mr Trompie Fouche, Landowner ❖ Mr Jaco Grobbelaar, Landowner			
Monday, 26 January 2026	**13H00 – 13H30**	**Local Municipality Meeting: Social and Labour Plan (SLP)** **telephonic meeting**	**Local Municipality: Free State** ❖ Matjhabeng Local Municipality	**Invited:** ❖ Mr Sefako Ramphoma, Executive Director LED, MLM **Attended:** ❖ Mr Sefako Ramphoma, Executive Director LED, MLM **Apologies:** None	❖ Background Information Document & Memo	Mr Andrew Hamlet, Kongiwe	-
Friday, 6 February 2026	**08H00 – 09H00**	**Pre – Application Meeting** **Online Meeting (Microsoft Teams)**	**Competent Authority Free State:** ❖ Department of Mineral and Petroleum Resources (DMPR)	**Invited:** ❖ Mr Tuwani Monyai, Assistant Director: Mine Environmental Management (DMPR) ❖ Mr Cedrick Fhedzisani, Deputy Director: Mine Environmental Management (DMPR) **Attended:** ❖ Mr Tuwani Monyai, Assistant Director: Mine Environmental Management (DMPR) ❖ Mr Cedrick Fhedzisani, Deputy Director: Mine Environmental Management (DMPR) **Apologies:** None	❖ Presentation ❖ Attendance Register	Ms Umeshree Naicker, Kongiwe	Mr Neels Hoek, Jelani Mr Ripfumelo Macevele, Kongiwe Ms Thuli Phakathi, Kongiwe

Date of the meeting	Time	Meeting Type / Format	Organisation / Address	Invited / Attended / Apologies	Resources Used	Who Presented (EAP / Jelani)	Project Team Attendance (Jelani and Kongiwe)
Tuesday, 26 May 2026	**14H00 – 15H00**	**District Municipality Meeting** **Online Meeting (Microsoft Teams)**	**District Municipality: Free State** ❖ Lejweleputswa District Municipality	**Invited:** ❖ Mr Dewald Kirsten, District Manager ❖ Mr Fannie Zim, Environmental Manager ❖ Mr Motlatsi Makhetha, Municipal Manager ❖ Ms Michelle Sello, Executive Manager of Environmental Health Services **Attended:** ❖ Mr Dewald Kirsten, District Manager **Apologies:** ❖ Mr Fannie Zim, Environmental Manager ❖ Mr Motlatsi Makhetha, Municipal Manager ❖ Ms Michelle Sello, Executive Manager of Environmental Health Services	❖ Presentation ❖ Attendance Register	Ms Umeshree Naicker, Kongiwe	Mr Neels Hoek, Jelani Mr Ripfumelo Macevele, Kongiwe
Wednesday, 27 May 2026	**10H00 – 11H00**	**Online Meeting** **Microsoft Teams**	**Broader Stakeholders:** ❖ All sectors of society / Broader Public	**Invited:** All sectors of society / Broader Public Ward Committee members, community leaders and relevant departments **Attended:** ❖ Mr Eduard Steyn, Directly Affected Landowner ❖ Mr Willem Taljaard, Directly Affected Landowner ❖ Mr Frans De Jager, Indirectly Affected Landowner ❖ Ms Nozipho Dlamini, Assistant Manager, DLRRD	❖ Presentation ❖ Attendance Register	Ms Umeshree Naicker, Kongiwe	Mr Neels Hoek, Jelani Mr Ripfumelo Macevale, Kongiwe

Date of the meeting	Time	Meeting Type / Format	Organisation / Address	Invited / Attended / Apologies	Resources Used	Who Presented (EAP / Jelani)	Project Team Attendance (Jelani and Kongiwe)
				❖ Ms Mariette Liefferink, CEO, FSE ❖ Ms Karabo Mabyana, Statutory Control Officer, SANRAL ❖ Ms Khuliso Nenguda, Statutory Control Officer, SANRAL ❖ Mr Andries Labuscagne, Chief Executive, Sand-Vet WUA **Apologies:** ❖ Mr Tshepo Moloto, Harmony			
Thursday, 28 May 2026	**10H00 – 11H00**	**Local Municipality Meeting** **Online Meeting (Microsoft Teams)**	**Local Municipality: Free State** ❖ Matjhabeng Local Municipality	**Invited:** ❖ Mr Clement Hanisi, Ward Councillor. ❖ Mr Lunga Ncapai, Solid Waste Manager ❖ Mr Sefako Ramphoma, LED ❖ Mr Eric Sello Senoge, Property Department ❖ Mr Sello Naniso, Manager of the Speakers Office ❖ Mr Johannes Griesel, Acting Manager: Development Planning **Attended:** ❖ Mr Serake Leeuw, Special Advisor to the Office of the Executive Mayor ❖ Mr Lunga Ncapai, Solid Waste Manager ❖ Mr Johannes Theunissen, Manager: Waste Department **Apologies:** ❖ Mr Neels Hoek, Jelani	❖ Presentation ❖ Attendance Register	Ms Umeshree Naicker, Kongiwe	Mr Ripfumelo Macevale, Kongiwe
Saturday, 30 May 2026	**11H00 – 13H00**	**Open Day** **In-Person**	**Open Day (Consultation)**	**Invited:**	❖ Non-Technical Summary ❖ Posters	Mr Ripfumelo Macevale, Kongiwe	Mr Neels Hoek, Jelani Ms Umeshree Naicker, Kongiwe

Date of the meeting	Time	Meeting Type / Format	Organisation / Address	Invited / Attended / Apologies	Resources Used	Who Presented (EAP / Jelani)	Project Team Attendance (Jelani and Kongiwe)
			❖ <u>All sectors of society / Broader Public</u> **<u>S.A. Mokhothu Primary School</u>** **<u>Physical address</u>**: 3073 Nyakallong, Allanridge, 9490	<u>All sectors of society / Broader Public</u> Ward Councillors, Committee members, community leaders and members **Attended:** ❖ Refer to the attendance register. (Appendix C) **Apologies:** None	❖ Maps ❖ Attendance Register ❖ Comments Register		Ms Jean-Mari Williams, Kongiwe Mr Lubabalo Zongolo

MINUTES OF MEETING			
Date	Monday, 15 December 2025	**Time**	10:00 – 11:00
Venue	Online Meeting (Microsoft Teams)		
Subject	**Meeting with Indirectly Affected Landowners**		

List of Attendees		
Organisation	**Name of Attendee**	**Designation**
Zuurbron No. 444 Portion 1	Mr Tertius De Jager	Indirectly Affected Landowner
Zuurbron No. 444 Portion 1	Mr Johan De Jager	Indirectly Affected Landowner
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevele	Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Ms Vanessa Viljoen	Principal Stakeholder Engagement Consultant
Kongiwe Environmental (Pty) Ltd	Ms Jean-Mari Williams	Project Co-Ordinator
Kongiwe Environmental (Pty) Ltd	Ms Umeshree Naicker	Principal Environmental Consultant

Apologies		
Organisation	**Name of Attendee**	**Designation**
Modderfontein N0. 343 Portion 1	Mr Christo Nel	Indirectly Affected Landowner
Uitkyk N0. 258 Portion 4	Mr Trompie Fouche	Indirectly Affected Landowner
Onrust No. 377 Portion 0	Mr Jaco Grobbelaar	Indirectly Affected Landowner

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place

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No	Item	Responsible Person
1	**Welcome and Introductions**	
1.1	Ms Vanessa Viljoen (Ms Viljoen) welcomed all attendees to the meeting.	Ms Viljoen
2	**Meeting Purpose**	
2.1	Present and discuss the proposed Jelani Joint Venture (JV) Underground Mining Operations.	Mr Ripfumelo Macevele (Mr Macevele)
2.2	Provide an overview of the Proposed Project.	
2.3	Provide an opportunity to raise comments/seek clarity as well as provide input.	
2.4	Record comments raised and included them in the Comments and Responses Report (CRR)	
2.5	Landowner consent for specialist to access properties	
3	**Meeting Agenda**	
3.1	Introductions	(Mr Macevele)
3.2	Project Background	
3.3	Project Location	
3.4	Project Description	
3.5	Infrastructure Requirements	
3.6	Proposed Mining Methods	
3.7	Environmental Permitting Processes	
3.8	Landowner consent for specialist to access properties	
3.9	Comments and Discussion	

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4	Discussion		
STAKEHOLDERS		**COMMENT**	**RESPONSE**
4.1	Mr Tertius De Jager (Mr De Jager)	Mr De Jager thanked (Mr Macevele)for his presentation. He stated that he did not understand why this was being presented as a new project, as he was under the impression that Harmony had owned the land for approximately 20 years and that exploration had already been conducted to depths of about 3,000 metres. The tunnels must be present throughout the area.	Mr Macevele explained that the blue area indicated on the map presented is the proposed project site. He clarified that the land does not belong to Harmony and that WRE has only acquired prospecting rights to search for minerals in the area.
4.2	Mr De Jager	Mr De Jager requested that Mr Macevele indicate the location of the existing operational underground tunnels. He noted that, to his knowledge, the underground tunnels are significantly wider than had been explained.	Mr Macevele indicated that they do not have drawings of the underground tunnels and only have information relating to the surface area. He further noted that the existing operational area is Target, which is currently operational. Ms Umeshree Naicker (Ms Naicker) added that the details relating to the underground activities, design, shaft usage, and the condition of the underground facilities are still under consultation. The appointed consultants are in the process of finalising the designs. She further acknowledged that Kongiwe understands the information Mr De Jager is requesting and confirmed that Kongiwe also requires the same information. The information will be shared with all relevant parties once it has been received.
4.3	Mr De Jager	Mr De Jager stated that, from a farming perspective, their primary concern relates to the potential impact of the proposed mining operation on their existing water supply. He noted that an irrigation stream runs along the outer boundary of the property and is used for crop production and pecan trees. He asked what would happen to the water supply should the mining operation proceed as indicated.	Ms Naicker informed the meeting that, as part of the process, several specialist studies have been identified and will be undertaken. These include a groundwater assessment, which incorporates a hydro census component. Information will be obtained from existing boreholes and will form part of the groundwater impact assessment. She added that additional specialist studies such as surface water assessment, biodiversity assessment and others will also be conducted and that more detailed information will be available at a later stage once the studies have progressed.

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4	Discussion		
STAKEHOLDERS		**COMMENT**	**RESPONSE**
			Ms Vanessa Viljoen (Ms Viljoen) informed Mr De Jager that the project is still in its initial stages and that a Scoping Report and an Environmental Impact Assessment (EIA) Report will be made available at a later stage. She explained that the purpose of the current meeting was to inform stakeholders of what is planned for the proposed project and to request permission/access for specialists to conduct their studies on the identified properties, she further added that detailed responses would be provided once additional information is received from the specialist studies.
4.4	Mr De Jager	Mr De Jager enquired about the scope of the specialists' work in relation to the boreholes, specifically what information they require and what activities will be undertaken.	Ms Naicker explained that a letter had been sent to all landowners outlining the scope of the specialist's site activities. She indicated that these activities include the identification and recording of the location of borehole(s), documenting their usage, measuring water levels within the borehole(s), and taking a preliminary water quality sample, should landowner agree.
4.5	Mr De Jager	Mr De Jager asked how the groundwater specialist would take water samples if a pump were already installed. He further indicated that, for the specialist to conduct a proper study, they would need assistance from the farmer (landowner), noting that the specialist should visit the site when the landowner is available.	Ms Naicker responded by stating that Kongiwe would engage with the specialist regarding the method for taking the samples, and that the specialist could provide a procedure to address this specific request. Ms Viljoen acknowledged the comment and indicated that she would request Jean, the Hydro Senses specialist, to contact the stakeholders directly to explain the scope of his work in more detail and what is required from the study. Post note: Jean contacted Mr De Jager to inform him that site access has been arranged for 12 January 2026. He also provided further details regarding the study he intends to conduct.

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4	Discussion			
STAKEHOLDERS		**COMMENT**	**RESPONSE**	
4.6	Mr De Jager	Mr De Jager expressed concern that not all relevant information had been presented and that the meeting seemed rushed, appearing to prioritise the commencement of the specialist study. He stated that he felt more preparation was needed from Kongiwe to adequately address questions regarding the scope and objectives of the study.	Ms Viljoen acknowledged the comment and explained that the project is still in its initial phase of the Scoping and Environmental Impact Assessment process. She further clarified that the purpose of the meeting was to provide an overview of the proposed Project, to provide an opportunity to raise initial comments and to inform landowners about the planned upcoming activities for the proposed project and to request permission or access for specialists to conduct their studies on the identified properties.	
5	**Closing**			
5.1	Ms Vanessa Viljoen thanked everyone for their time and the meeting was adjourned at 10:50AM.		ALL	-

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Jelani Resources (Pty) Ltd

Exploration Joint Venture (EJV) Underground Mining Operations

Indirectly Affected Landowner Meeting

Monday, 15 December 2025

Agenda

1. Introductions
2. Project Background
3. Project Location
4. Project Description
5. Infrastructure Requirements
6. Proposed Mining Methods
7. Environmental Permitting Processes
8. Comments & Discussion

Introductions

- Indirectly affected landowner(s)
- Kongiwe Environmental (Pty) Ltd (Kongiwe):
  - Ms Umeshree Naicker: Environmental Consultant
  - Mr Ripfumelo Macevele: Environmental Consultant
  - Ms Vanessa Viljoen: Stakeholder Engagement Consultant
  - Ms Jean-Mari Williams: Stakeholder Engagement Consultant

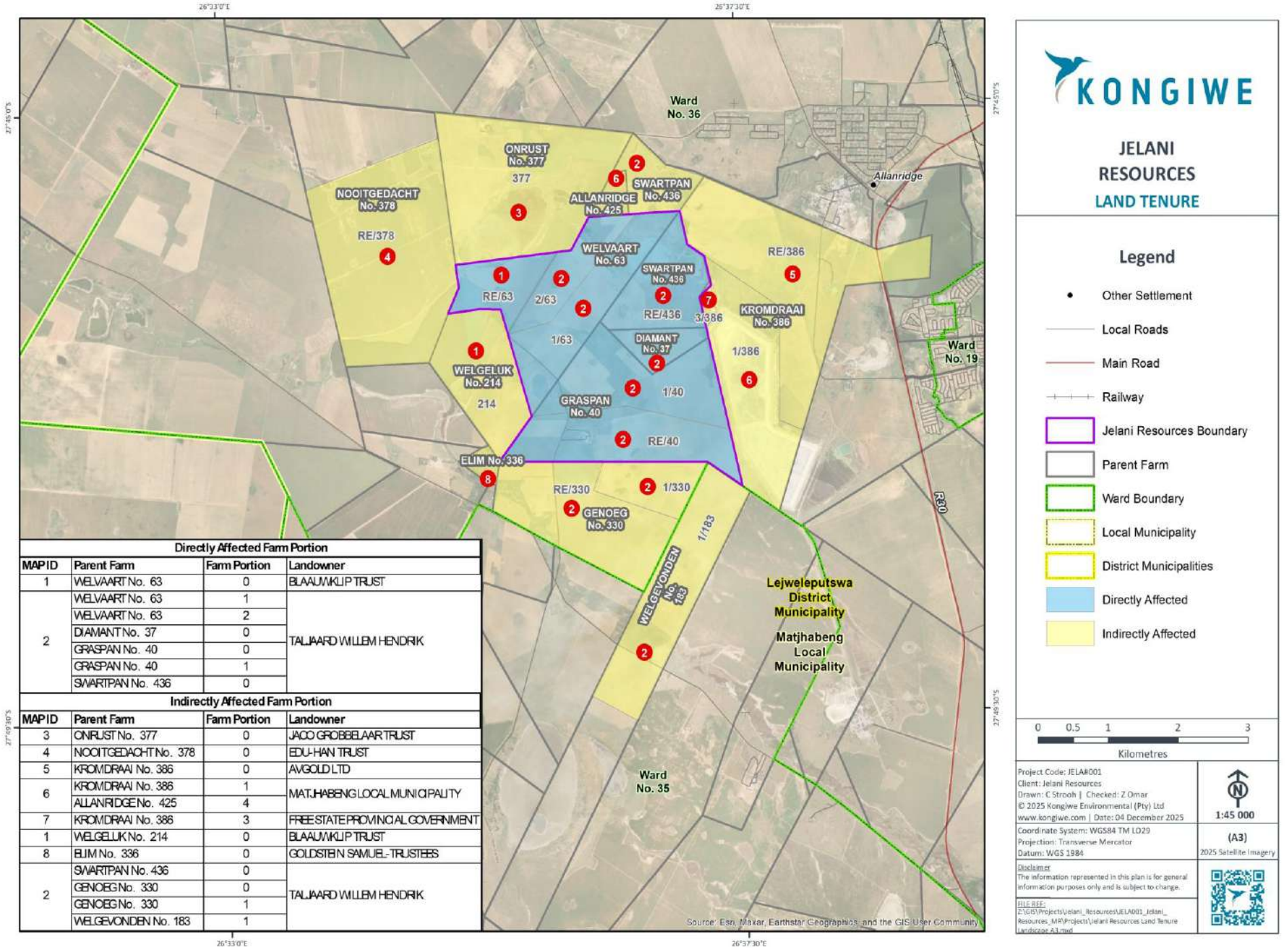
Project Background

- **Proponent**: Jelani Resources (Pty) Ltd
- **Activity**: EJV Underground Mining Operations
- **Life of Operation**: 23 years
- **Location**: The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.
- Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold.
- The JV was formed to conduct underground mining operations within the Exploration Joint Venture (EJV) area, situated adjacent to and west of Harmony Gold's existing Target Mine.

Project Background

- Jelani initially secured a Prospecting Right (PR) for various minerals within the EJV area. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

Project Background



Directly Affected Farm Portion

MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion

MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES

LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3

Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

1:45 000

(A3)

2025 Satellite Imagery

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
Z:\GIS\Projects\Jelani_Resources\JELA001_Jelani_Resources_MR\Projects\Jelani Resources Land Tenure Landscape A3.mxd

Project Description

Jelani intends to initiate underground mining operations to extract the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

Project Description

- The proposed underground mining operations initially will target shallower mineral resource deposits at the project site.
- As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased.

Infrastructure Requirements

- All infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area.
- Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing Harmony Target mining right.
- No new infrastructure is planned within the project area.
- New Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). **TSF is a separate project being undertaken by Harmony Gold.**
- The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations.

Proposed Mining Methods

- The proposed underground mining operations initially will target shallower mineral resource deposits at the project site.
- As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased.
- Two mining methods have been identified as the most practical for exploiting the mineral resources: **conventional drill-and-blast breast mining** and **shrinkage stoping**.
- The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.
- Ore will be transported to the shaft ore pass system using a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Environmental Permitting Processes

- The Proposed Project requires authorisation (Environmental Authorisation and Water Use Licence) for full scale mining and associated activities.
- **Application for EA** for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- **Application for a Waste Management Licence (WML)** authorising waste management activities listed in GN 921 of 29 November 2013 published in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (as amended) (NEM:WA).
- **Integrated Water Use Licence Application (IWULA)** in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Comment & Discussion

- Discussion
- Closing



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Contact

Name: Umeshree Naicker/Ripfumelo Macevele

Tel: 010 140 6508

Email: unaicker@kongiwe.com

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.

info@kongiwe.com
www.kongiwe.com

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MINUTES OF MEETING			
Date	Friday, 6 February 2026	**Time**	08:00 – 09:00
Venue	Microsoft Teams		
Subject	**Online Meeting Minutes: Pre-Application Meeting** **Department of Mineral and Petroleum Resources (DMPR)**		

List of Attendees **Organisation**	**Name of Attendee**	**Designation**
Department of Mineral and Petroleum Resources (DMPR)	Mr Tuwani Monyai	Assistant Director: Mine Environmental Management
DMPR	Mr Cedrick Fhedzisani	Deputy Director: Mine Environmental Management
Jelani Resources (Pty) Ltd	Mr Neels Hoek	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Umeshree Naicker	Principal Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevele	Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement Consultant
Apologies **Organisation**	**Name of Attendee**	**Designation**
None		

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place

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No	Item
1	**Welcome and Introductions**
1.1	Ms Naicker welcomed all online meeting attendees.
2	**Meeting Purpose**
2.1	Present and discuss the Project details.
2.2	Provide an overview of the Environmental Process and Procedure.
2.3	Provide an overview of the Specialist studies.
2.4	Provide an overview of the Public Participation Process.
2.5	Present and discuss the Project Timeframes.
3	**Meeting Agenda**
3.1	Introductions
3.2	Purpose of the Meeting
3.3	Kongiwe's Role as an independent EAP
3.4	Project Background
3.5	Project Description
3.6	Infrastructure Requirements
3.7	Baseline Environment
3.8	Specialist Studies
3.9	Legislative Framework
3.10	Listed and Specified Activity
3.11	Public Participation Process
3.12	The Project to Date
3.13	The Way Forward
3.14	Comments and Discussion
4	**Discussion**
4.1	Refer to the table below

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STAKEHOLDERS		COMMENT	RESPONSE
4.1	Mr Tuwani Monyai (Mr Monyai)	Mr Monyai enquired as to whether Harmony Target Shafts 2 and 3 form part of an existing Mining Right. Mr Monyai advised that a Memorandum of Understanding would be required between Harmany Gold and Jelani Recourses, given that all infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area and Jelani would be utilising Harmony Gold's shafts to access its underground mining area. This was noted as necessary to address operational and coordination challenges associated with multiple parties using the same infrastructure.	Ms Naicker explained that all existing infrastructure proposed to be included in the application falls under Harmony's Mining Right. No new operational mining infrastructure is planned within the project area. Mr Hoek clarified that Harmony Gold is a shareholder in the project through a joint venture arrangement. He further noted that, in terms of the joint venture agreement, no new infrastructure is required for the proposed project.
4.2	Mr Ripfumelo Macevele (Mr Macevele)	Mr Macevele sought clarification regarding the requirement for a Memorandum of Understanding between Jelani Resources and Harmony Gold. It was queried whether such an agreement would be necessary, given that Harmony Gold is a shareholder in Jelani Resources and that the parties have entered into a joint venture agreement.	Mr Fhedzisani advised that a Memorandum of Understanding (MoU) would be required to clearly set out how the two parties would work together as well as to address the project's development plan which includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. He noted that this information should be sufficiently detailed and accessible for inclusion in the public participation process and is therefore not only relevant to the competent authority or the proponent. Mr Hoek reiterated that a Joint Venture Agreement is in place, which would be reviewed to determine whether it adequately

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STAKEHOLDERS		COMMENT	RESPONSE
			addresses matters relating to shared infrastructure. It was further noted that, should the agreement not provide sufficient detail, a memorandum of agreement would be prepared for submission as part of the application
4.3	Mr Monyai	Mr Monyai stated that the specialist studies to be undertaken should not be informed solely by the screening tool. He further noted that, should any additional aspects be identified that require specialist input, these should also be included in the scope of studies.	Ms Naicker noted that any additional aspects identified that require specialist assessment will be undertaken as required.
4.4	Mr Monyai	Mr Monyai stated that EAPASA registration is a prerequisite for conducting the EIA. He further emphasised the importance of undertaking a robust cumulative impact assessment as part of the EIA process. It was noted that this is necessary to avoid situations where responsibility for cumulative impacts may be disputed, particularly where Harmony and Jelani could potentially attribute impacts to one another.	Ms Naicker confirmed that both herself and Mr Macevele are registered EAPs under EAPASA. She further confirmed that the relevant certificates would be included in the application. Ms Naicker also noted that, with regard to cumulative impacts, the S&EIA process will be conducted in accordance with NEMA, which includes the assessment of cumulative impacts. Mr Hoek acknowledged Mr Monyai's point and advised that Bara Engineering, who are responsible for the Mining Plans and associated engineering designs, are also involved in Harmony's operations. He noted that cumulative impacts are being considered within the engineering design process, including an assessment of whether the existing infrastructure is capable of accommodating the anticipated additional load associated with the Jelani project.
4.5	Mr Fhedzisani	Mr Fhedzisani enquired if a new Tailings Storage Facility would be constructed or if they would make use of existing Tailing Storage Facilities.	Ms Naicker stated that the application does not include a Tailings Storage Facility and that an existing facility would be utilised for deposition which falls under Harmony's Target Mining right infrastructure.

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STAKEHOLDERS		COMMENT	RESPONSE
4.6	Mr Fhedzisani	Mr Fhedzisani emphasised the importance of the Memorandum of Understanding, noting that it should include clear information regarding Tailings storage, specifically confirming that Jelani would be depositing onto Harmony's infrastructure. He referred to a precedent at Jagersfontein, where a storage facility failure was attributed to infrastructure not having been designed to accommodate increased deposition from a second operation. In this context, he stated that the Memorandum of Understanding would need to explicitly confirm that the Tailings Storage Facility is suitably designed and capable of receiving the additional load associated with the proposed Jelani operation.	Ms Naicker acknowledged this point and confirmed that the Memorandum of Understanding will be submitted as part of the application form.
4.7	Mr Fhedzisani	Mr Fhedzisani advised that the DWS should be consulted so that the DMPR and DWS can run the application process in parallel.	Ms Naicker acknowledged this point and added that a Water Use Licence Application (WULA) for the proposed underground mining project will be submitted to DWS.
4.8	Mr Monyai	Mr Monyai expressed support for Mr Fhedzisani's comments, with the view that, in order to streamline the licensing process, the applications should be undertaken concurrently. This would allow the proponent to obtain the Environmental Authorisation and Water Use Licence simultaneously. He further emphasised the importance of engagement with SAHRA, noting that formal comments should be actively sought from SAHRA rather than merely informing them of the project, which he observed to be common industry practice.	Ms Naicker stated that Kongiwe has included engagement with SAHRA within the project timeline and that the Water Use Licencing process would be aligned with the EIA application.
4.9	Ms Naicker	Ms Naicker enquired whether the department is happy to receive one hard copy and one soft copy for both the scoping and EIA reports?	Mr Monyai stated that they would provide confirmation after the application has been received as they do not know who the project manager for the DMPR will be. He stated that once the application

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STAKEHOLDERS		COMMENT	RESPONSE
			has been submitted, details relating to submission requirements would be communicated. Mr Hoek Stated that he would submit all the soft copies on to SAMRAD system and should any hard copies be required, Kongiwe would submit those.
4.10	Mr Monyai	Mr Monyai highlighted an issue with regard to climate change impacts, advicing that the proposed project would be required to consider how it may contribute to or impact climate change. He further noted that the Department has observed EIAs being challenged and appealed where insufficient consideration has been given to the potential climate change impacts of proposed developments.	Ms Naicker stated that a climate change impact assessment has been included as a specialist study for the project.
4.11	Mr Monyai	Mr Monyai stated that the EAP must consider the Financial Provision Regulations 2015 as they relate to mining project as well as relevant Environmental Regulations. He emphasised the importance of complying with these regulations and requested that the EAP take these requirements into account and ensure that they are included in the documentation.	Ms Naicker thanked Mr Moyai for his input and stated that this would be considered in the EIA process and will also be included in the submissions.
4.12	Mr Fhedzisani	Mr Fhedzisani stated that once an application has been lodged for the Water and waste use licences, that information can be forwarded to the relevant person from the DMPR.	Ms Naicker confirmed that they would forward this information once it is available.
4.13	Mr Monyai	Mr Monyai stated that the application would be subjected to the regulations of the MPRDA and therefore the application would need to be lodged simultaneously with the application in terms of NEMA. He stated that the timeline would only begin counting for the NEMA process once the application has been submitted in terms of the MPRDA.	Ms Naicker noted this comment.

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STAKEHOLDERS		COMMENT	RESPONSE		
4.14	Mr Fhedzisani	Mr Fhedzisani stated that any further information requirements would be communicated in writing once the application has been lodged. Mr Fhedzisani further advice that in future the team should include all the relevant mining right reference numbers (specifically Harmony Target Mining Right), particularly where an application may require or involve infrastructure already authorised under other Mining Rights so that the department can include all the relevant project managers in the meetings.	Ms Naicker acknowledged that in future the team would include those reference numbers.		
5	**Closing**				
5.1	Ms Naicker thanked everyone for their time and the meeting was adjourned at 09:00 AM.			ALL	-

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Jelani Resources (Pty) Ltd

Environmental Authorisation for the Proposed Jelani Underground Mining Project

Pre-Application Meeting – Department of Mineral and Petroleum Resources (DMPR)

DMPR reference number: To be Assigned

06 February 2026

Agenda

1. Introductions
2. Purpose of the Meeting
3. Kongiwe's Role as an independent EAP
4. Project Background
5. Project Description
6. Infrastructure Requirements
7. Baseline Environment
8. Specialist Studies
9. Legislative Framework
10. Listed and Specified Activity
11. Public Participation Process
12. The Project to Date
13. The Way Forward
14. Comments and Discussion

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Introductions

- Competent Authority : Department of Mineral and Petroleum Resources
- Proponent : Jelani Resources (Pty) Ltd
- EAP : Kongiwe Environmental (Pty) Ltd

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Purpose of the Meeting

- Project Details
- Environmental Process and Procedure
- Specialist Studies
- Public Participation Process
- Project Timeframes
- Way forward

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Kongiwe's Role as an EAP

As an independent Environmental Assessment Practitioner, it is our role to perform an objective assessment of what the positive and negative environmental impacts of the Proposed Project may be, to quantify these, describe possible mitigations, collect public comment and supply DMPR with the documentation so that it can determine if the project should proceed or not.

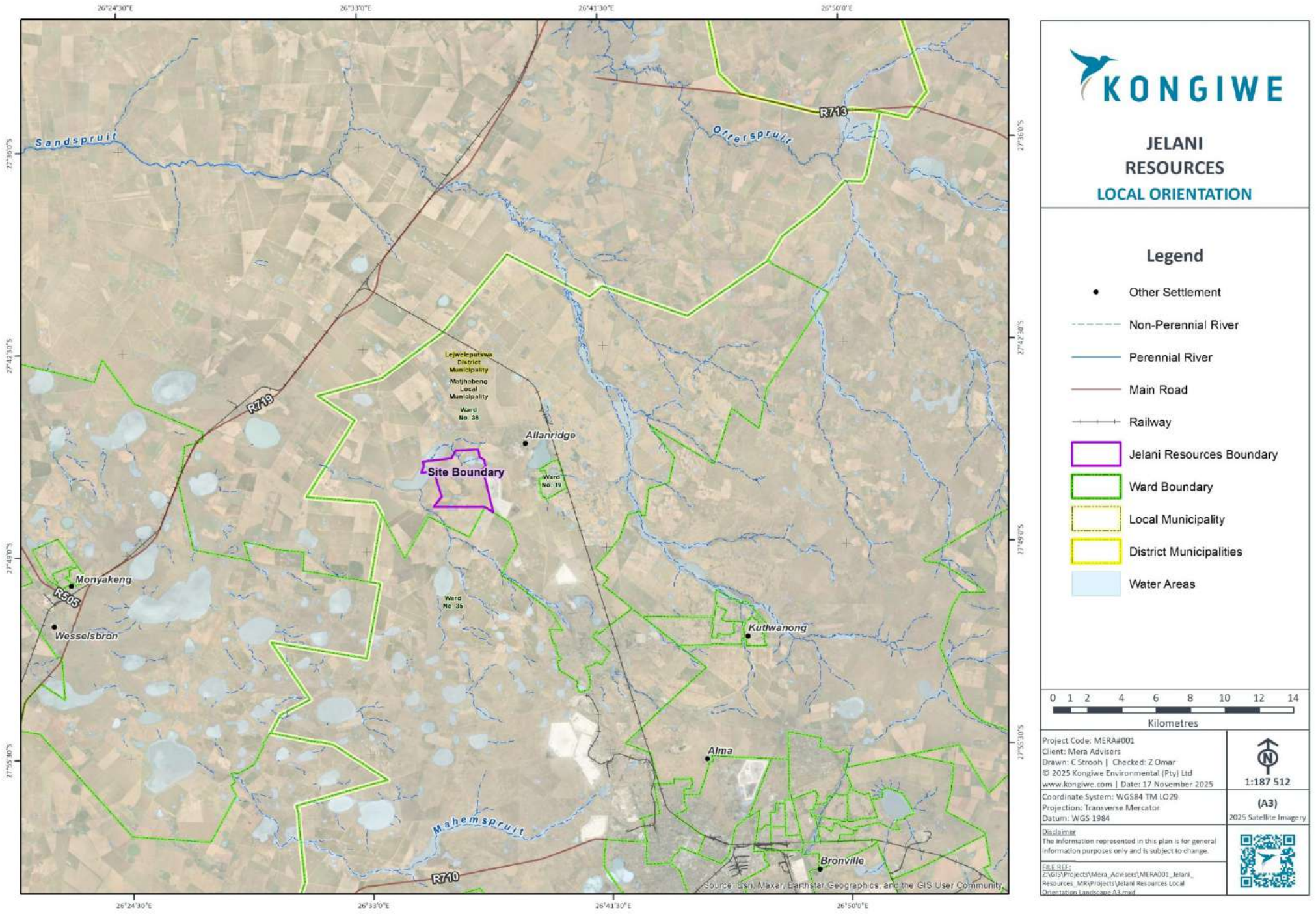
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Project Background

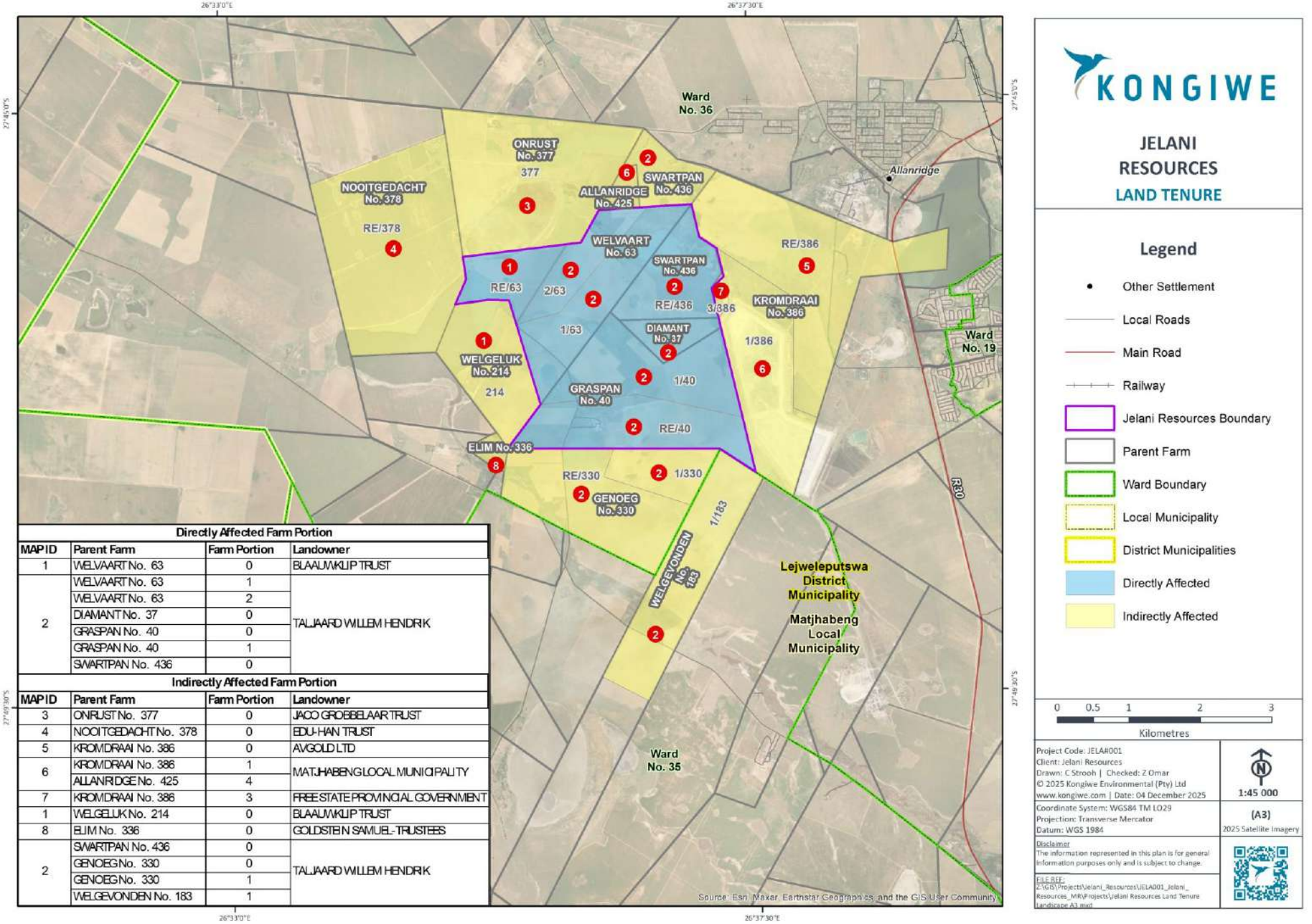
- **Proponent**: Jelani Resources (Pty) Ltd
- **Activity**: Underground Mining Operation
- **Life of Operation**: 14 years
- **Location**: The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.
- Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold.
- The JV was formed to conduct underground mining operations within the joint venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution).
- Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

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Project Location



Property Map



Directly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES

LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3

Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

1:45 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)

2025 Satellite Imagery

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
Z:\GIS\Projects\Jelani_Resources\JELA001_Jelani_Resources_MR\Projects\Jelani Resources Land Tenure landscape A3.mxd

Project Description

Jelani intends to initiate underground mining operations to extract the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

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Project Description

- Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1 200 mbs).
- As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.
- Two mining methods have been identified as the most practical for exploiting the mineral resources: **conventional drill-and-blast breast mining** and **shrinkage stoping**.
- The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

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Project Description

- Ore will be transported to the shaft ore pass system using a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.
- The total surface area assessed is 956,76 hectares (ha). A total area required for mining is 80.64 km2 (8064 ha).
- The orebodies extend between 1 500m and 2 600m below surface.
- All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

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Infrastructure Requirements

- All infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new infrastructure planned within the JV project area.
- Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.
- The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations.

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Underground Access Infrastructure Photos



Photo 1: Harmony Target No 3 Shaft

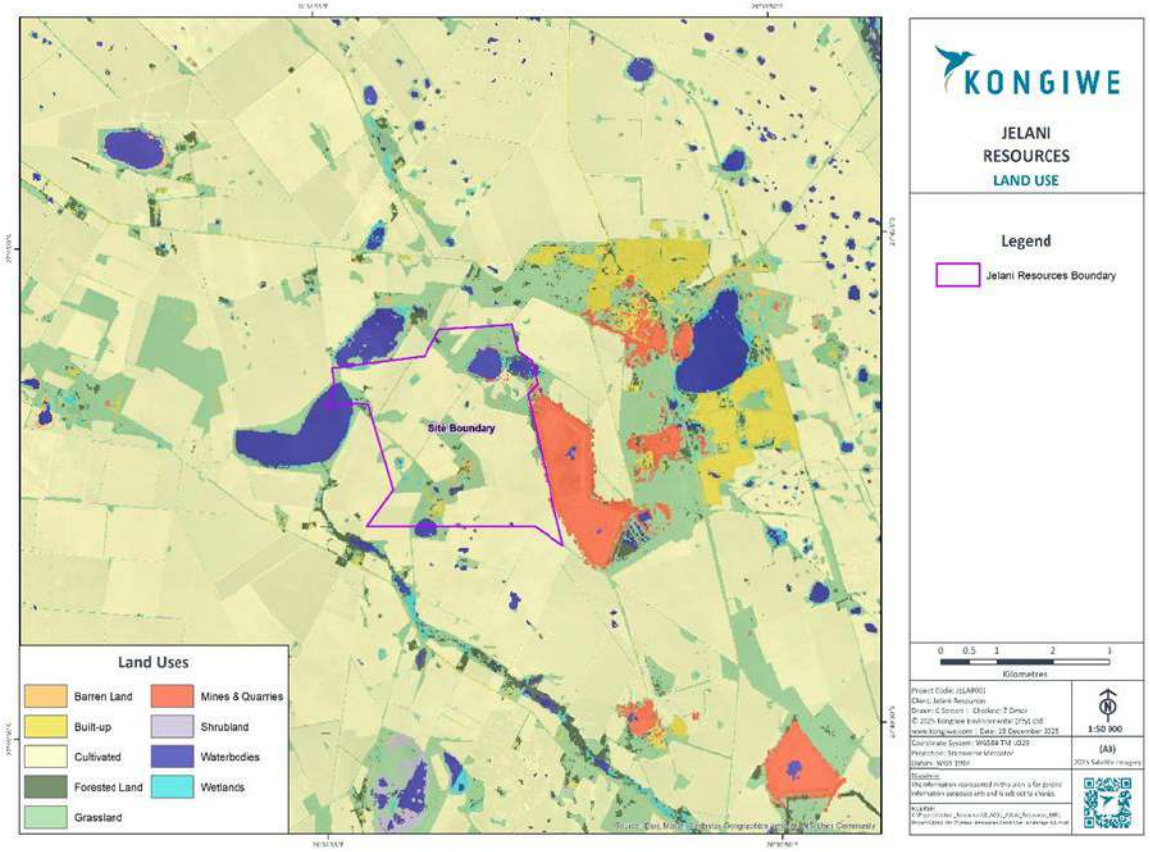


Photo 2: Harmony Target No 2 Shaft

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Current Land Use

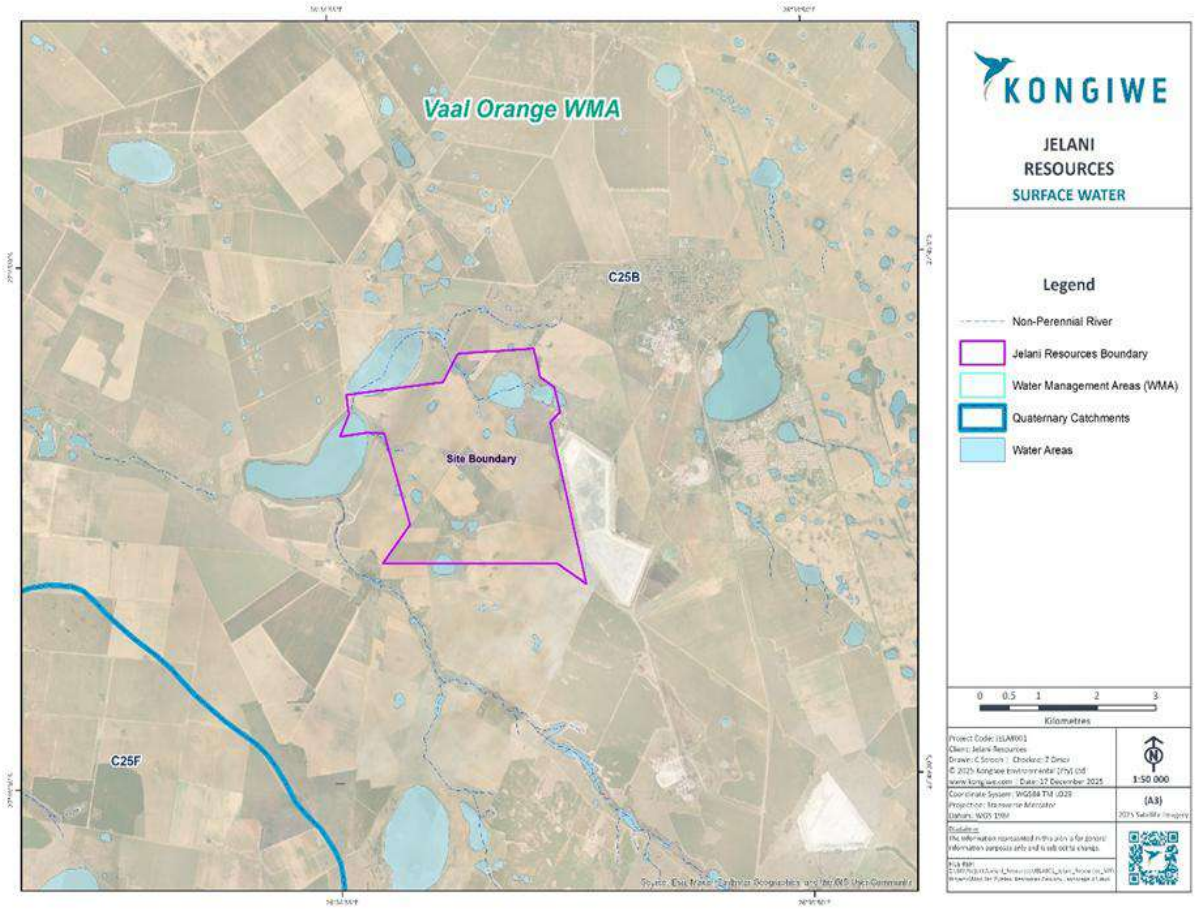
- The project boundary is currently utilised for agricultural purposes.
- Land uses within the immediate project boundary consist predominantly of cultivated fields, grassland, forested areas, waterbodies, and wetlands.
- The immediate surrounding landscape also includes existing mines and tailings storage facilities (TSFs), as well as transport infrastructure, electricity infrastructure, water supply infrastructure and various farming operations.
- Furthermore, the Proposed Project area is situated immediately adjacent to, and west of, the Harmony Gold Target Mine.



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Surface Water

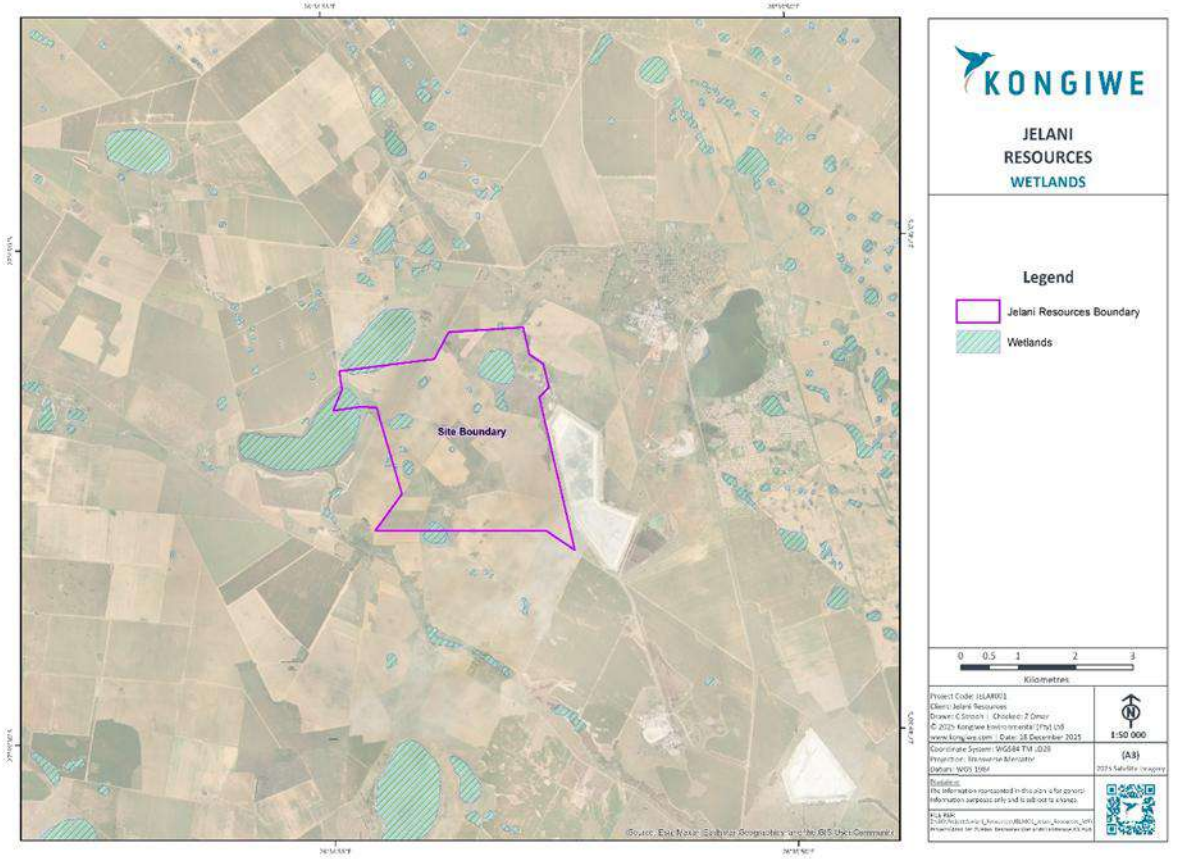
- The project is located within the Vaal Orange Water Management Area (WMA), specifically in quaternary catchment C25B.
- The surface water resource within the site boundary include a non-perennial river located to the north of the project area. Another non-perennial river is situated to the west of the site boundary.
- The surface water map indicates that the project area contains surface water areas, including wetlands.



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Wetland

- Several wetlands (wetlands depression and unchannelled valley-bottom (UVB) were identified and delineated occurring inside the project footprint with additional wetlands to the west, north, and south-central parts of the site.



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Biodiversity

- The Free State Conservation Plan (2024) classified areas on the basis of their contribution to reach the conservation targets within the province.
- These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either ‘Irreplaceable’ (must be conserved), or ‘Important’.
- Proposed Project falls within a CBA 1 and an ESA 2.

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Specialist Studies

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist Studies	
Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.	Mine Closure Plan
Desktop Heritage and Palaeontology	Hydrogeological Assessment
Hydrological Assessment	Climate Change Impact Assessment
Air Quality Impact Quality Assessment	Blasting and Vibrations
Noise Impact Assessment	Socio-Economic Impact Assessment

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Legislative Framework

- An Environmental Authorisation (EA) application will be submitted to DMPR as the Competent Authority.
  - EA application for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- An Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) will be submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project.



Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Waste Management Authorisation
Underground Mining Operation	956,76 Hectares	GNR 325 - Activity 17	Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right	No Waste Management License (WML) activities are triggered by the proposed underground mining operation

Submission to DMPR

- Application form
  - DFFE Screening Tool
  - Regulation 2(2) Plan
  - Mining Work Programme
  - Company Registration Documents
  - Certified ID Copies of Directors
  - Financial and Technical Ability
- Draft Scoping Report
- Social Labour Plan

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Public Participation Process

- Announcement of the Proposed Project: Advertisement, distribution of the Background Information Document (BID) and placement of site notices.
- The Application Form and Draft Scoping Report (DSR) will be submitted to DMPR (one hardcopy and one soft copy).
- The draft reports (Scoping Report and EIA Report) will be made available to various stakeholders and placed for public review at public venues and on the Kongiwe website for a period of 30 days.
- An Online meeting (via Teams) and an Open Day.
- Indirectly affected landowner and stakeholder meetings are ongoing.
- Comments will be recorded in a Comments and Response Report and submitted as part of the Final Scoping Report and Final EIA Report.

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Project to Date

- Conducting specialist studies that will contribute to the Water Use Licence Application and EIA Report.
- Engaging with landowners.
- Concluding the Social Labour Plan.
- Compiling the Application Form and Draft Scoping Report.

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The Way Forward

Timeframes	
Conclude SLP	Estimated to be complete by end of March 2026
Project Announcement	27 March 2026
Application Form and Draft Scoping Report	31 March 2026
Draft Scoping Report – 30 days comment period	1 April 2026 to 05 May 2026
Final Scoping Report to CA	29 May 2026
Acceptance of Scoping Report	13 July 2026
Draft EIA Report – 30 days comment period	12 August 2026 to 11 September 2026
Final EIA Report to CA	27 October 2026
CA Decision	January 2027

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Comment & Discussion

- Discussion
- Action Points
- Closing



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Contact

- **Name: Umeshree Naicker**
- **Tel: 010 140 1725/26**
- **Email: unaicker@kongiwe.com**

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.

info@kongiwe.com
www.kongiwe.com

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MINUTES OF MEETING			
Date	Tuesday, 26 May 2026	**Time**	14:00 – 14:30
Venue	Microsoft Teams		
Subject	**Lejweleputswa District Municipality**		
List of Attendees			
Organisation		**Name of Attendee**	**Designation**
Lejweleputswa District Municipality		Mr Dewald Kirsten	Manager of Municipal Services
Jelani Resources (Pty) Ltd		Mr Neels Hoek	Project Manager
Kongiwe Environmental (Pty) Ltd		Ms Umeshree Naicker	Principal Environmental Consultant
Kongiwe Environmental (Pty) Ltd		Mr Ripfumelo Macevale	Environmental Consultant
Apologies			
Organisation		**Name of Attendee**	**Designation**
None			

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place

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No	Item
1	**Welcome and Introductions**
1.1	Ms Umeshree Naicker (Ms Naicker) welcomed all online meeting attendees.
2	**Meeting Purpose**
2.1	Discuss the proposed Underground Mining Project.
2.2	Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
2.3	Provide you with an opportunity to raise comments/seek clarity and provide input.
2.4	Record comments raised and include in the Comments and Responses Report.
3	**Meeting Agenda**
3.1	Purpose of the Meeting.
3.2	Kongiwe's Role as an independent EAP.
3.3	Project Background.
3.4	Project Description.
3.5	Infrastructure Requirements.
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3.11	The Way Forward.
3.12	Comments and Discussion.
4	**Discussion**
4.1	Refer to the table below

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STAKEHOLDERS		COMMENT	RESPONSE
4.1.1	Mr Dewald Kirsten (Mr Kirsten)	Mr Kirsten sought clarification regarding the baseline information that was considered and included in the Draft Scoping Report.	Ms Naicker responded that, the Department of Forestry, Fisheries and the Environment (DFFE) National Web-Based Environmental Screening Tool was used to identify environmental sensitivities and specialist study requirements associated with the proposed development footprint. The tool assigns sensitivity ratings (Very High, High, Medium or Low) across a range of environmental themes, including biodiversity, terrestrial animal species, terrestrial plant species, aquatic biodiversity, agriculture, heritage, palaeontology, civil aviation and defence. Based on the identified sensitivities, the Screening Report indicates the specialist studies and assessment protocols that may be required for the application. She mentioned that the Scoping Report considered all baseline information in terms of vegetation, aquatic biodiversity, groundwater, heritage, palaeontology, as well as wetlands. She further added that for the Scoping phase, a desktop assessment of the baseline area is undertaken, and in the EIA phase, appointed specialist studies assess the impacts associated with the project. Refer to Section 7 of the Draft Scoping Report (DSR) for the baseline environment and Section 9, Table 9-1 of the DSR for the Plan of Study for specialist studies that is proposed for the EIA Phase.
4.1.2	Mr Kirsten	Mr Kirsten enquired whether the specialist studies would be undertaken as desktop assessments rather than field-based investigations.	Ms Naicker responded that, at the Scoping phase stage, a desktop assessment was conducted to identify potential impacts for the Proposed Project. However, detailed specialist assessments will take place in the EIA phase (see Section 9, Table 9-1 of the DSR for the Plan of Study for specialist studies that is proposed for the EIA Phase).

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STAKEHOLDERS		COMMENT	RESPONSE
			She mentioned that the specialist studies to be conducted consists of the following: Biodiversity and Freshwater Impact Assessment, Air Quality Impact Assessment, Hydrogeological, Hydrological Assessment and Climate Change Assessment. A desktop Heritage and Palaeontology Assessment will be conducted. She added that a Blasting and Vibration Assessment, Socio-Economic Impact Assessment, and a Mine Closure Plan will also be considered.
4.1.3	Mr Kirsten	Mr Kirsten mentioned that he will send the questions to Kongiwe team for written responses. However, he requested that the specialist assessments also consider that, due to the presence of uranium-bearing material, a radioactive exposure assessment should be conducted. He added that, although the site is not currently in operation, it had been operational for many years in the surrounding area. He suggested that the question should be raised regarding the cumulative impacts of the existing Harmony Target operations together with the new Jelani JV project, and that these should also be evaluated. He noted that he believes most of the specialist studies may include this aspect; however, from his perspective, there are currently many desktop studies being undertaken for project similar to Jelani. Given that the area is already a mining-disturbed environment, he emphasised the need to consider the cumulative impacts involved.	Ms Naicker noted that the existing Radioactivity Study for the Harmony Target Mine will be used for the Proposed Project. The geology of the Proposed Project area is a direct extension of the geological formations occurring within the Harmony Target Mine mining right area (Section 7.3 of the DSR), which has already been subject to detailed radiological assessment and regulatory approval (2024 Free State Radiological Public Safety Assessment: System Description, undertaken by AquiSim Consulting (Pty) Ltd for Harmony Gold Mining Company Limited - Free State Operations). Ms Naicker also noted that the specialist studies conducted in the EIA phase will consider cumulative impacts.

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STAKEHOLDERS		COMMENT	RESPONSE
		He pointed out that some specialist studies do not always take these into account, instead focusing on the specific operation in isolation. He clarified that his questions are not intended as an open critique of the entire development, but rather to highlight that, particularly from an environmental health perspective, it is important to assess impacts beyond the isolated environment in which the operation will take place.	
4.1.4	Mr Kirsten	Mr Kirsten mentioned that, based on his observations from similar operations, very little attention is often given to mine closure and post-closure environmental risks, particularly with regard to rehabilitation and closure planning processes. He added that, upfront, he would like to request that the necessary attention be given to these aspects. He further noted that, in line with this, there is sometimes a breakdown in communication once operations have commenced or after closure, particularly regarding the financial aspects between the relevant authorities and the operating companies. Specifically, he referred to continuous monitoring data on water quality, air quality, radiation, waste management, and related aspects.	Mine Closure Risk Assessment will be conducted for the Proposed Project, including the estimated financial rehabilitation quantum calculation will be undertaken. The financial quantum for rehabilitation is required to be paid in full prior to the issuance of the Environmental Authorisation as per the Mineral and Petroleum Resources Development Act (MPRDA). This information will be included the EIA phase.
4.1.5	Mr Kirsten	Mr Kirsten mentioned that, going forward, he will submit all his questions and inputs so that a good working relationship can be established with the Jelani Project, extending beyond the Scoping and EIA reporting processes.	Ms Naicker responded that Mr Kirsten is welcome to submit his comments, via the stakeholder email address.
4.1.6	Mr Neels Hoek (Mr Hoek)	Mr Hoek mentioned that an open day will be held on Saturday, 30 May 2026, between 11:00 and 13:00, and that municipal personnel are welcome to attend.	Mr Kirsten responded that he appreciates and has noted the invitation. However, based on his past experience, he does not prefer attending such meetings, as he would be seated with the community and, at times, questions raised may create

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STAKEHOLDERS		COMMENT	RESPONSE	
			misunderstandings among community members, which could place the project in a difficult position.	
4.1.7	Mr Hoek	Mr Hoek mentioned that he believes it would be beneficial, once the project reaches the EIA phase, to arrange an in-person meeting. He noted that the EIA will also be available for public comment, and suggested that the team consider holding a separate, dedicated meeting with the municipality at that stage, distinct from the open days. He added that such a meeting could be arranged with the municipality at that time, should there be a requirement from the municipal representatives.	Mr Kirsten responded that he would support this approach. He noted that he will be raising some questions with the team, and while responses will be provided, there may still be a need for further clarification. He therefore suggested that an open discussion on some of the questions, to ensure mutual understanding, would be beneficial, and that such a meeting could be arranged. Ms Naicker agreed that this was a good suggestion and added that, in the next phase, the team will present all the identified impacts and the outcomes of the specialist studies. She further indicated that the municipality will be provided with a copy of the report, and by the time engagement takes place in the next phase, the municipality will have significantly more information available.	
5	**Closing**			
5.1	Ms Naicker thanked everyone for their time and the meeting was adjourned at 14:30 PM.		ALL	-

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Jelani Resources (Pty) Ltd

Environmental Authorisation and Integrated Water Use License Application for the Proposed Jelani Underground Mining Project

Stakeholder Engagement Meeting – Lejweleputswa District Municipality

DMPR Reference Number: FS30/5/1/2/3/2/1(10098)MR

DWS Reference Number: WU38176

26 May 2026

Introductions

- **Jelani Resources (Pty) Ltd (Applicant)**
  - Neels Hoek

- **Kongiwe Environmental (Pty) Ltd (EAP)**
  - Umeshree Naicker
  - Ripfumelo Macevele
  - Vanessa Viljoen

- **Lejweleputswa District Municipality**

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Agenda

1. Purpose of the Meeting
2. Kongiwe's Role as an independent EAP
3. Project Background
4. Project Description
5. Infrastructure Requirements
6. Baseline Environment
7. Specialist Studies
8. Legislative Framework
9. Listed and Specified Activity
10. Public Participation Process
11. The Way Forward
12. Comments and Discussion

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Purpose of the Meeting

- Discuss the proposed Underground Mining Project.
- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation application.
- Provide you with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and include in the Comments and Responses Report.

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Important Notice

- This meeting is a formal consultation in terms of the requirements as stipulated in the:
  - National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for an Application for an Environmental Authorisation (EA) for listed activities triggered in Listing Notices GN R983 and GN R984 in terms of the Environmental Impact Assessment (EIA) Regulations of December 2014, as amended. The Department of Mineral and Petroleum Resources (DMPR)will be the Competent Authority to assess the EA for the Proposed Project.
  - National Water Act, 1998 (Act No.36 of 1998) (NWA) for an Integrated Water Use Licence Application (IWULA) in accordance with the Act. The Department of Water and Sanitation (DWS) will be the Competent Authority to assess the IWULA for the Proposed Project.

POPIA: Safeguarding registered person's personal information

In terms of section 19 of the Protection of Personal Information Act (POPIA), a responsible party must, subject to Sections 9 and 11 of the Act, ensure the integrity and confidentiality of personal information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss of, damage to or unauthorised destruction of personal information, unlawful access to or processing of personal information. POPIA requires that personal information should be adequately protected to avoid unauthorised access. Therefore, Kongiwe continuously reviews security controls and procedures to ensure that personal information is secured. It should be noted that in terms of Section 11, personal information may be processed to the extent that this is necessary for pursuing the legitimate interests of the responsible party to whom the information is supplied.

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Kongiwe's Role

As an independent Environmental Assessment Practitioner, it is our role to perform an objective assessment of what the positive and negative environmental impacts of the Proposed Project may be, to quantify these, describe possible mitigations, collect public comment and supply the Competent Authority with the documentation so that it can determine if the project should proceed or not.

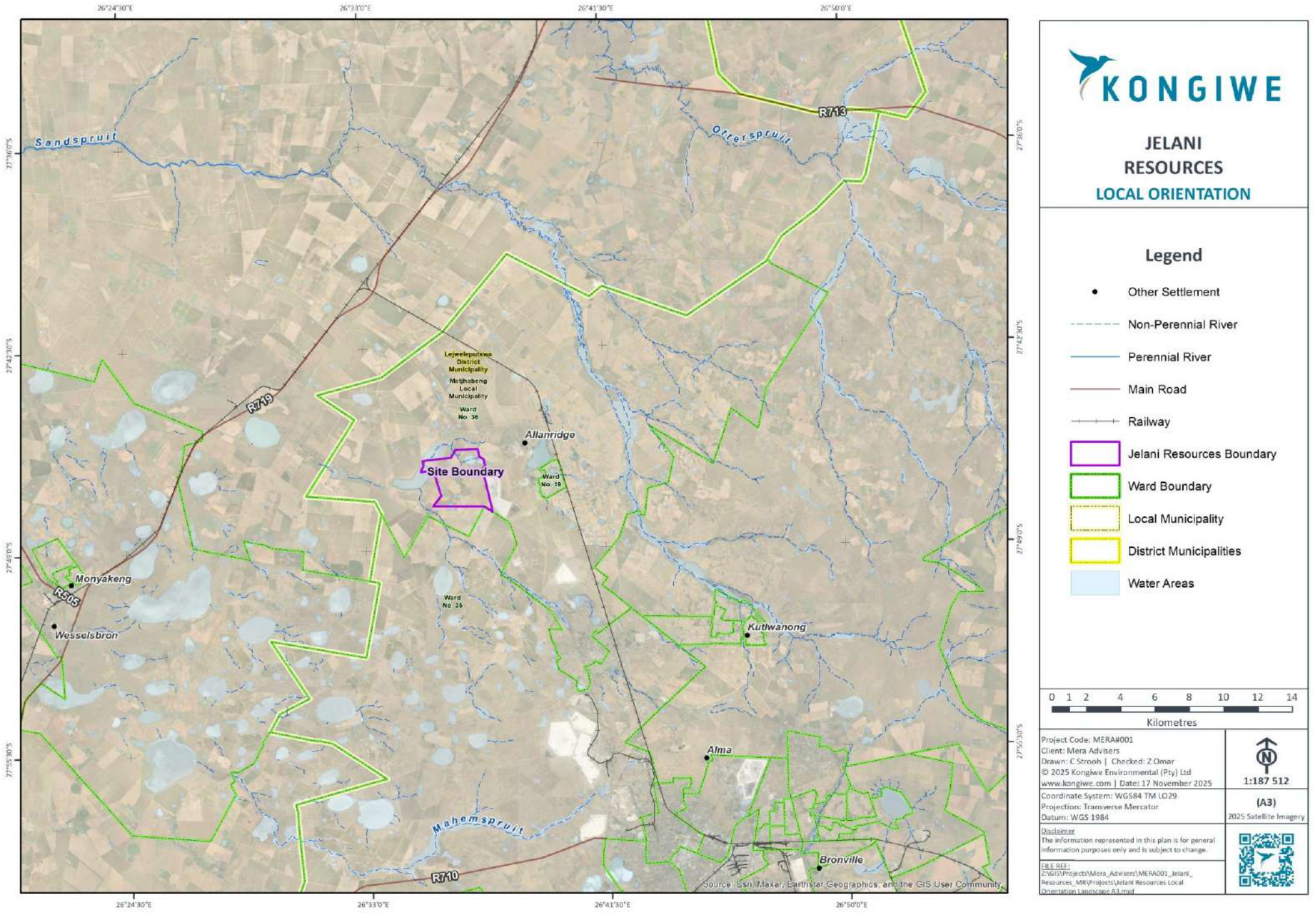
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Project Background

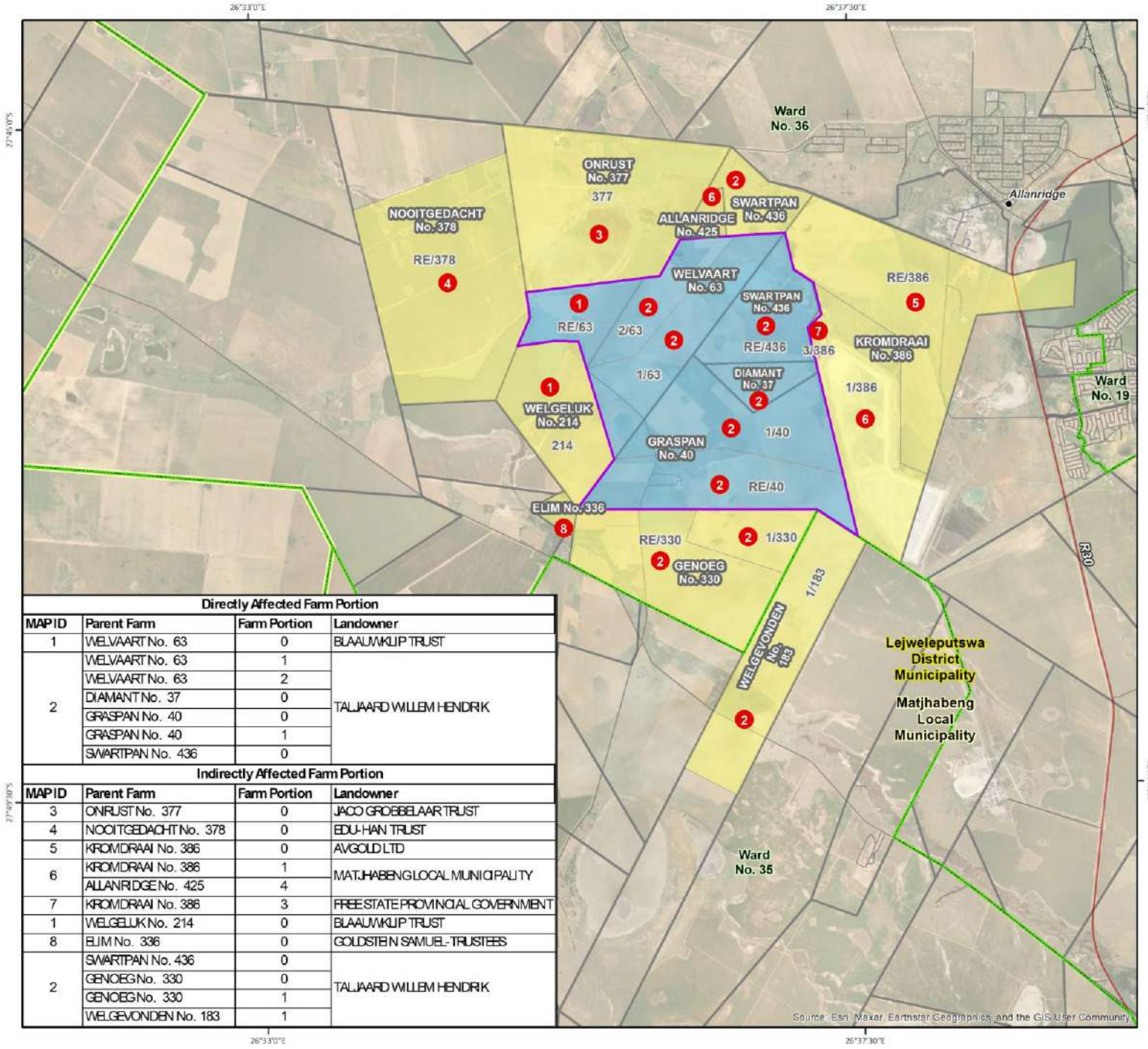
- **Applicant**: Jelani Resources (Pty) Ltd
- **Activity**: Underground Mining
- **Life of Operation**: 14 years
- **Location**: The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.
- Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold.
- The JV was formed to conduct underground mining operations within the joint venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution).
- Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

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Project Location



Property Map



Directly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES

LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3

Kilometres

Project Code: JELAR001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

1:45 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)

2025 Satellite Imagery

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
Z:\GIS\Projects\Jelani_Resources\JELA001_Jelani_Resources_MR\Projects\Jelani Resources Land Tenure Landscape A3.mxd

Project Description

Jelani intends to initiate underground mining operations to extract the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

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Project Description

- Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1 200 mbs).
- As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.
- Two mining methods have been identified as the most practical for exploiting the mineral resources: **conventional breast mining** and **shrinkage stoping**.
- The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

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Project Description

- Ore will be transported to the shaft ore pass system using a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.
- The orebodies extend between 1 500m and 2 600m below surface.
- The total extent of the application area is 956.76 hectares (ha).
- All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

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Infrastructure Requirements

- All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area.
- Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.
- The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations.

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Infrastructure Requirements

- To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary.
- Each station will include a small sensor pad/housing (approximately 5–10 m^2), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.
- Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

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Underground Access Infrastructure Photos



Photo 1: Harmony Target No 3 Shaft

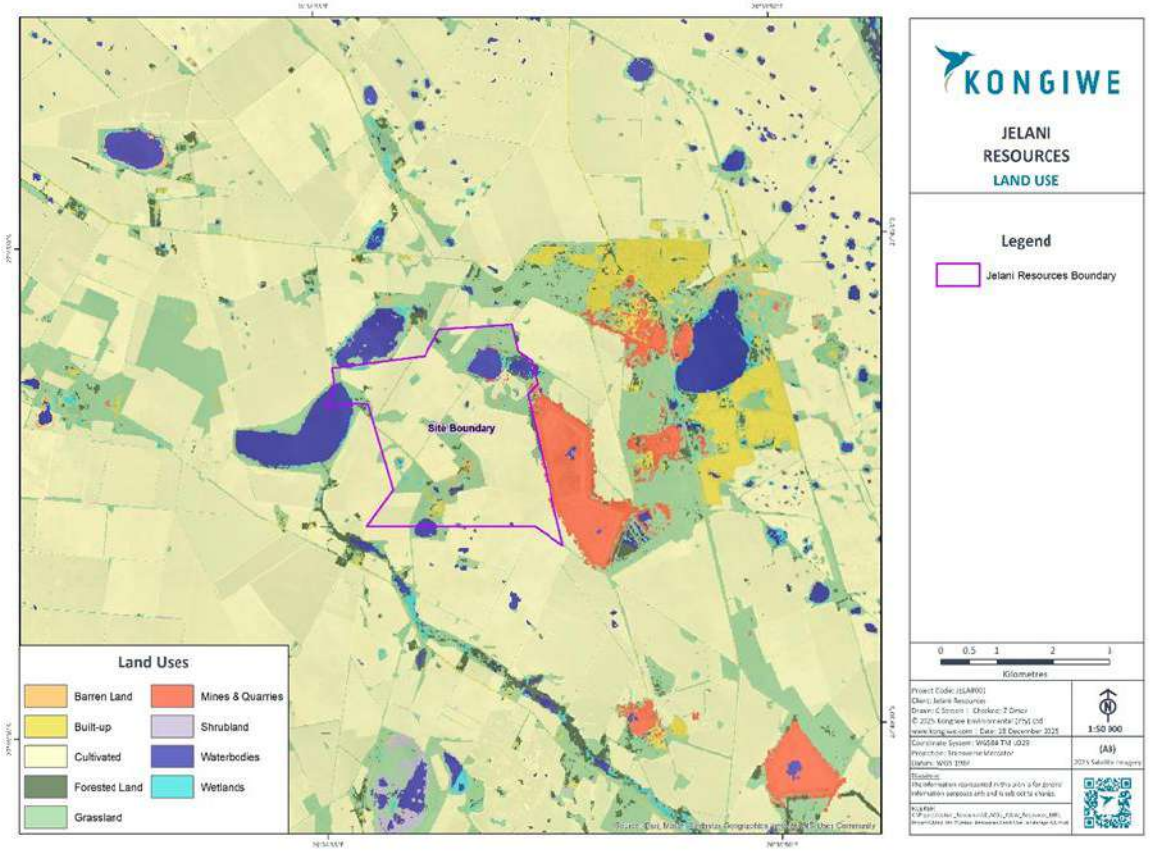


Photo 2: Harmony Target No 2 Shaft

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Current Land Use

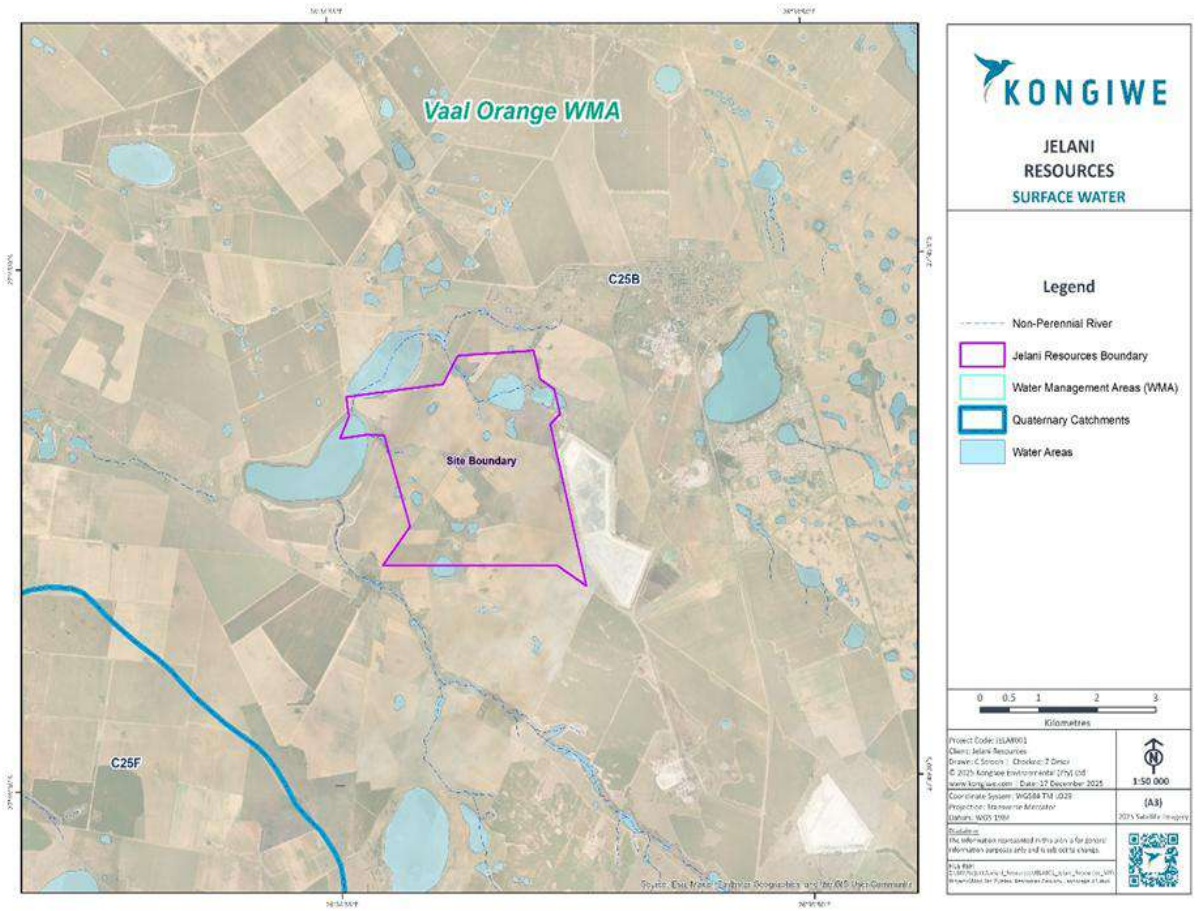
- The project boundary is currently utilised for agricultural purposes.
- Land uses within the immediate project boundary consist predominantly of cultivated fields, grassland, forested areas, waterbodies, and wetlands.
- The immediate surrounding landscape also includes existing mines and tailings storage facilities (TSFs), as well as transport infrastructure, electricity infrastructure, water supply infrastructure and various farming operations.
- Furthermore, the Proposed Project area is situated immediately adjacent to, and west of, the Harmony Gold Target Mine.



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Surface Water

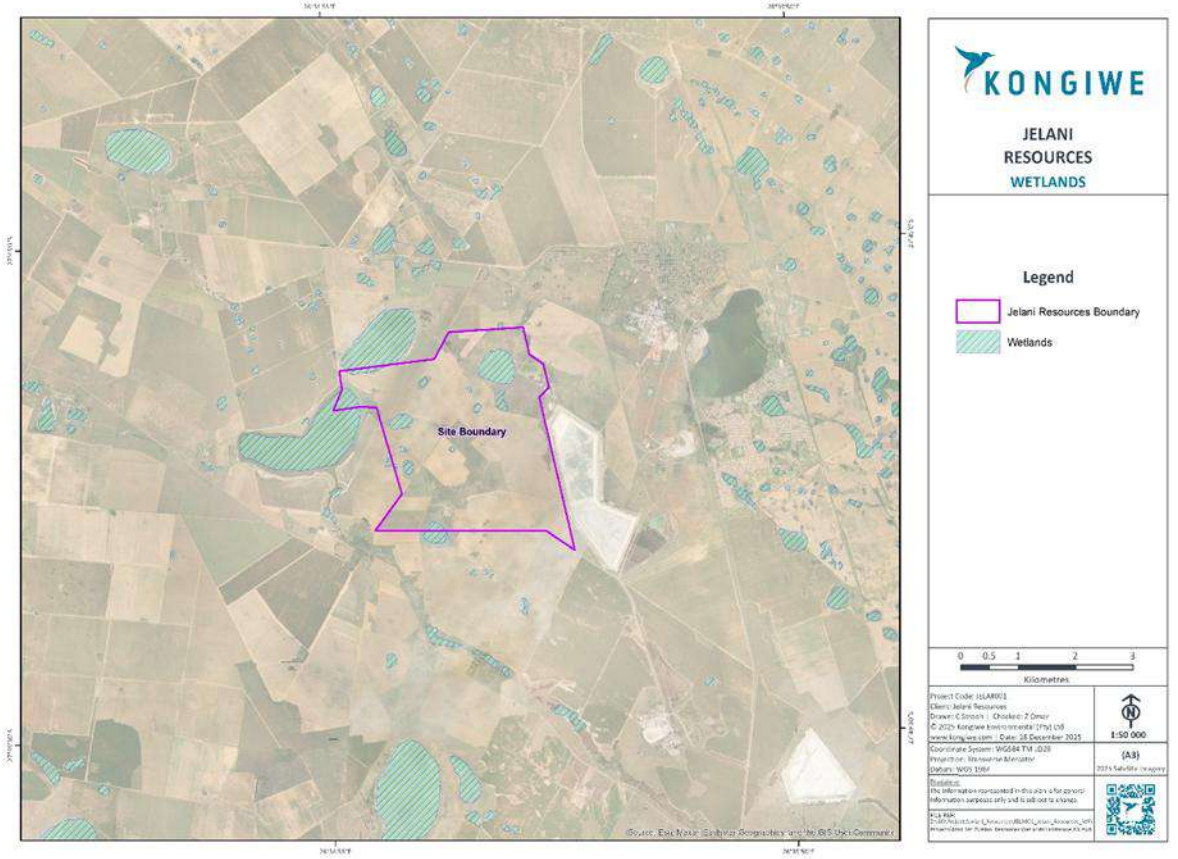
- The project is located within the Vaal Orange Water Management Area (WMA), specifically in quaternary catchment C25B.
- The surface water resource within the site boundary include a non-perennial river located to the north of the project area. Another non-perennial river is situated to the west of the site boundary.
- The surface water map indicates that the project area contains surface water areas, including wetlands.



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Wetland

- Several wetlands (wetlands depression and unchannelled valley-bottom (UVB) were identified and delineated occurring inside the project footprint with additional wetlands to the west, north, and south-central parts of the site.



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Biodiversity

- The Free State Conservation Plan (2024) classified areas on the basis of their contribution to reach the conservation targets within the province.
- These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either ‘Irreplaceable’ (must be conserved), or ‘Important’.
- Proposed Project falls within a CBA 1 and an ESA 2.

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Specialist Studies

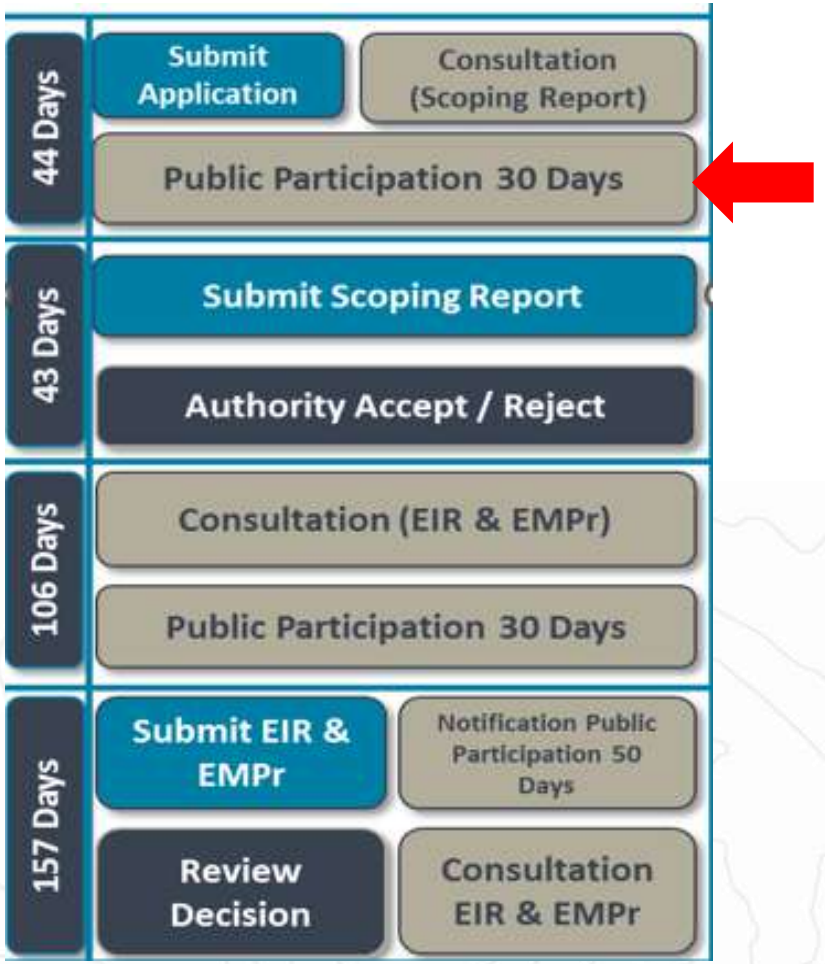
Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist Studies	
Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.	Mine Closure Plan
Desktop Heritage and Palaeontology	Hydrogeological Assessment
Hydrological Assessment	Climate Change Impact Assessment
Air Quality Impact Quality Assessment	Blasting and Vibrations
Noise Impact Assessment	Socio-Economic Impact Assessment

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Legislative Framework

- A Scoping and Environmental Impact Assessment (S&EIA) process is being undertaken which evaluates the environmental impacts associated with the Proposed Project as part of an application for Environmental Authorisation (EA). The S&EIA and specialist studies to be undertaken will support the application for the required approval. The following applications have been made to the relevant departments:
  - EA application for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
  - An Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) was submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project.



Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Underground Mining Operation	956,76 Hectares	GNR 325 - Activity 17	Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right	Section 21 (c) and (i)

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Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Development of gravel access tracks	Gravel access tracks approximately 1 km across all stations, with a width of 4 m wide	GNR 985 – Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **(b) Free State** (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Section 21 (c) and (i)

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Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Installation of the seismographic monitoring stations.	40 m²	GNR 985 - Activity 14	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse; **(b) Free State** (i) Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Section 21 (c) and (i)

Public Participation

- The EA Application was submitted to the DMPR on Tuesday, 21 April 2026. The acceptance letter for the EA application was received on 18 May 2026.
- The Draft Scoping Report (DSR) was released for public review on 21 May 2026 . The review period will remain open for 30 days, from Thursday, 21 May 2026 to Monday, 22 June 2026. A Copy of the DSR will be made available at the following locations:
  - Allanridge Public Library (53 Caledon St, Allanridge)
  - Kongiwe website: http://www.Kongiwe.com/publications-view/public-documents/
- Online Meeting: Wednesday, 27 May 2026, from 10:00 to 11:00 via Microsoft Teams.
- An Open Day will be held on Saturday, 30 May 2026,at S.A. Mokhothu Primary School from 11H00 – 13H00
- Indirectly affected landowner and stakeholder meetings are ongoing.
- After public review, the Final Scoping Report will be finalised and submitted.
- Comments will be recorded in a Comments and Response Report and submitted to the relevant Competent Authorities.

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Comment & Discussion

- Discussion
- Action Points
- Closing



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Contact

- **Name: Vanessa Viljoen / Jean-Mari Williams**
- **Tel: 010 140 1725/26**
- **Email: stakeholders@kongiwe.com**

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.

info@kongiwe.com
www.kongiwe.com

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Kongiwe Stakeholder Engagement

From: Kongiwe Stakeholder Engagement
Sent: Monday, 29 June 2026 14:22
To: dewald@lejwe.co.za
Subject: Jelani Resources (Pty) Ltd: JV Area Underground Mining Project: Minutes of Online Meeting held on Tuesday, 26 May 2026 with Lejweleputswa District Municipality
Attachments: JELA#001_Lejweleputswa.pdf; JELA_001_Lejweleputswa_District_Presentation.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Tracking:

Recipient	Read
dewald@lejwe.co.za	
Umeshree Naicker	
Ripfumelo Macevele	
Jean-Mari Williams	Read: 2026/06/29 14:23

Dear Stakeholders,

I hope this message finds you well.

Please find attached the minutes and associated appendices from the online meeting held with Lejweleputswa District Municipality on **Tuesday, 26 May 2026**.

Should you have any queries, please do not hesitate to contact us.

Kind Regards,

Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 1725 | Email: stakeholders@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.
www.kongiwe.com

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MINUTES OF MEETING

Date	Wednesday, 27 May 2026	**Time**	10:00 – 11:00
Venue	Microsoft Teams		
Subject	**Online Meeting Minutes: Broader Stakeholder Meeting**		

List of Attendees

Organisation	Name of Attendee	Designation
Blaauwklip Trust	Mr Eduard Steyn	Directly Affected Landowner
Taljaard Willem Hendrik (Private Landowner)	Mr Willem Taljaard	Directly Affected Landowner
Grootspruit Familie Trust\ de Jager Boerdery	Mr Frans De Jager	Indirectly Affected Landowner
Department of Land Reform and Rural Development (DLRRD)	Ms Nozipho Dlamini	Assistant Manager
Federation for a Sustainable Environment (FSE)	Ms Mariette Liefferink	CEO
South African National Road Agency (SANRAL)	Ms Karabo Mabyana	Statutory Control Officer
SANRAL	Ms Khuliso Nenguda	Statutory Control Officer
Sand-Vet WUA	Mr Andries Labuscagne	Chief Executive
Jelani Resources (Pty) Ltd	Mr Neels Hoek	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Umeshree Naicker	Principal Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevale	Environmental Consultant

Apologies

Organisation	Name of Attendee	Designation
Harmony Gold Mining Company Limited	Mr Tshepo Moloto	Specialist: Mining and Prospecting Rights

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place.

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No	Item
1	**Welcome and Introductions**
1.1	Ms Umeshree Naicker (Ms Naicker) welcomed all online meeting attendees.
2	**Meeting Purpose**
2.1	Discuss the proposed Underground Mining Project.
2.2	Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
2.3	Provide you with an opportunity to raise comments/seek clarity and provide input.
2.4	Record comments raised and include in the Comments and Responses Report.
3	**Meeting Agenda**
3.1	Purpose of the Meeting.
3.2	Kongiwe's Role as an independent EAP.
3.3	Project Background.
3.4	Project Description.
3.5	Infrastructure Requirements.
3.6	Baseline Environment.
3.7	Specialist Studies.
3.8	Legislative Framework.
3.9	Listed and Specified Activity.
3.10	Public Participation Process.
3.11	The Way Forward.
3.12	Comments and Discussion.
4	**Discussion**
4.1	Refer to the table below

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STAKEHOLDERS		COMMENT	RESPONSE
4.1.1	Mr Frans De Jager (Mr De Jager)	Mr De Jager stated that written comments had already been submitted to Kongiwe. He further enquired whether Ms Naicker had received the document that had been sent through.	Ms Naicker acknowledged receipt of the comments from the Grootspruit Familie Trust. She noted that the comments were of a highly technical nature and had therefore been shared with the appointed groundwater specialist for review and input. Ms Naicker further advised that the groundwater specialist is currently in the process of preparing a response. Once the specialist's feedback has been received, further engagement would be undertaken with Mr De Jager.
4.1.2	Mr De Jager	Mr De Jager stated that he did not want the consultation process to be treated merely as an administrative exercise to indicate that engagement had taken place with landowners. He noted that his primary concern relates to the potential impact of the proposed mining activities on his borehole water source and water quality, as well as what actions would need to be taken should the project impact his borehole water. He further raised concern regarding the depth of the proposed mining activities and the potential implications this may have on groundwater resources, including the possibility of lowering the water table or affecting aquifer systems. He queried what measures or actions would be implemented should adverse impacts on water resources occur. Mr De Jager emphasised the need for direct engagement with a qualified hydrologist or groundwater specialist with experience in underground mining projects, who could explain the location of aquifers, the depth of boreholes, and the potential implications of	Ms Naicker explained that the appointed groundwater specialist would be required to assess these aspects in detail as part of the specialist assessment being undertaken for the Proposed Project. She advised that the findings of the groundwater assessment would provide responses to the concerns and questions raised by Mr De Jager regarding potential impacts on groundwater resources and water quality. Ms Naicker further explained that the project is currently in the scoping phase, during which potential impacts associated with the proposed project are identified together with comments and concerns raised by interested and affected parties. She noted that the subsequent phase of the process would involve detailed impact assessments relating to each identified potential impact, including a dedicated groundwater impact assessment. Ms Naicker confirmed that, once the groundwater assessment has been completed, further engagement would be undertaken with affected stakeholders. She further advised that the request for

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STAKEHOLDERS		COMMENT	RESPONSE
		the proposed mining activities on surrounding groundwater resources. He further indicated that affected farmers would like to be shown the exact location of the proposed mining areas in relation to their water sources in order to better understand whether any impacts may occur. Mr De Jager concluded by reiterating that the availability and quality of water resources are of critical importance to farming operations and that this remains the primary concern of the affected landowners and further indicated that he would appreciate it if the submission from the Grootspruit Familie Trust could be shared with other affected landowners.	engagement with the groundwater specialist had been noted and that arrangements would be made for a session during which the findings of the groundwater assessment would be presented and discussed with the affected farmers and landowners.
4.1.3	Mr De Jager	Mr De Jager stated that he had additional comments which had not been included in his previously submitted document. He noted that these comments relate to the proposed power supply requirements for the project. He estimated that a mine of the proposed scale would likely require a power supply capacity of approximately 20 Megavolt-Amperes (MVA). He therefore enquired whether new Eskom powerlines would be constructed to service the proposed mining operations and requested clarity regarding the proposed routing of such infrastructure. Mr De Jager further queried how the proposed powerline infrastructure may affect his property and surrounding farming properties. He noted that understanding the location and extent of the associated infrastructure is important in order for affected landowners to gain a clearer understanding of the overall project	Ms Naicker responded that a more detailed response regarding the power supply would be provided. However at this stage, based on the Propose Project's infrastructure requirements, the intention is to utilise existing infrastructure that can be shared with the existing mine operations. **Post meeting Note:** Both Target No. 3 and Target No. 2 shafts have existing Eskom bulk supplies providing power for the care and maintenance operations. The 3 Shaft main substation has sufficient installed capacity in order supply the power requirements for the phase 1 mining operation. The 2 Shaft main substation will require a complete upgrade. Target No 3 Shaft Bulk Supply

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STAKEHOLDERS		COMMENT	RESPONSE
		layout and its potential impacts. He reiterated that this remains an additional concern for affected farmers and landowners. Mr De Jager further noted that, prior to his retirement, he had served as a Planning Manager at Eskom and therefore had experience relating to electricity supply requirements. Based on his experience, he advised that a mine of the proposed scale would likely require approximately two 20 MVA power supplies and expressed the view that there may currently be insufficient electricity supply capacity available for the project. Mr De Jager stated that, in his opinion, additional 132 kV or 88 kV powerlines may need to be constructed to supply electricity to the proposed mining operations. He requested that these potential infrastructure requirements and associated impacts be taken into consideration as part of the project assessment process.	The No. 3 shaft substation is supplied at 6.6kV from the Eskom bulk supply 44/6.6kV substation, which includes the following 44/6.6kV transformers: • 2 x 10MVA transformers • 2 x 5 MVA transformers • 4 x 3.1 MVA transformers No. 3 shaft will supply the complete power requirements for the phase 1 mining, which includes the first two years of production. During this initial period the repair and upgrading of No. 2 shaft facilities will occur, following which the mining operation will be supplied from No. 2 shaft. The calculated peak demand for No. 3 shaft is as follows: • Phase 1 – 12.5 MVA • Phase 2 – 1 MVA (Only JV project load) The existing No. 2 shaft substation is supplied at 6.6kV from the Eskom bulk supply 44/6.6kV substation and consists of the following 44/6.6kV transformers: • 1 x 5 MVA transformers • 2 x 3.1 MVA transformers

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STAKEHOLDERS		COMMENT	RESPONSE
			The No. 2 shaft substation will require complete upgrade of both the Eskom and mine substations in order to supply the additional load of the Jelani JV project.
4.1.4	Mr Willem Taljaard (Mr Taljaard)	Mr Taljaard referred to the land tenure map presented during the meeting and stated that his family owns the farms Swartpan, Diamant Graspan and the majority of Welvaart. Mr Taljaard sought clarification regarding the proposed mining operations and indicated that, based on his understanding of the presentation, Target 2 and Target 3 Shaft would be utilised for the proposed mining activities together with the associated Harmony Target slimes dam. He queried whether his understanding of the Proposed Project infrastructure and operations was correct.	Ms Naicker responded that the proposed project intends to utilise existing infrastructure associated with Harmony Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Information regarding the new TSF will be provided in the EIA phase.
4.1.5	Mr Taljaard	Mr Taljaard stated that the farms previously referenced are directly adjacent to the existing Harmony Target slimes dam. He further noted, in his capacity as a landowner operating adjacent to mining activities, that he has experienced ongoing operational and environmental concerns associated with the existing operations. He reported that he has previously raised complaints with the mine regarding contaminated water, which he described as cyanide-impacted water, reportedly discharging from the slimes dam area onto his agricultural land. He further expressed concern regarding the adequacy and reliability of maintenance responses to such incidents, stating that delays in pump repairs have occurred. With regards to potential pollution impacts on boreholes, Mr Taljaard commented that their galvanised pipes corrode rapidly. He	Ms Naicker explained that, in terms of the impact assessment process, the next phase of the study, which is the Environmental Impact Assessment (EIA) phase would provide a more detailed evaluation of potential impacts, including those relating to underground water resources and potential pollution impacts. She reiterated that these aspects would be assessed in greater detail as part of the specialist studies to be undertaken. The Groundwater Impact Assessment will be conducted in the EIA phase and will consider the assessment of impacted presented, where possible.

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STAKEHOLDERS		COMMENT	RESPONSE
		stated that, as a result, the water is not suitable for human or animal consumption. He further noted that overflow from Harmony Target evaporation and return water dams, located within the Jelani project site, has occurred during periods of heavy rainfall in recent years, which he indicated has resulted in downstream impacts, including loss of grazing land. Mr Taljaard expressed that, in his view, the introduction of additional mining activities may exacerbate existing issues. He further stated that he shares the concerns previously raised by Mr De Jager regarding potential impacts on boreholes and the risk of reduced or lost groundwater availability.	
4.1.6	Mr Eduard Steyn (Mr Steyn)	Mr Steyn stated that he is a neighbouring landowner to Mr Taljaard and indicated that he shares the concerns raised regarding underground water resources. He further noted concerns relating to above-ground water resources, including dams, pans and surrounding wetland features. He enquired what impact the proposed mining activities would have on above-ground farming operations. In particular, he requested clarity on potential impacts on farm infrastructure, roads, water resources, and farm labour residing on the properties.	Ms Naicker responded that the Surface Water Assessment as well as the Groundwater Impact Assessment would be undertaken as part of the EIA process. She explained that this specialist assessments would identify and assess potential impacts (including roads and surface water), including the significance of such impacts, and would also propose appropriate mitigation measures. This information would be included in the Draft EIA Report and Environmental Management Programme (EMPr). Ms Naicker further advised that, at this stage, the project considers the use of existing operational mining infrastructure.
4.1.7	Ms Karabo Mabyana (Ms Mabyana)	Ms Mabyana stated that she generally shares the concerns raised by Mr De Jager and other attendees regarding the potential impacts of the proposed activities on neighbouring properties. She enquired	Ms Naicker responded that, in terms of the surface infrastructure on directly affected properties, the project currently considers only monitoring stations and the associated access roads (see Section 1.7 of the DSR).

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STAKEHOLDERS		COMMENT	RESPONSE
		how such activities would affect surrounding landowners and to what extent such impacts may be experienced.	Potential impacts associated with these infrastructures will be investigated further through specialist assessment such as the biodiversity, surface water etc, which are currently being undertaken to support the application for Environmental Authorisation (EA).
4.1.8	Ms Mabyana	Ms Mabyana requested clarification on the intention regarding SANRAL's property, noting that although it may not be directly affected, she sought clarity on whether and how it may be impacted by the Proposed Project. She indicated that understanding the extent of potential impact remains a key concern for affected stakeholders. Ms Mabyana sought further clarification regarding potential future land use implications, including whether any land uses classified as subservient to mining activities may affect surrounding properties in any manner.	Ms Naicker advised that she would consult with the technical team regarding the potential future land use implications, as this matter requires further technical input. She reiterated that the current project proposes to utilise the existing Harmony Target Mine surface infrastructure to support the underground mining operations. Ms Naicker confirmed that feedback would be provided to Ms Mabyana following consultation with the technical team. She further noted that, at this stage, the assessment considers monitoring stations located within the directly affected surface footprint. Specialist assessments for the Proposed Project will be conducted in the EIA phase. The findings of these assessments will be included in the Draft EIA Report. **Post Meeting Note:** Closure and Rehabilitation Planning The Mine Closure and Rehabilitation Plan to include post-closure land use, rehabilitation of tailings and waste rock dumps (WRDs), and water treatment measures as well as provide an estimate of the financial provisioning required for closure, in line with NEMA

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STAKEHOLDERS		COMMENT	RESPONSE
			regulations and the Mine Works Programme as required by the MPRDA.
4.1.9	Ms Mariette Liefferink (Ms Liefferink)	Ms Liefferink indicated that her comments were comprehensive and requested that they be treated as recommendations rather than objections. She first commended Kongiwe, stating that she is familiar with the organisation and that there is a generally positive working relationship. She noted that the report is well structured and aligns with the EIA Regulations. However, she expressed the view that the Scoping Report remains largely a high-level desktop study with limited site-specific empirical specialist input. She further noted that the report acknowledges its baseline information is primarily derived from desktop investigation, which she indicated introduces uncertainty. Ms Liefferink concluded by reiterating that the comments should be considered recommendations and that a detailed response is requested. She further confirmed that she has no adversarial position toward the applicant and expressed willingness for constructive engagement.	Ms Naicker acknowledged that at this stage of the Scoping phase, only high-level desktop baseline studies have been conducted; however, specialist studies will be finalised in the EIA phase, and findings will be included in the Draft EIA Report.
		Ms Liefferink raised concerns regarding the absence of a radiological assessment for the Proposed Project, given the uranium mining context and associated risks related to uranium, radioactive decay products, and long-term exposure pathways. She highlighted the need to consider radiological risks, including radon exposure, radioactive waste management, regulatory requirements, and potential radiological implications associated with other minerals	The geology of the Proposed Project area is a direct extension of the geological formations occurring within the Harmony Target Mine mining right area (Section 7.3 of the DSR), which has already been subject to detailed radiological assessment and regulatory approval (2024 Free State Radiological Public Safety Assessment: System Description, undertaken by AquiSim Consulting (Pty) Ltd

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STAKEHOLDERS		COMMENT	RESPONSE
		such as molybdenum. She further recommended that water quality assessments consider uranium toxicity thresholds and human health risks. In addition, concerns were raised regarding legacy mining impacts, including acid mine drainage (AMD), sulphide oxidation, long-term environmental degradation, and the need to assess closure liabilities and post-closure water quality risks.	for Harmony Gold Mining Company Limited - Free State Operations). Harmony Gold Mining Company Limited, a joint venture partner in Jelani Resources, already holds a Radiological Public Safety Assessment for its Free State operations, as well as a valid Certificate of Registration (CoR Regulation 10) issued by the National Nuclear Regulator (NNR) for its Target Mine operation located adjacent to the Proposed Project area. The proposed underground mining operation will involve the excavation of mineral resources within the Proposed Project area. However, access to and egress from the underground workings will be undertaken through the existing Harmony Target shafts, and the ore will be processed using the existing Harmony Target operational mining infrastructure. These shafts, operational systems and geological formations have already been assessed and approved by the NNR. Although uranium is listed as a potential co-product within the mineral resource, the Proposed Project does not introduce new processing streams or changes in radiological exposure pathways beyond those already authorised under Harmony's existing operations. Based on the above, it is considered that the Proposed Project does not introduce new or materially different radiological risks

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STAKEHOLDERS		COMMENT	RESPONSE
			that would warrant a standalone Radioactivity assessment at this stage. It was further noted that a Radiological Public Safety Assessment is a key requirement for an initial CoR application. International best practice recommends that such assessments be reviewed and updated every 3 to 5 years. Should the project be authorised, the Jelani Project's contributions will be incorporated into the next scheduled update of the radiological assessment. The Radiological aspects will be included in the EIA report. It is further noted that the EIA phase will assess potential impacts associated with groundwater and surface water quality, including existing legacy mining influences, AMD-related risks, and relevant human health considerations where applicable. The assessment will also consider closure and post-closure environmental risks in accordance with the applicable regulatory requirements.
		The high-level nature of the assessment does not adequately address cumulative impacts, including groundwater risks, seismicity, biodiversity sensitivity, socio-economic impacts, and radiological risks associated with uranium and its progeny. She emphasised that uranium has a very long half-life and that environmental impacts may persist over geological timeframes, not only biological timescales, which should be considered in closure liability planning.	The assessment of cumulative impacts will be undertaken during the detailed EIA phase, and appropriate mitigation measures will be proposed. The impact identification and evaluation methodology applied by all specialists incorporates cumulative impacts quantitatively to determine the final impact score and corresponding significance rating (refer to Section 8.3 of the DSR).

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STAKEHOLDERS		COMMENT	RESPONSE
		Existing Tailing Storage Facility (TSF) may present seepage and contamination risks; therefore, cumulative impacts should be assessed. In addition, the potential cumulative impact of a proposed new 69-hectare TSF should be assessed. It is noted that this will be a separate application undertaken by Harmony Gold.	
		The Scoping Report is largely a high-level desktop assessment with limited site-specific empirical specialist input, creating uncertainty in the baseline conditions.	The Scoping Report is intended to provide a preliminary assessment of the receiving environment and identify potential issues, sensitivities, and information gaps requiring further investigation. Detailed site-specific baseline studies, fieldwork, and empirical data collection will be undertaken during the EIA phase through the relevant specialist assessments, which will refine the baseline conditions and inform the impact assessment. A Plan of Study for the EIA has been developed during the Scoping Phase.
		The report states there are no alternative sites considered, and all required infrastructure will be located within the Harmony Target mining right area, indicating that this is not compatible with Section 24 of NEMA as well as the EIA Regulations, because it requires a comparative assessment of feasible and reasonable alternatives. The alternatives that must also be considered include, layout, technology, operational, and no-go alternatives. Reliance on existing infrastructure does not automatically make the site environmentally preferable. It was recommended that the assessment consider whether the proposed development represents the best practicable	The Proposed Project intends to initiate an underground mining operation within the Joint Venture area to extract various minerals, primarily Gold, along with Silver, Uranium, and associated minerals. Jelani Resources Pty Ltd holds the Prospecting Rights for these minerals in this area. The Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development. Additionally, the Proposed Project intent to utilise available spare capacity within Harmony's existing infrastructure at the Target Mine, which is located adjacent to the JV area. As the

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STAKEHOLDERS		COMMENT	RESPONSE
		environmental options in terms of National Environmental Management Act (NEMA) principles.	potential mineral resources were confirmed within specific properties and the required supporting operational mining infrastructure already exists within Harmony's Target Mine mining right area, the activity is constrained to these locations. Therefore, no alternative sites are feasible. Furthermore, Activity, Design and Technology and Operation alternatives have been considered, and the no go alternative has been included (see Section 5 of the DSR).
		The report also appears to heavily relay on the argument that the infrastructure planned to be utilised for the project is already existing but this is not sufficient justification for excluding site assessment as the no-go alternative and the approach to site alternatives may be legally vulnerable because cumulative impacts in the region may already be severe due to the legacy of gold mining within the Witwatersrand and Free State goldfields. Concerns were also raised that, in addition to regional legacy impacts, existing impacts within the Harmony Target mine area itself should be considered.	The use of existing infrastructure is one of several factors considered and does not replace the assessment of alternatives. The No-Go Alternative will be assessed during the EIA phase. The EIA phase will include an assessment of cumulative impacts, taking into account both the legacy impacts of mining within the region and existing impacts associated with the Target Mine operations.
		The scoping report acknowledges the groundwater impacts such as the dewatering of deep aquifer causing groundwater level decline, lowering of the water table in the shallow aquifer, groundwater flow alteration and potential seepage of mine water to the groundwater system, which may contaminate groundwater resources. Groundwater impacts require more detailed assessment, including:	The Groundwater Impact Assessment will be conducted in the EIA phase and will consider the assessment of impacted presented, where possible.

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STAKEHOLDERS		COMMENT	RESPONSE
		a. Deep aquifer dewatering, which may alter regional groundwater flow partners b. Aquifer connectivity and transmissivity c. Drawdown cone modelling d. Regional groundwater flow impacts beyond the mine area e. Decant risks and post-closure rewatering scenarios f. Long-term mobilisation of contaminants, including uranium and other metals. The hydrogeological assessment should include geochemical testing, sulphur balance analysis, radionuclide mobility, and long-term post-closure monitoring.	
		The scoping report confirms the project activities trigger section 21 water uses, necessitating the application for Water Use License. However, water balance information, water demand projections, cumulative water stress analysis, and regional water status have not been presented. It was recommended that water quality discharges comply with Resource Quality Objectives and Water Use Licence conditions, with reference to uranium toxicity thresholds and associated human health risks	An application will be submitted to Department of Water and Sanitation (DWS). As part of the WUL application process, supporting technical report, including the Integrated Water and Waste Management Plan (IWWMP) will be developed. The IWWMP will address the water balance information, water demand projections, cumulative water stress analysis, and regional water status as well as water quality objectives requirements.
		Seismicity and subsidence risks require further assessment and monitoring plan.	Blasting and Vibration Assessment will be undertaken during the EIA phase, and the outcomes of this study will be presented and assessed in the Draft EIA Report.

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STAKEHOLDERS		COMMENT	RESPONSE
		Closure liabilities and long-term environmental risks, including post-closure AMD generation and water quality deterioration over geological timeframes, should be incorporated into assessments.	The Groundwater Impact Assessment will be conducted in the EIA phase and will consider the assessment of impacted presented, where possible.
		Biodiversity and ecological impacts require further detailed assessment, including aquatic ecology, wetlands, grassland sensitivity, and cumulative biodiversity impacts, indicating that the project area is heavy disturbed and therefore stringent mitigation measure are required.	A Terrestrial Biodiversity (Flora and Fauna) Assessment Study and Freshwater and Aquatic Biodiversity Assessment Study will be conducted in the EIA phase. The EIA phase will include an assessment of cumulative impacts.
		Socio-economic vulnerability in mining-affected communities was highlighted as an ongoing concern and should be considered in the assessment.	A Socio-Economic Impact Assessment will be conducted during the EIA phase.
4.10	Mr Neels Hoek (Mr Hoek)	Mr Hoek thanked all attendees for their participation in the meeting. He further extended specific appreciation to Ms Liefferink for her detailed comments.	
4.11	Ms Naicker	Ms Naicker added a final comment, thanking all attendees for participating in the meeting and for providing their comments. She noted that the project team would work through and address all comments raised during the meeting. She further advised that the team would remain in communication with all attendees going forward and that feedback would be provided on the matters raised. She encouraged attendees to submit any additional comments not raised during the meeting directly to Kongiwe stakeholder engagement team, noting that contact details had been provided. Ms Naicker concluded by stating that the team looks forward to continuing engagement and addressing all inputs received in relation to the project.	
5	**Closing**		
5.1	Ms Naicker thanked everyone for their time and the meeting was adjourned at 10:58AM.	ALL	-

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Jelani Resources (Pty) Ltd

Environmental Authorisation and Integrated Water Use License Application for the Proposed Jelani Underground Mining Project

Online Stakeholder Engagement Meeting

DMPR Reference Number: FS30/5/1/2/3/2/1(10098)EM

DWS Reference Number: WU38176

27 May 2026

Introductions

- **Jelani Resources (Pty) Ltd (Applicant)**
  - Neels Hoek
- **Harmony Gold Mining Company Limited**
  - Tshepo Moloto
- **Kongiwe Environmental (Pty) Ltd (EAP)**
  - Umeshree Naicker
  - Ripfumelo Macevele
  - Vanessa Viljoen

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Agenda

1. Purpose of the Meeting
2. Kongiwe's Role as an independent EAP
3. Project Background
4. Project Description
5. Infrastructure Requirements
6. Baseline Environment
7. Specialist Studies
8. Legislative Framework
9. Listed and Specified Activity
10. Public Participation Process
11. The Way Forward
12. Comments and Discussion

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Purpose of the Meeting

- Discuss the proposed Underground Mining Project.
- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation application.
- Provide you with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and include in the Comments and Responses Report.

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Important Notice

- This meeting is a formal consultation in terms of the requirements as stipulated in the:
  - National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for an Application for an Environmental Authorisation (EA) for listed activities triggered in Listing Notices GN R983 and GN R984 in terms of the Environmental Impact Assessment (EIA) Regulations of December 2014, as amended. The Department of Mineral and Petroleum Resources (DMPR)will be the Competent Authority to assess the EA for the Proposed Project.
  - National Water Act, 1998 (Act No.36 of 1998) (NWA) for an Integrated Water Use Licence Application (IWULA) in accordance with the Act. The Department of Water and Sanitation (DWS) will be the Competent Authority to assess the IWULA for the Proposed Project.

POPIA: Safeguarding registered person's personal information

In terms of section 19 of the Protection of Personal Information Act (POPIA), a responsible party must, subject to Sections 9 and 11 of the Act, ensure the integrity and confidentiality of personal information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss of, damage to or unauthorised destruction of personal information, unlawful access to or processing of personal information. POPIA requires that personal information should be adequately protected to avoid unauthorised access. Therefore, Kongiwe continuously reviews security controls and procedures to ensure that personal information is secured. It should be noted that in terms of Section 11, personal information may be processed to the extent that this is necessary for pursuing the legitimate interests of the responsible party to whom the information is supplied.

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Kongiwe's Role

As an independent Environmental Assessment Practitioner, it is our role to perform an objective assessment of what the positive and negative environmental impacts of the Proposed Project may be, to quantify these, describe possible mitigations, collect public comment and supply the Competent Authority with the documentation so that it can determine if the project should proceed or not.

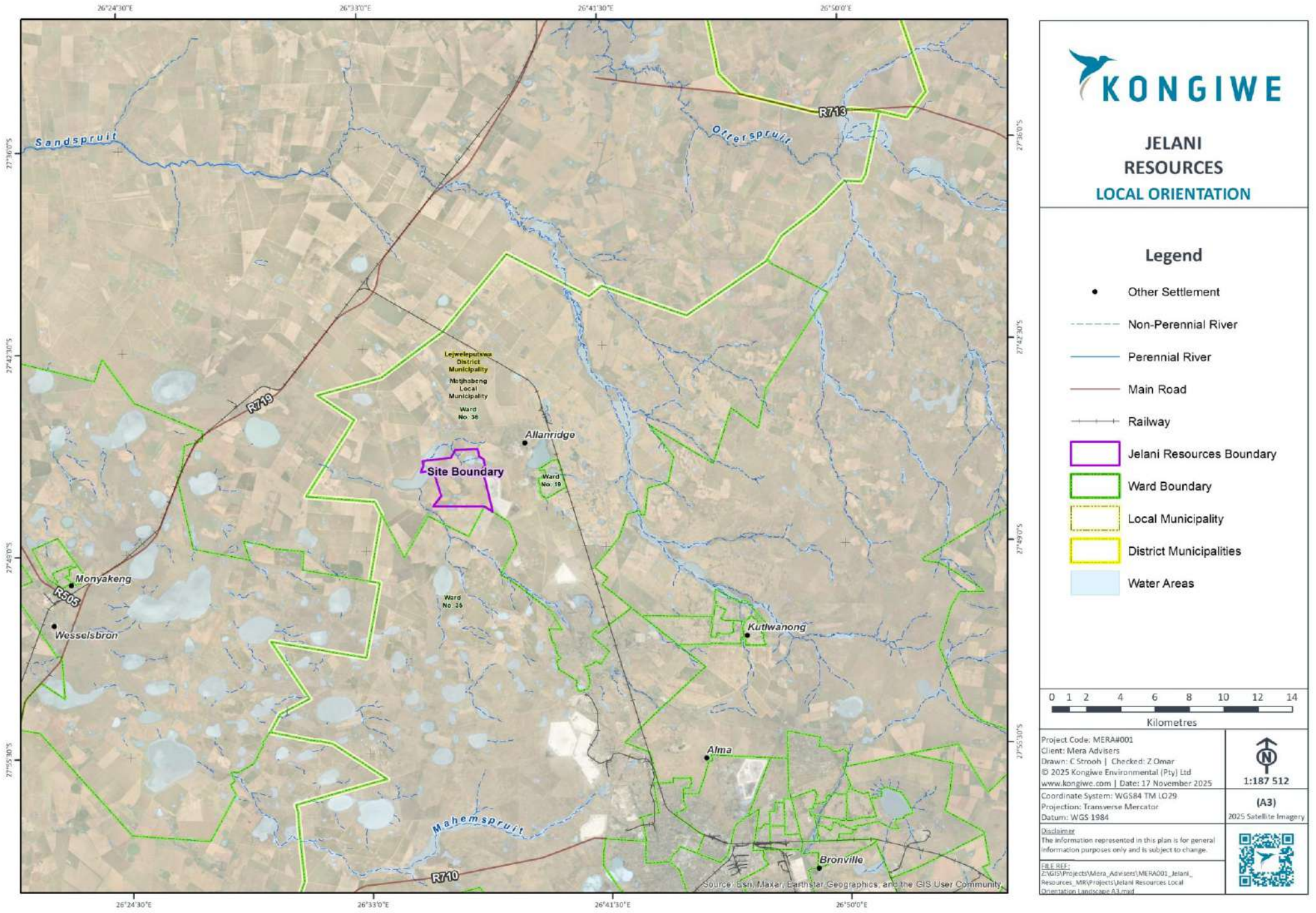
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Project Background

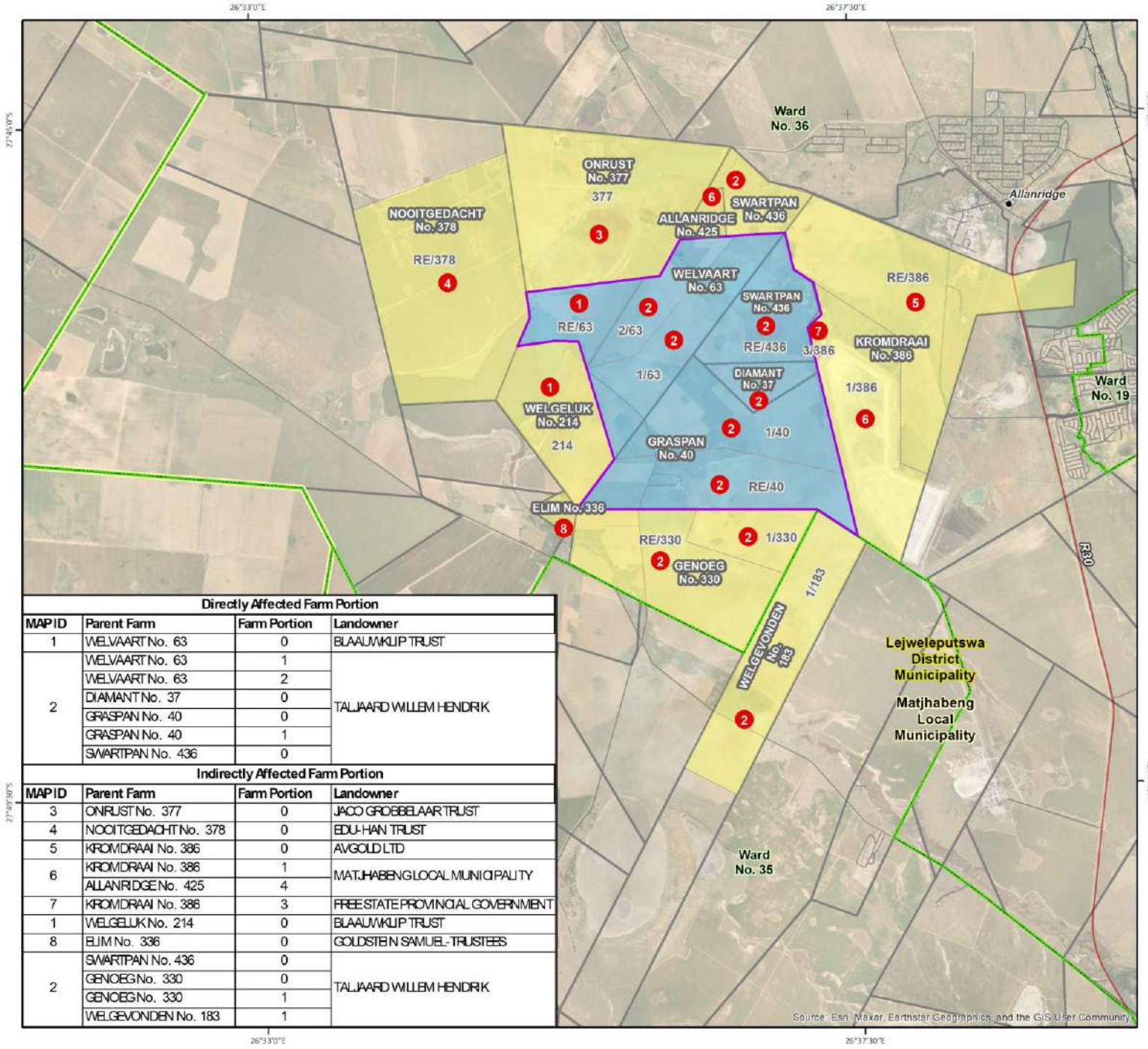
- **Applicant**: Jelani Resources (Pty) Ltd
- **Activity**: Underground Mining
- **Life of Operation**: 14 years
- **Location**: The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.
- Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold.
- The JV was formed to conduct underground mining operations within the joint venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution).
- Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

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Project Location



Property Map



Directly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES

LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3

Kilometres

Project Code: JELAR001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

1:45 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)

2025 Satellite Imagery

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
Z:\GIS\Projects\Jelani_Resources\JELA001_Jelani_Resources_MR\Projects\Jelani Resources Land Tenure Landscape A3.mxd

Project Description

Jelani intends to initiate underground mining operations to extract the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

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Project Description

- Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1 200 mbs).
- As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.
- Two mining methods have been identified as the most practical for exploiting the mineral resources: **conventional breast mining** and **shrinkage stoping**.
- The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

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Project Description

- Ore will be transported to the shaft ore pass system using a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.
- The orebodies extend between 1 500m and 2 600m below surface.
- The total extent of the application area is 956.76 hectares (ha).
- All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

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Infrastructure Requirements

- All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area.
- Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.
- The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations.

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Infrastructure Requirements

- To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary.
- Each station will include a small sensor pad/housing (approximately 5–10 m^2), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.
- Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

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Underground Access Infrastructure Photos



Photo 1: Harmony Target No 3 Shaft

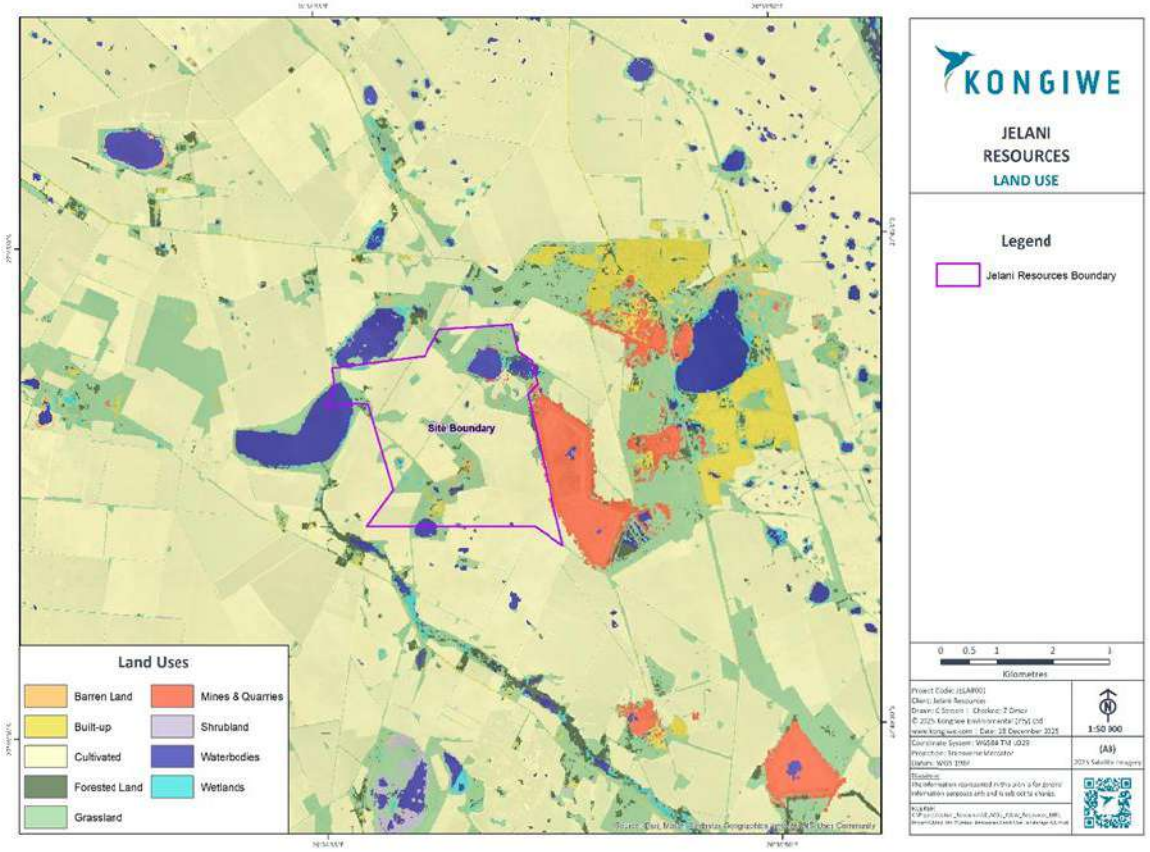


Photo 2: Harmony Target No 2 Shaft

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Current Land Use

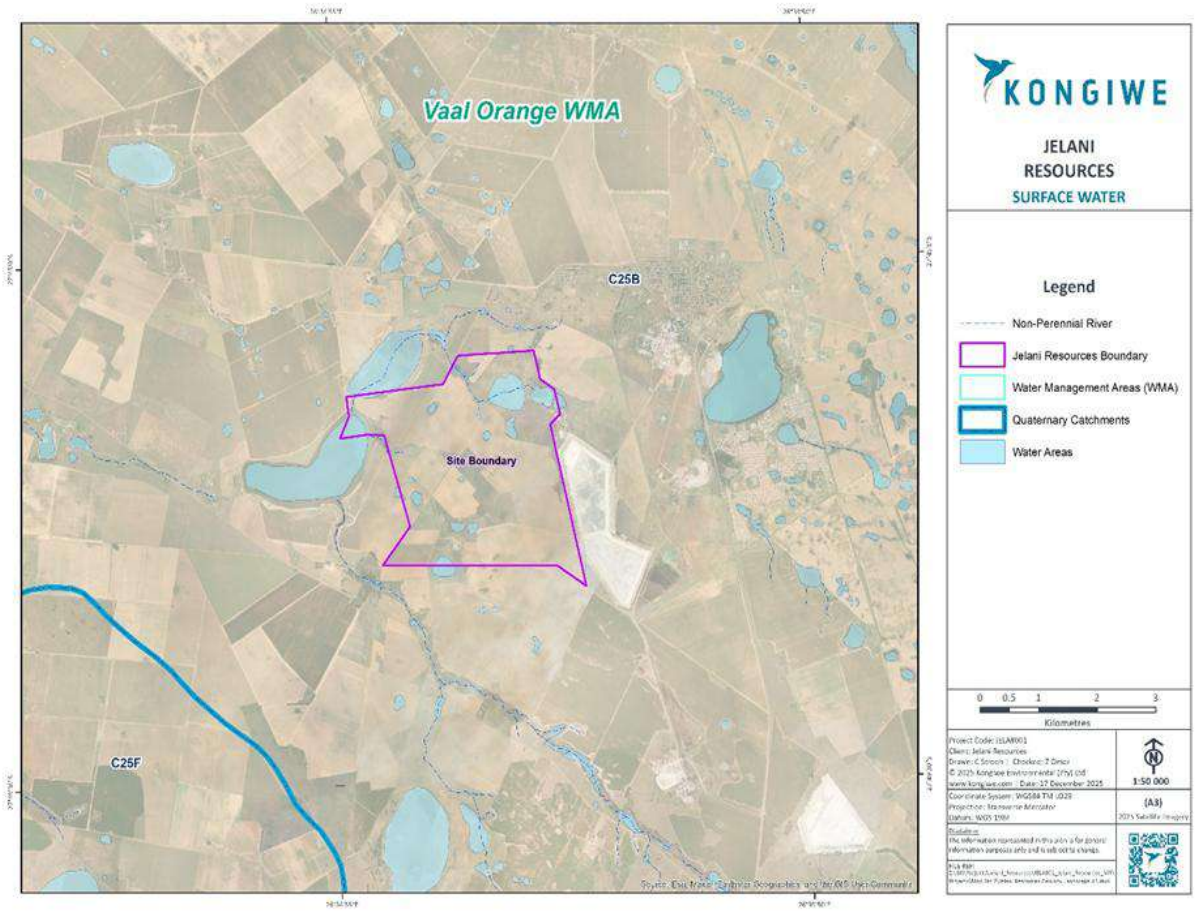
- The project boundary is currently utilised for agricultural purposes.
- Land uses within the immediate project boundary consist predominantly of cultivated fields, grassland, forested areas, waterbodies, and wetlands.
- The immediate surrounding landscape also includes existing mines and tailings storage facilities (TSFs), as well as transport infrastructure, electricity infrastructure, water supply infrastructure and various farming operations.
- Furthermore, the Proposed Project area is situated immediately adjacent to, and west of, the Harmony Gold Target Mine.



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Surface Water

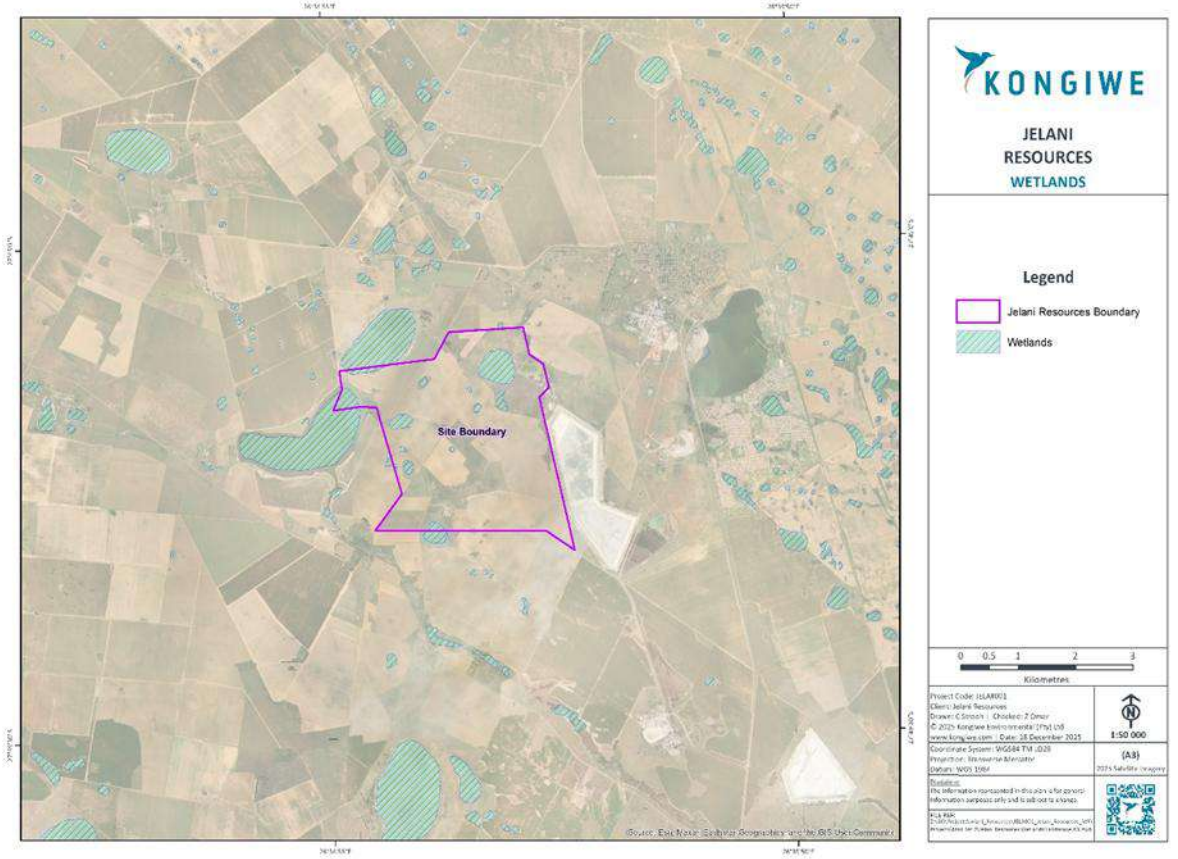
- The project is located within the Vaal Orange Water Management Area (WMA), specifically in quaternary catchment C25B.
- The surface water resource within the site boundary include a non-perennial river located to the north of the project area. Another non-perennial river is situated to the west of the site boundary.
- The surface water map indicates that the project area contains surface water areas, including wetlands.



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Wetland

- Several wetlands (wetlands depression and unchannelled valley-bottom (UVB) were identified and delineated occurring inside the project footprint with additional wetlands to the west, north, and south-central parts of the site.



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Biodiversity

- The Free State Conservation Plan (2024) classified areas on the basis of their contribution to reach the conservation targets within the province.
- These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either ‘Irreplaceable’ (must be conserved), or ‘Important’.
- Proposed Project falls within a CBA 1 and an ESA 2.

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Specialist Studies

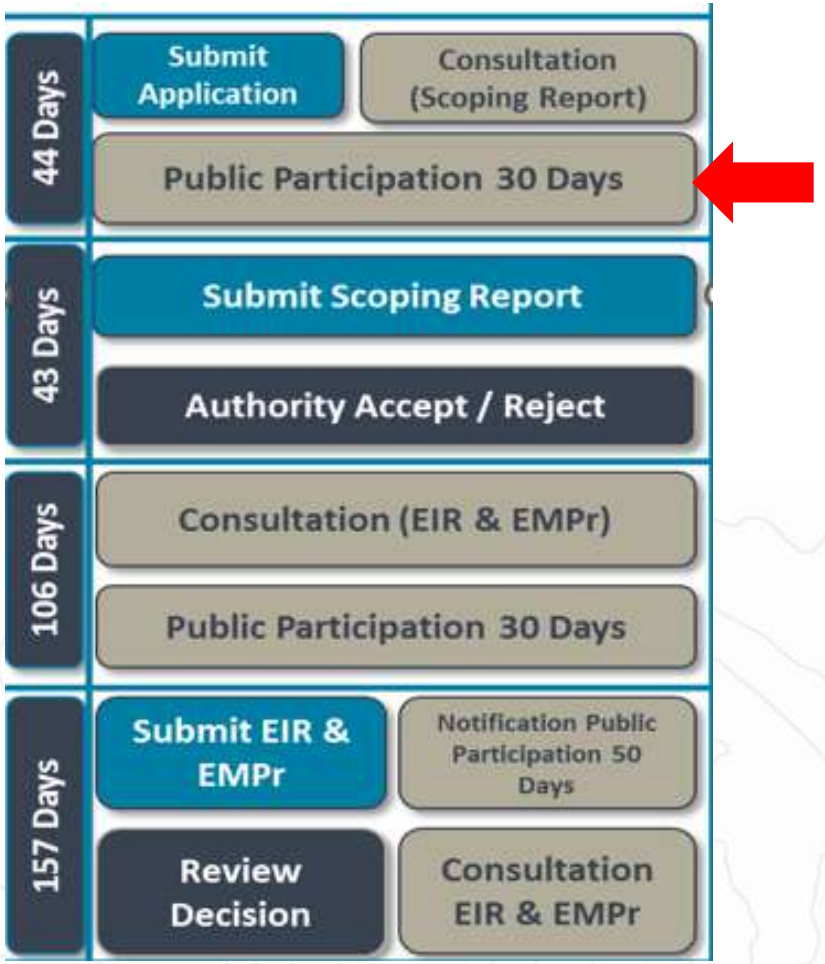
Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist Studies	
Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.	Mine Closure Plan
Desktop Heritage and Palaeontology	Hydrogeological Assessment
Hydrological Assessment	Climate Change Impact Assessment
Air Quality Impact Assessment	Blasting and Vibrations
Socio-Economic Impact Assessment	

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Legislative Framework

- A Scoping and Environmental Impact Assessment (S&EIA) process is being undertaken which evaluates the environmental impacts associated with the Proposed Project as part of an application for Environmental Authorisation (EA). The S&EIA and specialist studies to be undertaken will support the application for the required approval. The following applications have been made to the relevant departments:
  - EA application for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
  - An Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) was submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project.



Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Underground Mining Operation	956,76 Hectares	GNR 325 - Activity 17	Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right	Section 21 (c) and (i)

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Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Development of gravel access tracks	Gravel access tracks approximately 1 km across all stations, with a width of 4 m wide	GNR 985 – Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **(b) Free State** (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Section 21 (c) and (i)

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Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Installation of the seismographic monitoring stations.	40 m²	GNR 985 - Activity 14	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse; **(b) Free State** (i) Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Section 21 (c) and (i)

Public Participation

- The EA Application was submitted to the DMPR on Tuesday, 21 April 2026. The acceptance letter for the EA application was received on 18 May 2026.
- The Draft Scoping Report (DSR) was released for public review on 21 May 2026 . The review period will remain open for 30 days, from Thursday, 21 May 2026 to Monday, 22 June 2026. A Copy of the DSR is available at the following locations:
  - Allanridge Public Library (53 Caledon St, Allanridge)
  - Kongiwe website: http://www.Kongiwe.com/publications-view/public-documents/
- Online Meeting: Wednesday, 27 May 2026, from 10:00 to 11:00 via Microsoft Teams.
- An Open Day will be held on Saturday, 30 May 2026,at S.A. Mokhothu Primary School from 11H00 – 13H00
- Indirectly affected landowner and stakeholder meetings are ongoing.
- After public review, the Final Scoping Report will be finalised and submitted.
- Comments will be recorded in a Comments and Response Report and submitted to the relevant Competent Authorities.

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Comment & Discussion

- Discussion
- Action Points
- Closing



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Contact

- **Name: Vanessa Viljoen / Jean-Mari Williams**
- **Tel: 010 140 1725/26**
- **Email: stakeholders@kongiwe.com**

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.

info@kongiwe.com
www.kongiwe.com

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Kongiwe Stakeholder Engagement

From: Kongiwe Stakeholder Engagement
Sent: Friday, 26 June 2026 11:09
To: Jean-Mari Williams
Cc: Umeshree Naicker; Ripfumelo Macevele
Subject: Jelani Resources (Pty) Ltd: JV Area Underground Mining Project: Minutes of Online Meeting held on Wednesday, 27 May 2026 with Broder Stakeholders
Attachments: Online_Day_Minutes_Final.pdf; JELA_001_Online_Meeting_Presentation.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Tracking:

Recipient	Read
Jean-Mari Williams	Read: 2026/06/26 11:15
Umeshree Naicker	Read: 2026/06/29 12:41
Ripfumelo Macevele	Read: 2026/06/26 13:27
steyn4007@gmail.com	
whtaljaard@gmail.com	
frans@djbagri.co.za	
alabuscagne@sandvet.co.za	
mariette@pea.org.za	
nozipho.dlamini@dlrrd.gov.za	
MabyanaK@nra.co.za	
NengudaK@nra.co.za	

Dear Stakeholders,

I hope this message finds you well.

Please find attached the minutes and associated appendices from the online meeting held with Broader Stakeholders on **Wednesday, 27 May 2026**.

Should you have any queries, please do not hesitate to contact us.

Kind Regards,

KONGIWE

Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 1725 | Email: stakeholders@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.
www.kongiwe.com

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MINUTES OF THE MEETING			
Date	Saturday, 30 May 2026	**Time**	11:00 – 13:30
Venue	S.A. Mokhothu Primary School		
Subject	**Open Day Meeting Minutes**		

List of Attendees		
Organisation	**Name of Attendee**	**Designation**
Jelani Resources (Pty) Ltd	Mr Neels Hoek	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Umeshree Naicker	Principal Environmental Consultant
	Mr Ripfumelo Macevele	Environmental Consultant
	Mr Lubabalo Zongolo	Junior Environmental Consultant
	Ms Jean-Mari Williams	Project Coordinator

Apologies		
Organisation	**Name of Attendee**	**Designation**
Harmony Gold Mining Company Limited	Mr Tshepo Moloto	Specialist: Mining and Prospecting Rights

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place.

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No	Item
1	**Welcome and Introductions**
1.1	Mr Ripfumelo Macevele (Mr Macevele) welcomed all attendees.
2	**Meeting Purpose**
2.1	Discuss the proposed Underground Mining Project.
2.2	Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
2.3	Content of the Social and Labour Plan (SLP)
2.4	Provide Stakeholders, as well as Interested and Affected Parties (I&AP), with an opportunity to raise comments, seek clarity, and provide input
2.5	Record comments raised and include in the Comments and Responses Report.
3	**Meeting Agenda**
3.1	**Scoping and Environmental Impact Assessment (S&EIA) process**
3.1.1	Purpose of the Meeting.
3.1.2	Kongiwe's Role as an independent EAP.
3.1.3	Project Background.
3.1.4	Project Description.
3.1.5	Infrastructure Requirements.
3.1.6	Baseline Environment
3.1.7	Specialist Studies.
3.1.8	Legislative Framework.
3.1.9	Listed and Specified Activity.
3.1.10	Public Participation Process.
3.1.11	The Way Forward.
3.2	**Social and Labour Plan (SLP)**
3.2.1	Content of the Social and Labour Plan (SLP).
3.2.2	Public Participation Process.
3.2.3	The Way Forward.

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No	Item		
4	Comments and Discussion		
Stakeholder/I&AP		Comment	Response
4.1	Community Member (Ms Khanyisile)	Ms Khanyisile enquired whether the community will experience additional Tailings Storage Facilities (TSFs), noting that dust emissions are currently affecting the community. She further indicated that crops (agricultural activities) near Shaft 2 are also impacted and raised concerns regarding water usage and water quality.	Mr Macevele explained that the Proposed Project's development plan includes the utilisation of available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes Target No. 2 and No. 3 shafts, the Target No. 1 Processing Plant, and associated surface infrastructure. All operational mining infrastructure, including Tailings Storage Facilities (TSFs) required for the Proposed Project, will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area (refer to Chapter 1.7 of the Final Scoping Report (DSR) for a detailed project description). He further noted that a new Tailings Storage Facility (TSF) is proposed to be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. However, this TSF forms part of a separate project and application being undertaken by Harmony Gold and is not included in the current Proposed Project. The project is currently in the Scoping Phase of the Environmental Impact Assessment (EIA) process. At this stage, the Final Scoping Report (FSR) has identified high-level potential impacts and associated mitigation measures for the Proposed Project (refer to Table 9-3 of the DSR). Should the application proceed to the EIA phase, Chapter 9 of the DSR outlines the proposed Plan of Study for the EIA. The Plan of Study includes detailed specialist assessments covering key environmental aspects such as biodiversity, surface water, groundwater, air quality, soil, agriculture, climate etc. These studies will assess potential impacts,

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Stakeholder/I&AP		Comment	Response
			including those related to water quality and air quality, in greater detail and propose mitigation measures. The findings of the specialist assessments will be included in the EIA Report and presented to stakeholders and interested and affected parties (I&APs) during the public participation process for the EIA phase. In accordance with the National Environmental Management Act (NEMA) and the Environmental Impact Assessment (EIA) Regulations, the environmental assessment will include an evaluation of cumulative impacts.
4.2		Ms Khanyisile requested that the EIA documents be translated into other languages used in the area, such as Sesotho and Afrikaans, during the next Public Participation Process window.	The Public Participation Process will continue to accommodate the predominant languages spoken within the Project area. Accordingly, key project information and engagement activities will be made available in English and Sesotho, where appropriate, to promote meaningful participation and understanding by Interested and Affected Parties. The full Environmental Impact Assessment report will remain available in English, as the official language of submission to the Competent Authority.
4.3	Mr Molefi Abel Thebeeahae (Director of KB Salman Civil Engineering and General Projects)	Mr Molefi raised a concern regarding the Social and Labour Plan (SLP). He stated that the presentation did not adequately explain what the SLP entails and how it benefits the mine community. He further expressed concern that the presentation indicated the SLP would be treated as an expansion of the existing Harmony Target Mine SLP. He emphasised that the existing Harmony Target Mine SLP does not benefit the mine-affected community. He recommended that the Jelani Resources SLP be reviewed to ensure that it includes tangible benefits for the communities directly affected by the mining operations.	**Public Engagement Discussion** Kongiwe has been appointed by Jelani Resources (Pty) Ltd to undertake the required applications for Environmental Authorisation (EA) and the Integrated Water Use Licence (IWUL), as well as the development of the Social and Labour Plan (SLP) for the Jelani Project. A key component of our scope includes facilitating the Public Participation Process (PPP) associated with the Proposed Project. As part of the PPP, stakeholders and interested and affected parties must be consulted. As mentioned above, Kongiwe is assisting Jelani Resources with developing its own SLP, which is currently under public review.

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Stakeholder/I&AP		Comment	Response
			Ms Naicker explained that an SLP is a legally required document that mining companies in South Africa must submit as part of their application for a Mining Right (MR). It is developed in terms of the Mineral and Petroleum Resources Development Act (MPRDA) and outlines how the company will contribute to the social and economic development of affected communities and employees. The SLP sets out the company's commitments in areas such as skills development, local economic development, employment equity, and improved living conditions for workers. With specific reference to the Jelani Project SLP, the Matjhabeng Local Municipality and the ward councillor were engaged to identify community needs and the SLP initiatives. Through this process, the refurbishment of the Community Hall was identified. Should the SLP be approved, it must therefore be reviewed every five years. As part of the initial phase (Jelani Project SLP 1), the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community. Given that the Jelani Project is not yet operational, limited funding is expected during this phase. In the second phase (Jelani Project SLP 2: Years 5–10), increased funding is anticipated, which may enable the implementation of larger community development projects. **Post Meeting Note** Kindly note the clarification as follows:

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Stakeholder/I&AP		Comment	Response
			The stakeholder engagement being undertaken relates to both the EA and the SLP. The public meeting included an overview of the SLP and specified the proposed LED Project. Selection of LED programmes are subject to alignment with the Matjhabeng Local Municipality's Integrated Development Plan (IDP) (2024/2025) in conjunction with recommendations made by the Matjhabeng Local Municipality's Executive Director of LED. In light of the chronic lack of capacity by Matjhabeng Local Municipality to provide funds to support Jelani in LED projects, investment in the Nyakallong Community Hall for this initial SLP cycle – which requires minimal maintenance while providing long term functions for the community - is the preferred option for both the Matjhabeng Local Municipality and Jelani. Although the Jelani Project is a joint venture (JV) between Harmony Gold and White Rivers Exploration (Pty) Ltd (WRE), Jelani Resources, as the applicant and prospective holder of the Mining Right (should it be granted), will be responsible for the implementation of the SLP. Accordingly, comments relating to Harmony Gold's existing SLP for the Target Mine fall outside the scope of this SLP process and should be directed to Harmony Gold through the appropriate engagement channels.
4.4	Community Member	Community member commented that, in future, the Kongiwe project team should focus their presentations on the specific project they have been appointed to undertake, namely the development of the SLP for Jelani Resources. The inclusion of the existing Harmony Target Mine SLP was viewed as unnecessary, as it is perceived not to benefit the community and may lead to additional questions directed at the Kongiwe team.	**Post Meeting Note** Kindly note the clarification as follows: The stakeholder engagement being undertaken relates specifically to the **mining project proposed by Jelani**, and not **Harmony Gold Mining Company Limited**. Although the Jelani Project is a joint venture (JV) between Harmony Gold and White Rivers Exploration (Pty) Ltd (WRE), Jelani Resources, as the applicant and prospective holder of the Mining Right (should it be granted), will be responsible

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Stakeholder/I&AP		Comment	Response
			for the implementation of the SLP. Accordingly, comments relating to Harmony Gold's existing SLP for the Target Mine fall outside the scope of this SLP process and should be directed to Harmony Gold through the appropriate engagement channels.
4.5	Community Member	He further stated that the Jelani Project SLP should include provisions for bursaries for the community, rather than focusing solely on the refurbishment of the Nyakallong Community Hall. He emphasised that a more pressing community need is the development of a clinic, which would provide greater benefit, as the Community Hall is reportedly used more by the Municipality than by the community. He concluded by recommending that, when recruitment process begin, the mine community must be considered.	**Public Engagement Discussion** The LED project is only one of numerous social development initiatives. Jelani will implement various training programmes relating to AET, core business, learnerships and portable skills. **Post Meeting Note** In consultation with the MLM, Jelani will award a limited number of bursaries per year (no more than three) to HDPs from the local community, to study for a diploma or degree at an accredited tertiary institutions in South Africa. The bursaries will be focused on engineering (particularly mine engineering and metallurgy), geology or environmental management. Jelani's SLP 2: will make provision for further bursary opportunities.
4.7	Community Member	Community member stated that any company proposing to undertake mining activities within the Allanridge area should have a formal written agreement with the affected community. He expressed the view that the current consultation process appears to be a 'tick-box' exercise, indicating concern that signatures on attendance registers may be used to support authorisation applications.	**Post Meeting Notes** The purpose of the Public Participation Process is to provide Interested and Affected Parties with an opportunity to obtain information about the Proposed Project, raise concerns, and submit comments for consideration as part of the environmental assessment process. Attendance registers are used solely as a record of participation and do not constitute support for, or consent to, the Proposed Project or the environmental authorisation application. All comments received will be objectively considered and addressed in the Comments and Responses Report.

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Stakeholder/I&AP		Comment	Response
4.8		Regarding the EIA process, he questioned where the Draft Scoping Report hard copy is made available for public review, noting that some community members may find it difficult to access the Allanridge Library. He emphasised that, during the next consultation period, more hard copies should be placed in easily accessible public areas throughout Allanridge to improve access.	Mr Macevele responded by stating that Kongiwe is an independent environmental consulting firm conducting EIA process, including an independent Public Participation Process (PPP), in accordance with the EIA Regulations. He referred to his presentation on the role of Kongiwe and the phases of the S&EIA process, emphasising that once a decision on the application for Environmental Authorisation (EA) has been made by DMPR (the Competent Authority), any I&APs who feel aggrieved by the decision have the right to appeal. He noted that the outcome of the application, along with information regarding the appeal process, will be communicated to all I&APs). Regarding copies of the Draft Scoping Report, he indicated that for those with internet access, the report is available on Kongiwe's website under the public documents section. He also highlighted that the Kongiwe team is available to assist attendees with downloading the report. Additionally, the Kongiwe stakeholder consultation team remains available to assist with any PPP matters, and community members are encouraged to reach out for support where needed.
4.9		He recommended that Jelani Resources should present its economic development plan to the community and engage them before finalising the SLP. This would allow the community to provide input on key development initiatives to be included in the SLP, such as SMME participation, targets for the inclusion of women in mining, and the involvement of persons living with disabilities. He emphasised the need for a signed agreement outlining community benefits prior to submission of the SLP to the Department of Mineral and Petroleum Resources (DMPR).	**Public Engagement Discussion** With specific reference to the Jelani Project SLP. Ms Naicker explained that the Matjhabeng Local Municipality and the ward councillor were engaged to identify community needs and the SLP initiatives. Through this process, the refurbishment of the Nyakallong Community Hall was identified. She further indicated that the current consultation process is intended to present the contents of the SLP. All submissions are being recorded and will be included in the Comments and Responses Report to be submitted to the DMPR for

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Stakeholder/I&AP		Comment	Response
			evaluation and decision-making. She noted that the SLP timeframes differ from those of the EIA process. She also indicated that, upon receiving the outcome of the SLP, Jelani Resources will be required to communicate the contents of the approved SLP as follows: • to the public within 30 days; • to the local community within 180 days (through a public communication process); and • to employees immediately upon their appointment. **<u>Post Meeting Notes</u>** Local contractor teams/ SMMEs will be considered favourably during the procurement process for the LED programme, on the condition that they have the pre-requisite certifications for their trade.Selection of LED programmes are subject to alignment with the Matjhabeng Local Municipality's Integrated Development Plan (IDP) (2024/2025) in conjunction with recommendations made by the Matjhabeng Local Municipality's Executive Director of LED.
4.10		Future consultation meetings should be conducted through presentations delivered by a speaker using a projector, rather than posters.	Mr Macevele acknowledged the comments regarding the format of future consultation meetings. He noted the request that meetings be conducted through presentations delivered by a speaker using a projector rather than posters.
4.11	Community Member	Community member asked about all the potential mineral resources in the Proposed Project area, that Jelani plans to extract, as well as the current activities at Harmony Target 3.	Jelani intends to initiate underground mining operations. The Proposed Project involves obtaining licenses for the underground mining of the following potential mineral resources: • Gold ore (primary target),

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Stakeholder/I&AP		Comment	Response
			• Silver ore, • Uranium ore, • Sulphur, • Platinum Group Metals, • Rare earths, • Diamonds (alluvial), • Copper ore, • Cobalt ore, • Manganese ore, • Molybdenum ore, • Nickel ore, • Lead ore, • Tungsten ore, • Zinc ore, and • Iron ore. At present, the Harmony Target 3 Shaft is used for dewatering, while the Target 2 Shaft serves as an emergency exit for Target 1.
4.12	Community Member	Community member raised concerns regarding how information was circulated, suggesting that it should be communicated to all interested and affected parties, taking into account the geographical layout of Nyakallong and Allanridge. He recommended that public consultation documents be placed in accessible public areas such as schools, municipal offices and other community facilities to improve access. Concern was noted that currently the documents are only available at the Allanridge Library.	The recommendation to make project documentation available at additional public facilities within Nyakallong and Allanridge, where feasible, will be considered for the EIA phase of the Public Participation Process to improve accessibility. Furthermore, future public engagements will continue to accommodate the predominant languages spoken within the Project area, with presentations and key project information being provided in English and Sesotho, where appropriate, to facilitate meaningful participation and understanding.

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Stakeholder/I&AP		Comment	Response
		He further suggested that future presentations be conducted in Sesotho to ensure broader understanding.	
5	**Comment Register** - Key Issues Recorded: Please refer to Appendix B for the submissions recorded in the comment register collected during the Open Day.		
5.1	Unemployment		A Social Impact Assessment will be conducted in the EIA phase and will consider the Proposed Project's impact on unemployment. The findings of the assessment will be included in the Draft EIA Report and presented to the I&APs. At present, as part of the Social and Labour Plan, the Nyakallong Community Hall will be refurbished. This forms part of the Local Economic Development (LED) project approved by the Matjhabeng Local Municipality. This initiative is expected to contribute to short-term employment. There will be no employees on the Jelani payroll in the first four years of the SLP cycle. In Year 5, there will be 39 employees on the Jelani pay roll. The breakdown of these employees, based on job grading bands, there will be no personnel on contractor's payrolls or service provider payrolls. Where possible, Harmony workers will be sourced from Target. If Target cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area.

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<table>
<tr><th colspan="2">Stakeholder/I&AP</th><th>Comment</th><th>Response</th></tr>
<tr><td colspan="2"></td><td></td><td>
Table 1: Number of Jelani Employees, by Job Grading
<table>
<tr><th>Job Grade</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Total</th></tr>
<tr><td>Executive Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>Senior Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>7</td><td>7</td></tr>
<tr><td>Professionally qualified and experienced specialists and mid-management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>31</td><td>31</td></tr>
<tr><td>Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Semi-skilled and discretionary decision making.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Non-permanent employees.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>39</td><td>39</td></tr>
</table>
Table 2: Number of Employees on the Harmony Payroll, by Job Grading
<table>
<tr><th>Job Grade</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Total</th></tr>
<tr><td>Executive Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3</td><td>3</td></tr>
<tr><td>Senior Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23</td><td>23</td></tr>
<tr><td>Professionally qualified and experienced specialists and mid-management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>99</td><td>99</td></tr>
<tr><td>Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>159</td><td>159</td></tr>
<tr><td>Semi-skilled and discretionary decision making.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>222</td><td>222</td></tr>
<tr><td>Non-permanent employees.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>506</td><td>506</td></tr>
</table>
</td></tr>
<tr><td>5.2</td><td>Bursaries for the community</td><td></td><td>As part of the initial phase (Jelani Project SLP 1), the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within</td></tr>
</table>

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Stakeholder/I&AP	Comment	Response
		the local community. Given that the Jelani Project is not yet operational, limited funding is expected during this phase. In the second phase (Jelani Project SLP 2: Years 5–10), increased funding is anticipated, which may enable the implementation of larger community development projects. The submissions regarding bursaries for the community and the consideration of a local surveying company have been noted.
5.3	Regular engagement and inclusivity during the process	Engagement with Interested and Affected Parties (I&APs) will continue throughout the environmental assessment process, providing opportunities for stakeholders to review project information, submit comments, and participate meaningfully in the decision-making process. All comments received will be recorded, considered, and addressed in the Comments and Responses Report.
5.4	Consideration of a local surveying company	The appointment of service providers will be based on the required scope of work, demonstrated capability, compliance, and commercial considerations.
5.5	Commitment from Jelani Resources to supply tankered water should a decline in groundwater levels be recorded. Protection of water resources (borehole water) and monitoring programme	At this stage, Jelani Resources cannot commit to the request. A Groundwater Impact Assessment will be undertaken as part of the EIA phase to assess the potential impacts of the Proposed Project on groundwater resources. Where required, appropriate mitigation measures, monitoring requirements, and contingency actions will be incorporated into the Environmental Management Programme (EMPr). Should monitoring indicate that the Proposed Project has resulted in a demonstrable impact on groundwater resources affecting existing lawful users, appropriate mitigation and remedial measures will be implemented in consultation with the relevant authorities and affected parties. The nature of

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Stakeholder/I&AP	Comment	Response		
		such measures, including the provision of an alternative water supply where warranted, will be determined based on the findings of the investigation and the confirmed cause of the impact		
6	**Closing**			
6.1	The project team thanked everyone for their time and the meeting adjourned at around 13:30PM.		ALL	-

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Jelani Resources (Pty) Ltd: Environmental Authorisation and Integrated Water Use License Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province
Draft Scoping Report

Project Background

Kongiwe Environmental (Pty) Ltd ("Kongiwe") has been appointed by Jelani Resources (Pty) Ltd ("Jelani") as the independent Environmental Service Provider to conduct the Scoping and Environmental Impact Assessment (S&EIA) process. This process aims to critically evaluate the potential environmental and social impacts of the **proposed Jelani Joint Venture (JV) Area Underground Mining Project** ("Proposed Project"), as part of its Environmental Authorisation (EA) application. The S&EIA process, together with the required specialist studies, will support the application for the necessary authorisation. The following application has been submitted to the Department of Mineral and Petroleum Resources (DMPR)(Competent Authority):

- EA application for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
- An Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) will be submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project.

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold. The JV was formed to conduct underground mining operations within the joint venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution).

Project Description

Jelani intends to initiate underground mining operations to extract the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1 200 mbs). As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55° , conventional breast mining will be used.

Ore will be transported to the shaft ore pass system using conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mines life, be used for the movement of men, material and rock depending on which phase the mine is in.

Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area.

Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, with short gravel access tracks provided for each station. These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

Area Extent

The total extent of the application area is 956.76 hectares (ha).

Depth of Mineral Below Surface

The orebodies extend between 1 500m and 2 600m below surface.

Proposed Beneficiation Process

All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

Underground Access Infrastructure Photos



Figure 1: Harmony Target No 3 Shaft



Figure 2: Harmony Target No 2 Shaft

Project Schedule

Prior to the initiation of mine implementation and construction activities, various stages of design work will be required to be undertaken. It is expected that these activities will take approximately four years before implementation can be initiated. Active mining can commence during year 7.

Table 1: Project Timelines

Period	Description
Year 1 - 3	Site data gathering and feasibility studies
Year 4	Detailed engineering design
Year 5 - 8	Implementation and construction activities
Year 7	Hiring of employees
Year 7	Initiation of mining activities underground

The production build-up is planned to occur in two phases:

- In Phase 1, which is planned to last for four years starting in Year 5, with construction and refurbishment with mining starting in Year 7. The first two years are required for level access and refurbishment, after which Target No 3 shaft will be used for hoisting of men, material and rock.
- Phase 2 commences in Year 9, whereby access to the underground workings is via Target No 2 shaft, with Target No 3 shaft being reserved as a second outlet.

As mine development progresses over the first four years, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of ore per month, which is achieved in Year 10.

10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years

Jelani Resources (Pty) Ltd: Environmental Authorisation and Integrated Water Use License Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province
Draft Scoping Report

Project Location

The Proposed Project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 1,5km west of Allanridge town, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality. Refer to Figure 3 for the Proposed Project local orientation.

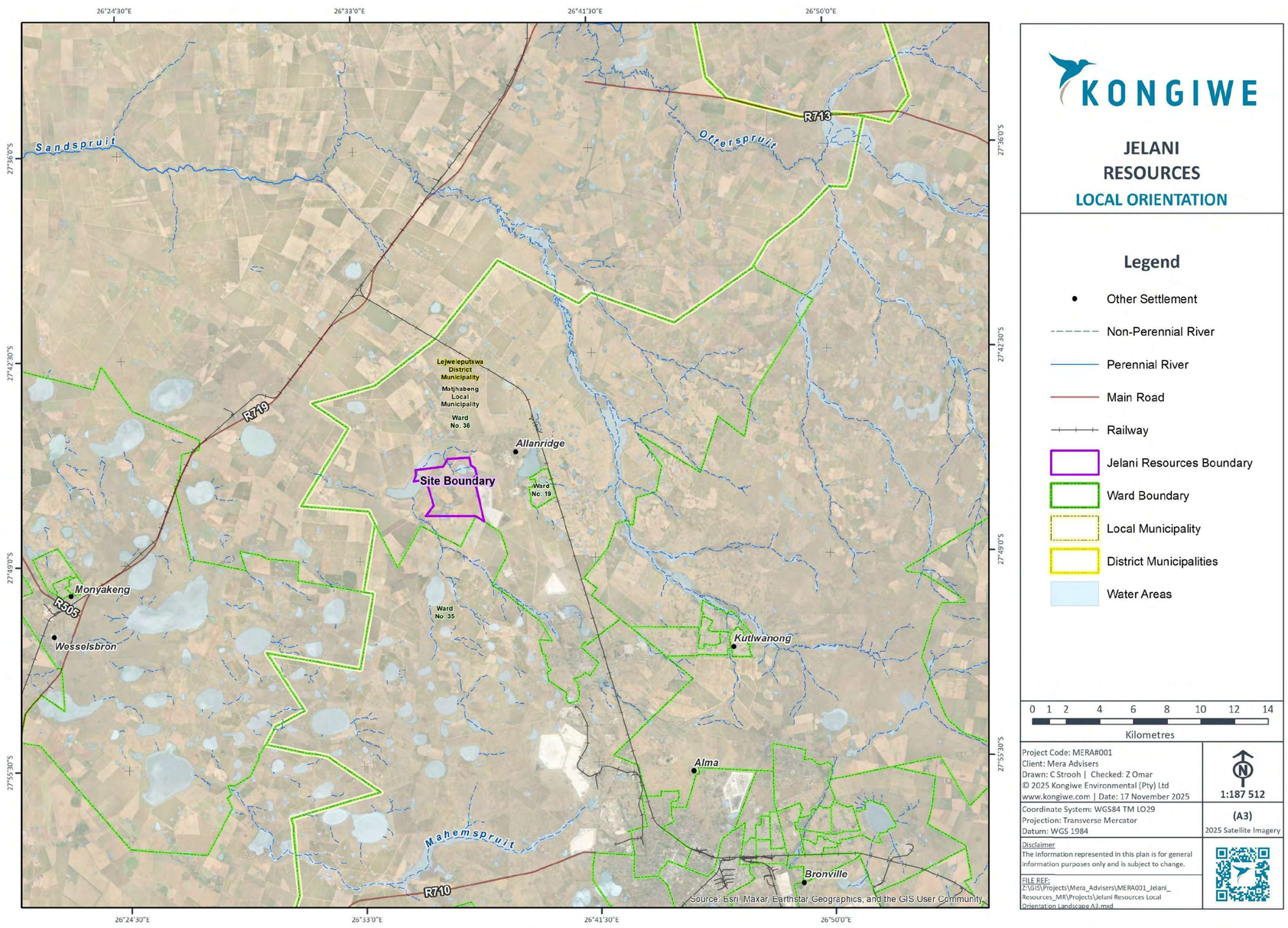


Figure 3: Local Orientation of the proposed JV Area Underground Mining Project

Key Findings of the Scoping Report

Environmental Component	Component Type	Potential Impact (positive or negative)	Specialist Study Planned for EIA
Physical Environment (non-living)	Surface water	• Potential hydrocarbon spills during the construction of the seismographic monitoring stations and the development of the gravel access tracks.	• Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM). • Hydrological Assessment
	Groundwater	• Dewatering of deep aquifer causing groundwater level decline. • Lowering of the water table in the shallow aquifer. • Groundwater flow alteration. • Potential seepage of mine water to the groundwater system may contaminate groundwater resources.	• Hydrogeological Assessment
	Soil and geology	• Potential soil contamination from hydrocarbon spills. • Subsidence risk above mined-out areas. • Seismicity risk from deep-level blasting.	• Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential. • Hydrogeological Assessment. • Blasting and Vibrations.
	Air quality	• Dust emissions during the installation of the seismographic monitoring stations and the development of the gravel access tracks. • Dust emissions from ore handling. • Diesel exhaust emissions.	• Air Quality Impact Assessment • Climate Change Impact Assessment
Biological Environment	Fauna and Flora	• Vegetation clearance required for the installation of the seismographic monitoring stations and the development of the gravel access tracks may result in the loss of habitat for local flora and fauna, potentially disrupting ecological communities and reducing biodiversity in the affected area.	• Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.
Social and Economic Environment	Socio-Economic	• Potential employment opportunities and job security. • Potential investment in local economy. • Influx of people seeking employment. • Potential community conflict and increases in certain social challenges (e.g., in-migration and potential increases in crime). • Impact on economic and social infrastructure in the local area. • Impact on local resource use (energy, water).	• Social Impact Assessment.
	Vibration	• Vibration from shaft hoisting operations and ore handling. • Vibration from underground blasting and drilling. • Vibration impacts from blasting potentially affecting nearby structures.	• Blasting and Vibrations.

Jelani Resources (Pty) Ltd: Environmental Authorisation and Integrated Water Use License Application for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province
Draft Scoping Report



National Environmental Management Act and National Water Act

Application for EA for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):

- GNR 984 - Activity 17
- GNR 985 – Activity 4
- GNR 985 - Activity 14

An Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) will be submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project. In this regard, any objection to that application may be lodged in writing within sixty days of the date of this notice to the Minister of the DWS as provided in Section 41(4) of the NWA.

- Water uses 21 C and I.

Public Participation Process

AVAILABILITY OF THE SCOPING REPORT FOR PUBLIC REVIEW AND COMMENT: The Draft Scoping Report (DSR) was released for public review on Wednesday, 13 May 2026. The review period will remain open for 30 days, from Thursday, 21 May 2026 to Monday, 22 June 2026.

National Environmental Management Act and National Water Act

The Proposed Project requires Environmental Authorisation (EA) in terms of the NEMA and will follow a Scoping and Environmental Impact Assessment (S&EIA) process in terms of the EIA 2014 Regulations, as amended. The aforesaid Regulations enforce a strict timeframe and require a decision by the Competent Authority (CA), the DMPR, within 300 days of the submission of the EA application.

Furthermore, the Proposed Project will require a Water Use Licence (WUL) in terms of the National Water Act, An Integrated Water Use Licence Application (IWULA) will be prepared and submitted in accordance with the Water Use Licence Application and Appeals Regulations 2017 and will be supported by a technical report and other supplementary information.

The Draft Scoping Report (DSR) has been conducted to identify potential positive and negative impacts on the environment and to gather comments and queries from stakeholders. It documents the process followed, the findings and recommendations of the scoping phase study and the proposed plan of study for the EIA Phase to follow.

The overarching objectives of the EIA process will be to:

- Prepare integrated sensitivity maps for the study area based on the findings of specialist assessments as input into the project design process;
- Identify and assess the significance of potential impacts associated with the project activities; and
- Recommend mitigation and enhancement measures to ensure that the development is undertaken in such a way as to promote the positive impacts and to minimise the negative impacts.

Public Participation Process

- NEMA EA Application was submitted to the DMPR on Tuesday, 21 April 2026. The acceptance letter for the EA application was received on 18 May 2026.
- Project Announcement: Thursday, 14 May 2026

- The DSR will be made available as follows:
  - A hard copy at the Allanridge Public Library
  - An electronic copy on Kongiwe's website: https://kongiwe.com/projects/

- **Stakeholder Meeting**

Proposed Dates	Time	Method of Engagement
Online Meeting		
Wednesday, 27 May 2026	10H00 – 11H00	Microsoft Teams
In-Person Meetings: Open Day		
Saturday, 30 May 2026	11H00 – 13H00	S.A. Mokhothu Primary School

- Submission of the Final Scoping Report by 1 July 2026
  - 43 days review period (approve/reject)

Way Forward

- During the EIA phase of the Proposed Project, a Draft Environmental Impact Assessment and Draft Environmental Management Programmes (DEIAs/EMPrs) with required Specialist Assessment reports, in support of the EA application, will be made available for a public review for 30 days. After the review period a Final Reports will be compiled and the following would take place:
  - Submit the Reports to DMPR.
  - 107 days review period (approve/reject)
  - Notify stakeholder of the decision from the Competent Authority (DMPR)

- 60 day Public Participation period for Water Use Licence

Jelani Resources (Pty) Ltd: Social Labour Plan for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

Project Background

Kongiwe Environmental (Kongiwe) has been appointed by Jelani Resources (Pty) Ltd (Jelani) to compile this Social and Labour Plan (SLP) for their proposed mining Project ('the Project'). The SLP, which sets out the social and labour programmes for Project's Life of Mine (LoM), has been prepared in accordance with requirements of Mineral and Petroleum Resources Development (MPRDA) Act (Act No. 28 of 2002). Jelani will be required to submit this SLP to the Department of Mineral and Petroleum Resources (DMPR) for approval as a prerequisite for a Mining Right (MR) to be granted.

Upon receiving approval for the SLP, Jelani will be required to communicate the contents of the SLP:

- To the public within 30 days (through various means, such as local newspapers, company website and hard copies placed at municipal offices);
- To the local community within 180 days (through a process of public communication); and
- To employees immediately upon their appointment.

The MPRDA requires that mining proponents promote broad-based economic empowerment, sustainable local development and environmental protection. Thus, the objectives of the SLP are to promote economic growth, employment, skills development (among employees and the community), socio-economic development and social welfare – particularly regarding empowerment of historically disadvantaged people (HDPs) in the vicinity.

The SLP demonstrates Jelani's commitment to advancing the social and economic welfare of its employees as well as the local community as by promoting employment, contributing to local socio-economic development, and playing a role in the transformation of the mining industry to ensure a fairer distribution of benefits.

Local communities refer to communities located in areas where a mine is operating – as well as areas from which most of the workforce is sourced.

In the meeting held with the DMPR on 25 November 2025, Kongiwe was advised that a stand-alone LED project should be identified by the Matjhabeng Local Municipality (MLM) 's LED Department.

Jelani Resources (Pty) Ltd

Kongiwe contacted MLM's Executive Director of LED (Dr. Sefako Ramphoma) in January 2026 regarding Jelani's proposed funding for a LED project. Following consultation with the Ward Councillor of Ward 19, Dr. Ramphoma advised Kongiwe (on 4 February 2026) that a priority LED project was the refurbishment of Nyakallong Community Hall. Nyakallong is a major sending area for the Target mine.

On 19 March 2026, the MLM issued a letter of approval (signed by Dr Vuyo Adonis, Acting Municipal Manager) for Jelani to allocate R1,000,000 to the refurbishment of Nyakallong Community Hall.

There will be no employees on the Jelani payroll in the first four years of the SLP cycle. In Year 5, there will be 39 employees on the Jelani pay roll. The breakdown of these employees, based on job grading bands, are shown in Table 1 For the entire SLP cycle, there will be no personnel on contractor's payrolls or service provider payrolls.

Where possible, Harmony workers will be sourced from Target. If Target cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area. The number of employees on the Harmony payroll that are to be involved in the Project is presented in Table 2.

Table 1: Number of Jelani Employees, by Job Grading

Job Grade	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Executive Management.	0	0	0	0	1	1
Senior Management.	0	0	0	0	7	7
Professionally qualified and experienced specialists and mid-management.	0	0	0	0	31	31
Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.	0	0	0	0	0	0
Semi-skilled and discretionary decision making.	0	0	0	0	0	0
Non-permanent employees.	0	0	0	0	0	0
Total	0	0	0	0	39	39

Table 2: Number of Employees on the Harmony Payroll, by Job Grading

Job Grade	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Executive Management.	0	0	0	0	3	3
Senior Management.	0	0	0	0	23	23
Professionally qualified and experienced specialists and mid-management.	0	0	0	0	99	99
Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.	0	0	0	0	159	159
Semi-skilled and discretionary decision making.	0	0	0	0	222	222
Non-permanent employees.	0	0	0	0	0	0
Total	0	0	0	0	506	506

Jelani Resources (Pty) Ltd: Social Labour Plan for Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

Project Name	Refurbishment of the Nyakallong Community Hall.	Community Services
Background	This project is being implemented with the support of the MLM. Wherever possible, suitably qualified and skilled local contractors will be sourced. Contractor teams comprising women and youth will also be considered favourably. The entire Nyakallong community will benefit from the renovations to be undertaken.	

Geographical location	**District Municipality**	**Local Municipality**	**Villages**	**Project Start Date:**		**Project End date:**	
	Lejweleputswa District Municipality,	MLM	Nyakallong	3rd year of SLP cycle.		5th year of SLP cycle	

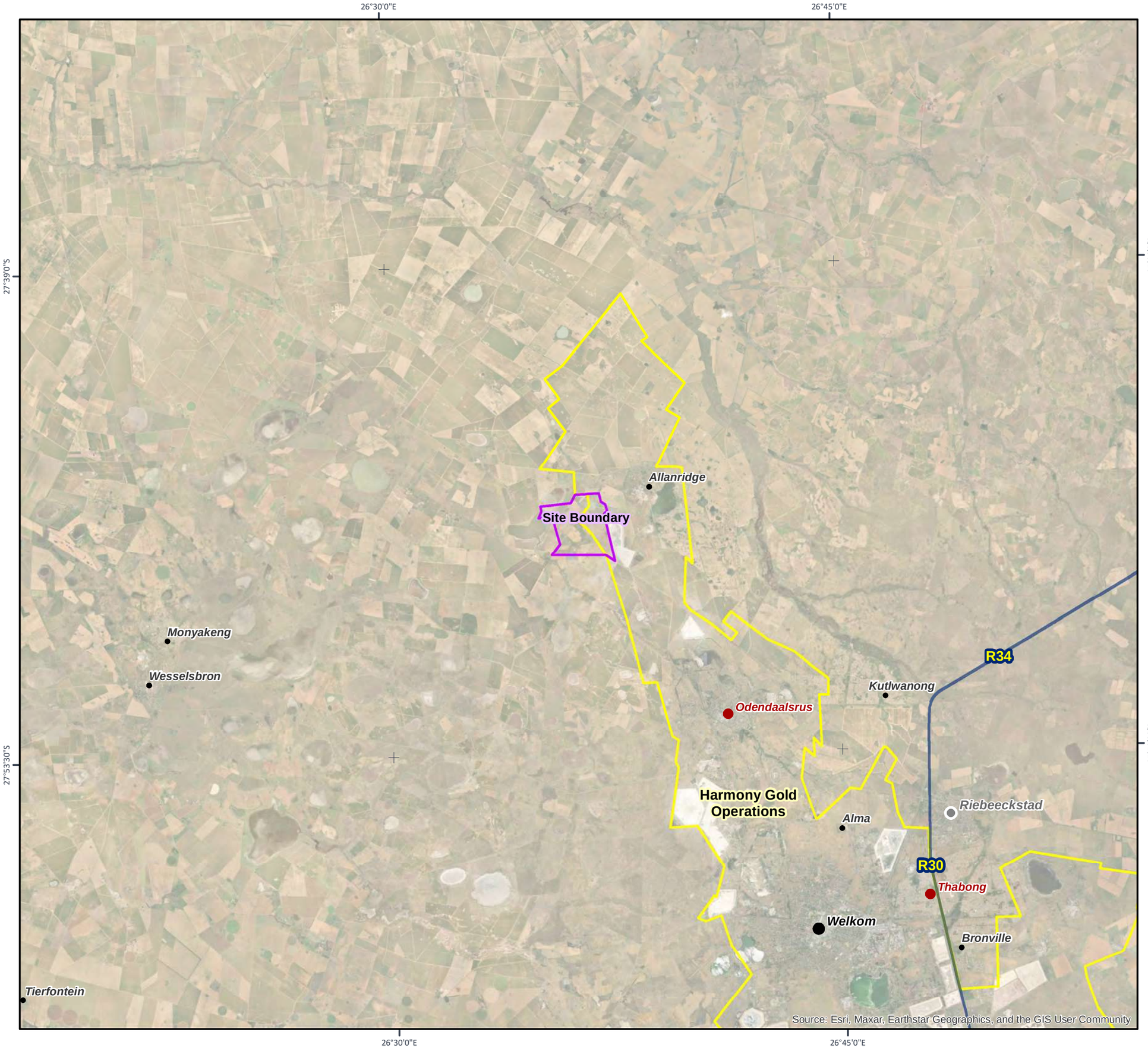
Output	**Key Performance Area**	**Responsible entity (inclusive all role players)**	**Quarterly timelines and year**	**Quarterly timelines and year**	**Quarterly timelines and year**	**Budget**
Community Amenities	Renovated community hall	Jelani and MLM Council.	3rd year of SLP cycle. R400 000	4th year of SLP cycle. R300 000	4th year of SLP cycle. R300 000	R1,000 000

Classification of jobs	**No of jobs to be created**	**Male Adults**	**Female Adults**	**Male Youth**	**Female Youth**	**Total**	**Comments**
Short term	Number of jobs - and composition of males, females and youth in contractor teams - will be dependent on composition of contractor teams. Local contractor teams comprising women and youth will be considered favourably, on the condition that they have the pre-requisite certifications for their trade. For example: • Building contractors must be registered with the National Home Builders Registration Council (NHBRC); • Plumbers must be certified by the Plumbing Industry Registration Board (PIRB) to sign off on compliance certificates; and • Electricians must hold an Installation Electrician (IE) or Master Installation Electrician (MIE) registration to sign off on compliance certificates. Trades not specified above, that are to be required for the refurbishment of the project, must be appropriately certified. Also note that major renovations and structural alterations require approved, registered professional plans (SACAP) and municipal approval to comply with National Building Regulations.						
Medium term	The entire Nyakallong community will benefit from the renovations to be undertaken.						
Long term	The entire Nyakallong community will benefit from the renovations to be undertaken.						
Number of dependents?	The entire Nyakallong community will benefit from the renovations to be undertaken.						

Completion date and exit strategy: Year 5 of the SLP cycle.

Sustainability: Funds to enable the maintenance of the facility may be considered as one of the LED initiatives in the next SLP cycle – pending agreement by the MLM at the commencement of the second SLP cycle.

NB: Beneficiaries include the entire community of Nyakallong.



KONGIWE

JELANI RESOURCES

CUMULATIVE IMPACTS

Legend

- Other Settlement
- SecondaryTown
- Major Town
- City
- National Road
- Harmony Operations
- Jelani Resources Boundary

0 2 4 8 12 16

Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 17 December 2025

1:200 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)
2025 Satellite Imagery

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
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26°34'55"E

26°39'50"E

27°45'0"S

27°49'30"S

Site Boundary

Land Uses

- Barren Land
- Built-up
- Cultivated
- Forested Land
- Grassland
- Mines & Quarries
- Shrubland
- Waterbodies
- Wetlands

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

KONGIWE

JELANI RESOURCES

LAND USE

Legend

Jelani Resources Boundary

0 0.5 1 2 3

Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 18 December 2025

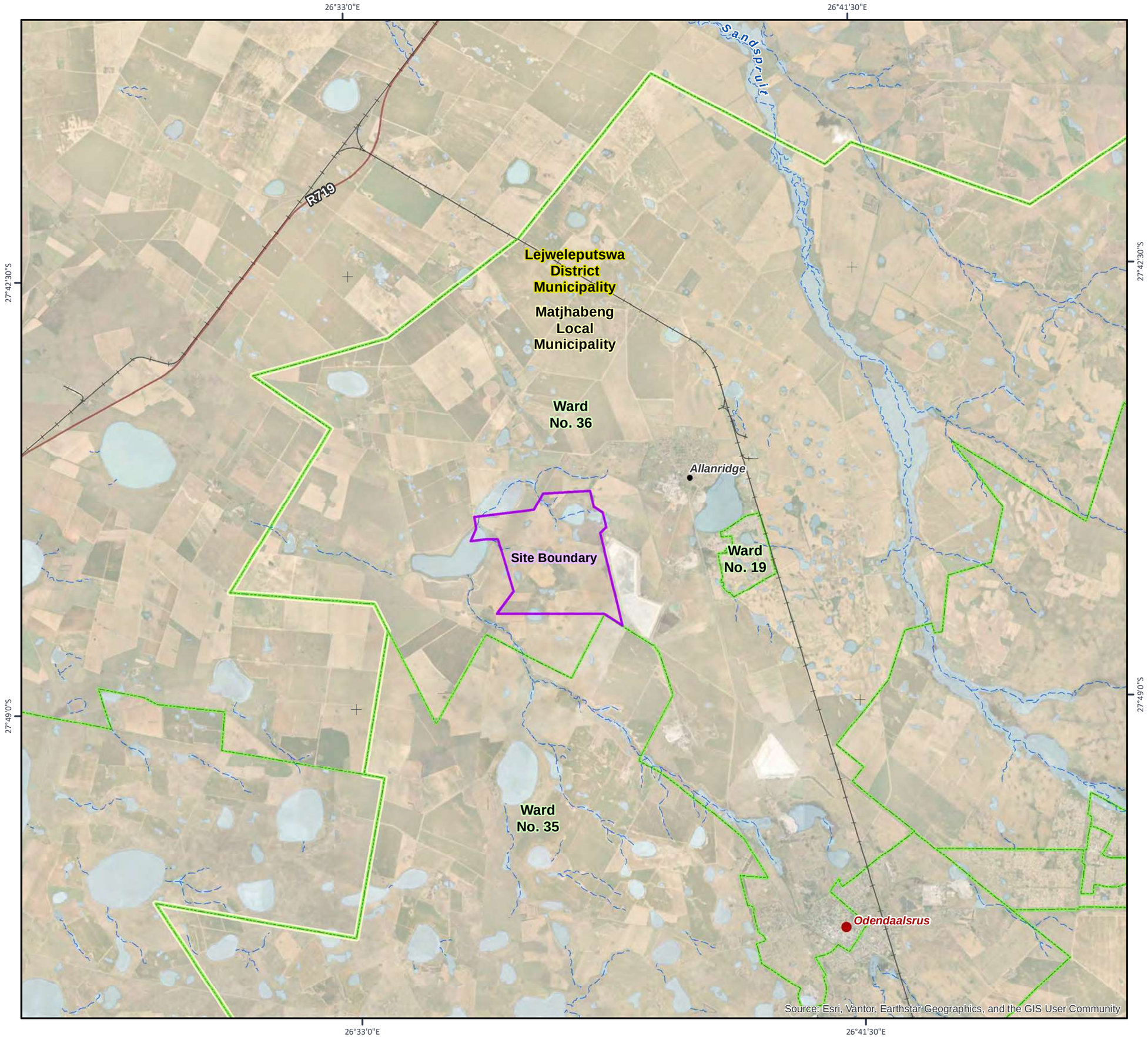
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Projection: Transverse Mercator
Datum: WGS 1984

(A3)
2025 Satellite Imagery

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KONGIWE

JELANI RESOURCES

LOCAL ORIENTATION

Legend

- Other Settlement
- Major Town
- Non-Perennial River
- Perennial River
- Main Road
- Railway
- Jelani Resources Boundary
- Ward Boundary
- Local Municipality
- District Municipalities
- Water Areas

0 1 2 4 6

Kilometres

Project Code: MERA#001
Client: Mera Advisers
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 18 May 2026

1:100 000

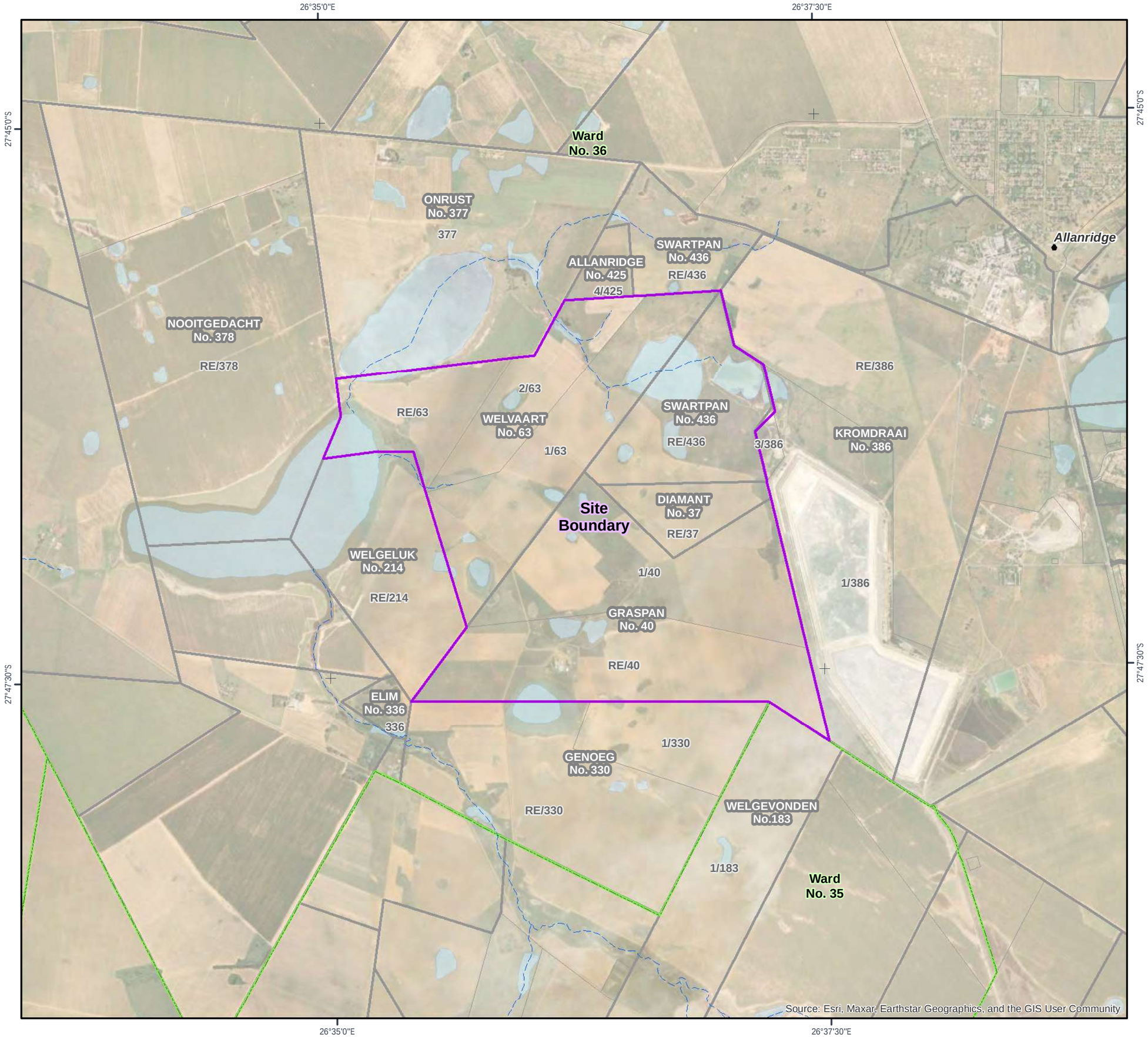
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Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

2025 Satellite Imagery

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FILE REF:
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JELANI RESOURCES

SITE ORIENTATION

Legend

- Other Settlement
- Non-Perennial River
- Perennial River
- Main Road
- Railway
- Farm Portions
- Parent Farm
- Jelani Resources Boundary
- Ward Boundary
- Water Areas

0 0.5 1 2

Kilometres

Project Code: MERA#001
Client: Mera Advisers
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 17 November 2025

1:30 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)
2025 Satellite Imagery

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FILE REF:
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MINUTES OF MEETING			
Date	Thursday, 28 May 2026	**Time**	10:00 – 11:00 AM
Venue	Microsoft Teams		
Subject	**Online Meeting Minutes: Matjhabeng Local Municipality**		

List of Attendees		
Organisation	**Name of Attendee**	**Designation**
Matjhabeng Local Municipality	Mr Serake Leeuw	Special Advisor to the Office of the Executive Mayor
Matjhabeng Local Municipality	Mr Lunga Ncapai	Solid Waste Manager
Matjhabeng Local Municipality	Mr Johannes Theunissen	Manager: Waste Department
Kongiwe Environmental (Pty) Ltd	Ms Umeshree Naicker	Principal Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevale	Environmental Consultant
Apologies		
Organisation	**Name of Attendee**	**Designation**
Jelani Resources (Pty) Ltd	Mr Neels Hoek	Project Manager

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place.

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No	Item
1	**Welcome and Introductions**
1.1	Ms Naicker welcomed all online meeting attendees.
2	**Meeting Purpose**
2.1	Discuss the proposed Underground Mining Project.
2.2	Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation Application.
2.3	Content of the Social and Labour Plan
2.4	Provide you with an opportunity to raise comments/seek clarity and provide input.
2.5	Record comments raised and include in the Comments and Responses Report.
3	**Meeting Agenda**
3.1	Purpose of the Meeting.
3.2	Kongiwe's Role as an independent EAP.
3.3	Project Background.
3.4	Project Description.
3.5	Infrastructure Requirements.
3.6	Baseline Environment.
3.7	Specialist Studies.
3.8	Legislative Framework.
3.9	Listed and Specified Activity.
3.10	Social and Labour Plan.
3.11	Public Participation Process.
3.12	The Way Forward.
3.13	Comments and Discussion.
4	**Discussion**
4.1	Refer to the table below

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STAKEHOLDERS		COMMENT	RESPONSE
4.1.1	Mr Johannes Theunissen (Mr Theunissen)	Mr Theunissen raised queries regarding the specialist assessments for the Proposed Project, including whether dewatering and groundwater impact assessments had been undertaken and whether potential impacts on Nyakallong had been considered. He also enquired about assessments relating to acid mine drainage (AMD), waste management, alignment with municipal services, and potential impacts on water, wastewater, and waste infrastructure. In addition, he requested clarity on the status and availability of the Air Quality Assessment and whether further engagement would be held to discuss the findings. Lastly, he queried whether any assessment or modelling of potential ground subsidence associated with the proposed mining activities would be undertaken.	Ms Naicker responded by explaining that, during the Scoping phase, the project team identifies all potential impacts that may arise from the Proposed Project together with the relevant specialist studies required to assess such impacts in detail. The relevant specialist studies are conducted in the Environmental Impact Assessment (EIA) phase (see Chapter 9 of the Draft Scoping Report, for the plan of study for the Environmental Impacts Assessment). Ms Naicker advised the groundwater impact assessment, have already commenced, while additional studies such as the air quality assessment and surface water assessment, blasting and vibration, closure risk assessment which will address potential ground subsidence would also be undertaken. She noted that these studies would contribute toward assessing potential pollution risks and related environmental impacts. She further explained that detailed findings relating to groundwater impacts, waste management, pollution risks, air quality, and associated mitigation measures would be presented during the EIA phase. The Draft EIA Report would be circulated for a 30-day public review and comment period, during which stakeholders would have the opportunity to submit additional comments and engage further on the findings of the specialist studies.
4.1.2	Mr Theunissen	Mr Theunissen recommended that the specialist studies give particular consideration to waste management, noting that the Allanridge landfill site is relatively small and has limited capacity, and therefore recommended that this aspect be carefully considered during the relevant impact assessments.	Ms Naicker will inform the specialist accordingly.

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STAKEHOLDERS		COMMENT	RESPONSE
4.1.3	Mr Serake Leeuw (Mr Leeuw)	Mr Leeuw stated that a number of his key concern had already been addressed through the comments raised by Mr Theunissen, particularly relating to integrated waste management. He noted the following for the Social Labour Plan:	
		Clarification regarding the applicable Social Development Framework (SDF) and enquired what provisions or guidance the framework contains in relation to the proposed development.	**Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: To address identified skills gaps among employees, Jelani will implement various training programmes relating to AET, core business, learnerships and portable skills. It is proposed that limited funding for these training programmes be allocated over the final three years of the SLP cycle. Within six months of the appointment of Project employees (in Year 5 of the SLP cycle), the HR Department is to recruit a skills development facilitator to prepare detailed training programmes and associated budgets.
		Local Economic Development (LED) initiatives associated with the proposed project should be aligned and integrated with existing local development planning processes.	**Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: Kongiwe contacted Matjhabeng Local Municipality (MLM's) Executive Director of LED (Dr. Sefako Ramphoma) in January 2026 regarding Jelani's proposed funding for a LED project. Following consultation with the Ward Councillor of Ward 19, Dr. Ramphoma advised Kongiwe (on 4 February 2026) that a priority LED project was the refurbishment of Nyakallong Community Hall. Nyakallong is a major sending area for the Target mine.

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STAKEHOLDERS		COMMENT	RESPONSE
			On 11 February, Dr Ramphoma presented the LED proposal to the Matjhabeng Local Municipality Executive Committee. On 19 March 2026, the MLM issued a letter of approval (signed by Dr Vuyo Adonis, Acting Municipal Manager) for Jelani to allocate funds to the refurbishment of Nyakallong Community Hall. Funds would be distributed over three years, from Year 3 to Year 5 of the SLP cycle.
		Noted that mining projects typically allocate a percentage of investment toward social development initiatives. He enquired whether the project proponents are considering the establishment of a community trust for the duration of the proposed project, which was indicated to be approximately 14 years.	**Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: No employees will be appointed for the Project for the first four years of this SLP cycle. As the Mine Work Programme for the initial SLP cycle (Years 1 to 5) will be dedicated to feasibility/ engineering studies and implementation/ construction activities, the mandatory SLP Future Forum will be established at the commencement of Year 5. The Future Forum will comprise representatives from Jelani management, employees and contractors – and will act as a committee that addresses labour issues, worker rights, and strategies for job preservation or retrenchment.
		Nyakallong Community Hall refurbishment mentioned during the presentation and enquired whether there are additional associated projects planned which stakeholders should be aware of.	As no revenue will be generated for the first SLP cycle (SLP-1), financial provisions for LED initiatives are limited for this cycle. Other LED initiatives will be considered only in the next SLP cycle (SLP-2).
		Raised concerns relating to the Voëlpan, noting that it is currently creating challenges within the area. He enquired whether the proposed project has considered any measures or assistance in this regard.	Voëlpan is located approximately 2.6 km east of the Proposed Project within Harmony Target's Mining Right area. Where relevant and appropriate, potential cumulative impacts associated with Voëlpan will be considered as part of the EIA phase.
4.1.4		Mr Ncapai stated that a number of his questions had already been addressed through the comments raised for the SLP by previous speakers but wanted to raise the following points:	

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STAKEHOLDERS		COMMENT	RESPONSE
	Mr Lunga Ncapai (Mr Ncapai)	Mr Ncapai highlighted concerns regarding the high unemployment rate within the Matjhabeng area. Emphasised the need for local SMME (Small, Medium and Micro Enterprise) participation and inclusion in the Proposed Project.	The LED Project Plan specifies that, wherever possible, suitably qualified and skilled local contractors will be sourced. Contractor teams comprising women and youth will also be considered favourably.
		Enquired about the proposed rehabilitation and closure plans following the anticipated 14-year life of mine. Requested information on the guarantees and measures that will be implemented to ensure successful rehabilitation and restoration of affected land.	A Closure and Rehabilitation Plan will be compiled during the EIA phase and included in the Draft EIA Report.
		Highlighted the importance of assessing potential community health impacts associated with the Proposed Project. Requested that potential health risks to surrounding communities be considered as part of the environmental assessment process.	The Air Quality Impact Assessment will be conducted in the EIA phase. The specialist study will assess anticipated air quality impacts and develop mitigation and management measures for the identified potential impacts. This will include the implementation of an air quality monitoring programme.
		Requested clarity on the percentage of employment opportunities that would be allocated to local community members.	Ms Naicker advised that she would need to consult with the relevant specialist before providing a response to the matter raised. **Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: No employees will be appointed for the Project for the first four years of this SLP cycle. As the Mine Work Programme for this entire SLP cycle (Years 1 to 5) will be dedicated to feasibility/ engineering studies and implementation/ construction activities, it is likely that all 39 employees – to be appointed in Year 5 of the SLP cycle - will have professional qualifications. Suitably qualified candidates will be selected at the discretion of Jelani through a formal interview process.

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<table>
<tr><th colspan="2">STAKEHOLDERS</th><th>COMMENT</th><th>RESPONSE</th></tr>
<tr><td colspan="2"></td><td></td><td>In Year 5, 506 contactors will be sourced from the Harmony Target Operation (as shown in Table 1 below). If Target cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area.

The Target SLP will apply to employees contracted from the Harmony Target Operation. Employees on the Harmony payroll are ineligible in terms of contributions from the Jelani SLP.

Table 1: Number of Employees on the Harmony Payroll, by Job Grading

<table>
<tr><th>Job Grade</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Total</th></tr>
<tr><td>Executive Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3</td><td>3</td></tr>
<tr><td>Senior Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23</td><td>23</td></tr>
<tr><td>Professionally qualified and experienced specialists and mid-management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>99</td><td>99</td></tr>
<tr><td>Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>159</td><td>159</td></tr>
<tr><td>Semi-skilled and discretionary decision making.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>222</td><td>222</td></tr>
<tr><td>Non-permanent employees.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>506</td><td>506</td></tr>
</table></td></tr>
<tr><td colspan="2"></td><td>Suggested that social responsibility initiatives should consider additional community infrastructure and services, including schools, clinics, and support for the Allanridge landfill site, which has limited capacity.</td><td>The proposed initiatives will be considered for inclusion in future SLP activities, where feasible.

Selection of LED programmes are subject to alignment with the Matjhabeng Local Municipality’s Integrated Development Plan (IDP) (2024/2025) in conjunction with</td></tr>
</table>

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STAKEHOLDERS		COMMENT	RESPONSE	
			recommendations made by the Matjhabeng Local Municipality's Executive Director of LED. As the Matjhabeng Local Municipality has been placed under provincial administration due to a total breakdown of service delivery, the municipality in no position to contribute funds to the establishment and maintenance of public services at this stage. In light of the chronic lack of capacity by Matjhabeng Local Municipality to provide funds to support Jelani in LED projects, investment in the Nyakallong Community Hall for this initial SLP cycle – which requires minimal maintenance while providing long term functions for the community - is the preferred option for both the Matjhabeng Local Municipality and Jelani.	
4.1.5	Ms Naicker	Ms Naicker concluded the meeting by advising attendees that additional comments may still be submitted to the Kongiwe project team. Ms Naicker noted that comments requiring specialist input would be referred to the relevant specialists for review and response, and that adequate time would be needed to consider and address such submissions. She thanked attendees and indicated that the project team looks forward to receiving any additional feedback.		
5	**Closing**			
5.1	Ms Naicker thanked everyone for their time and the meeting was adjourned at 10:37AM.		ALL	-

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Jelani Resources (Pty) Ltd

Environmental Authorisation and Integrated Water Use License Application, as well as Social and Labour Plan for the Proposed Jelani Underground Mining Project

Stakeholder Engagement Meeting – Matjhabeng Local Municipality

DMPR Reference Number: FS30/5/1/2/3/2/1(10098)MR

DWS Reference Number: WU38176

28 May 2026

Introductions

- **Jelani Resources (Pty) Ltd (Applicant)**
  - Neels Hoek

- **Kongiwe Environmental (Pty) Ltd (EAP)**
  - Umeshree Naicker
  - Ripfumelo Macevele
  - Vanessa Viljoen

- **Matjhabeng Local Municipality**

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Agenda

1. Purpose of the Meeting
2. Kongiwe's Role as an independent EAP
3. Project Background
4. Project Description
5. Infrastructure Requirements
6. Baseline Environment
7. Specialist Studies
8. Legislative Framework
9. Listed and Specified Activity
10. Social and Labour Plan
11. Public Participation Process
12. The Way Forward
13. Comments and Discussion

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Purpose of the Meeting

- Discuss the proposed Underground Mining Project.
- Provide an overview of the Scoping and Environmental Impact Assessment (S&EIA) process in support of the Environmental Authorisation application.
- Content of the Social and Labour Plan.
- Provide you with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and include in the Comments and Responses Report.

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Important Notice

- This meeting is a formal consultation in terms of the requirements of the following legislation:
  - National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) for an Application for an Environmental Authorisation (EA) for listed activities triggered in Listing Notices GN R983 and GN R984 in terms of the Environmental Impact Assessment (EIA) Regulations of December 2014, as amended. The Department of Mineral and Petroleum Resources (DMPR)will be the Competent Authority to assess the EA for the Proposed Project.
  - Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) in fulfilment of the requirements of Regulations 42(3) and (4) relating to stakeholder engagement on the content of the Social and Labour Plan.
  - National Water Act, 1998 (Act No.36 of 1998) (NWA) for an Integrated Water Use Licence Application (IWULA) in accordance with the Act. The Department of Water and Sanitation (DWS) will be the Competent Authority to assess the IWULA for the Proposed Project.

POPIA: Safeguarding registered person's personal information

In terms of section 19 of the Protection of Personal Information Act (POPIA), a responsible party must, subject to Sections 9 and 11 of the Act, ensure the integrity and confidentiality of personal information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss of, damage to or unauthorised destruction of personal information, unlawful access to or processing of personal information. POPIA requires that personal information should be adequately protected to avoid unauthorised access. Therefore, Kongiwe continuously reviews security controls and procedures to ensure that personal information is secured. It should be noted that in terms of Section 11, personal information may be processed to the extent that this is necessary for pursuing the legitimate interests of the responsible party to whom the information is supplied.

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Kongiwe's Role

As an independent Environmental Assessment Practitioner, it is our role to perform an objective assessment of what the positive and negative environmental impacts of the Proposed Project may be, to quantify these, describe possible mitigations, collect public comment and supply the Competent Authority with the documentation so that it can determine if the project should proceed or not.

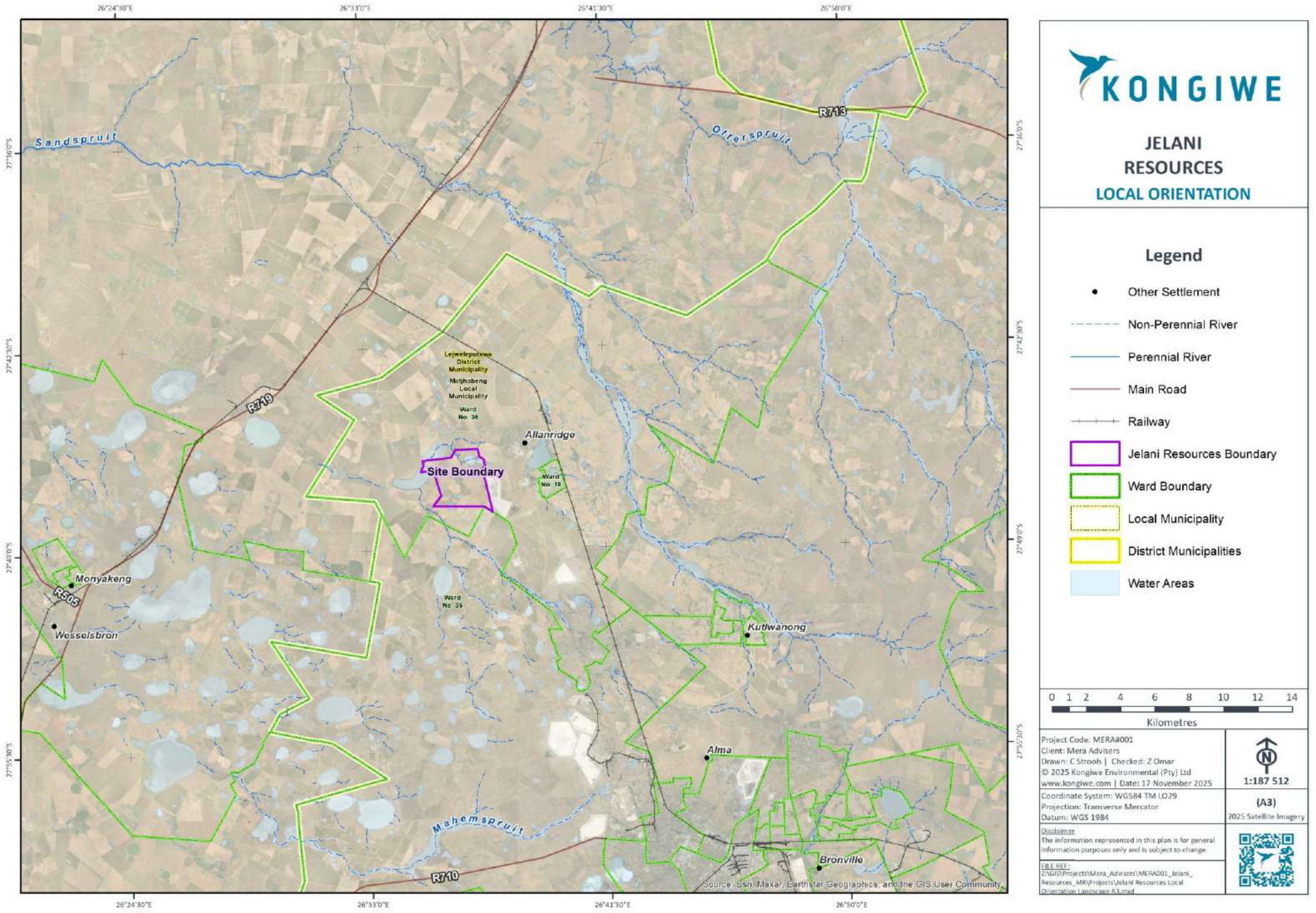
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Project Background

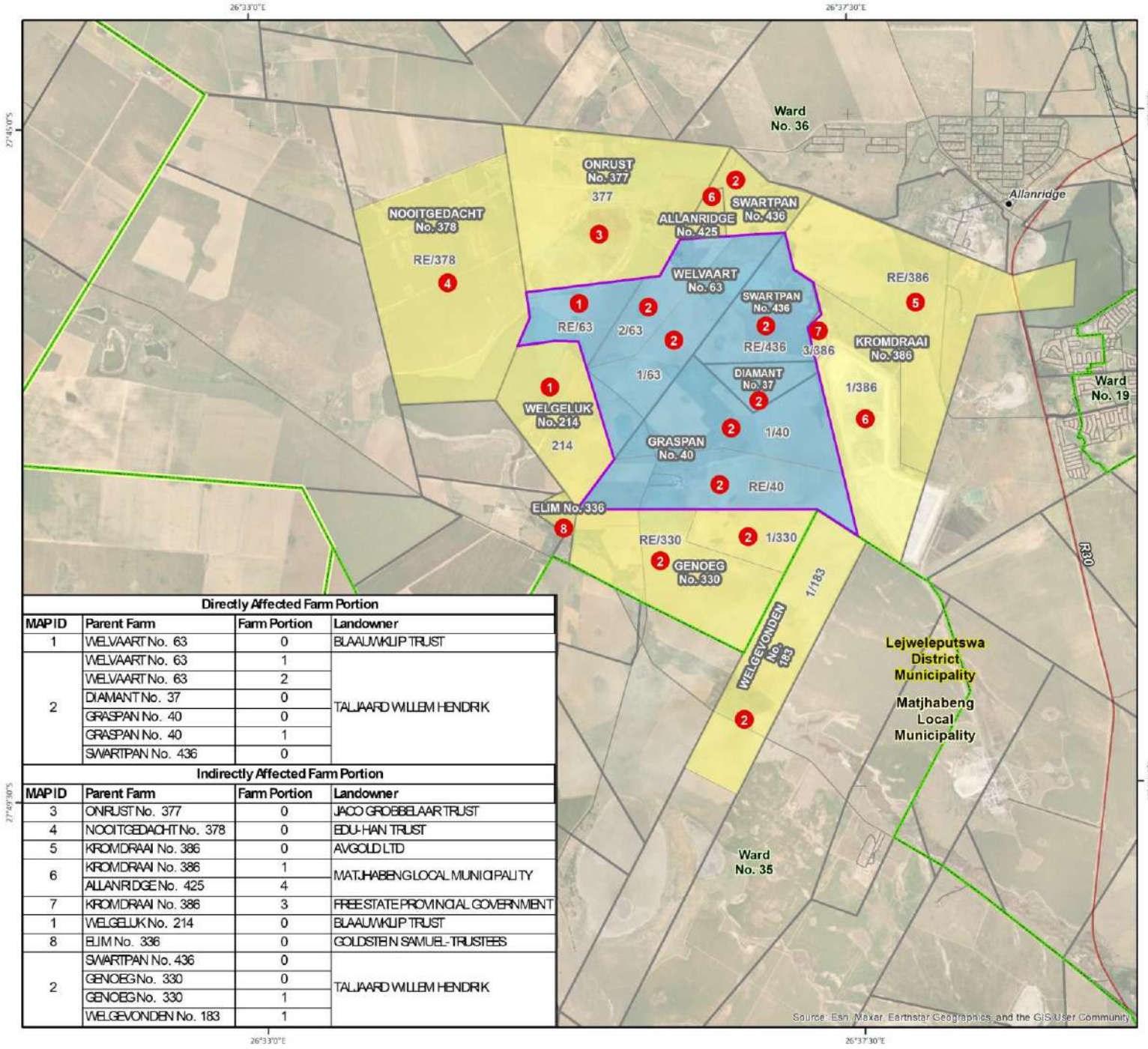
- **Applicant**: Jelani Resources (Pty) Ltd
- **Activity**: Underground Mining
- **Life of Operation**: 14 years
- **Location**: The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.
- Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold.
- The JV was formed to conduct underground mining operations within the joint venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution).
- Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

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Project Location



Property Map



Directly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES

LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

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Kilometres

Project Code: JELAR001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

1:45 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)

2025 Satellite Imagery

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Project Description

Jelani intends to initiate underground mining operations to extract the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

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Project Description

- Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1 200 mbs).
- As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.
- Two mining methods have been identified as the most practical for exploiting the mineral resources: **conventional breast mining** and **shrinkage stoping**.
- The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

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Project Description

- Ore will be transported to the shaft ore pass system using a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.
- The orebodies extend between 1 500m and 2 600m below surface.
- The total extent of the application area is 956.76 hectares (ha).
- All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

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Infrastructure Requirements

- All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area.
- Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.
- The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations.

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Infrastructure Requirements

- To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary.
- Each station will include a small sensor pad/housing (approximately 5–10 m^2), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.
- Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

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Underground Access Infrastructure Photos



Photo 1: Harmony Target No 3 Shaft

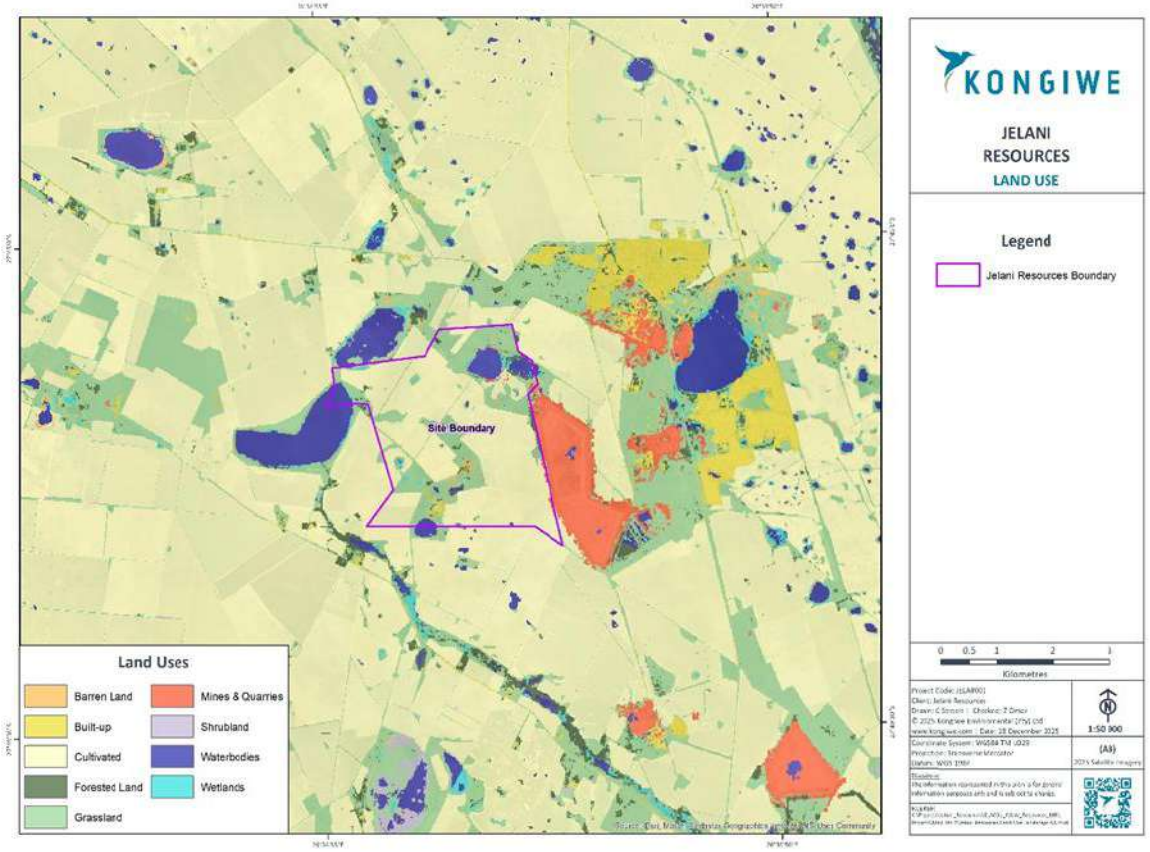


Photo 2: Harmony Target No 2 Shaft

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Current Land Use

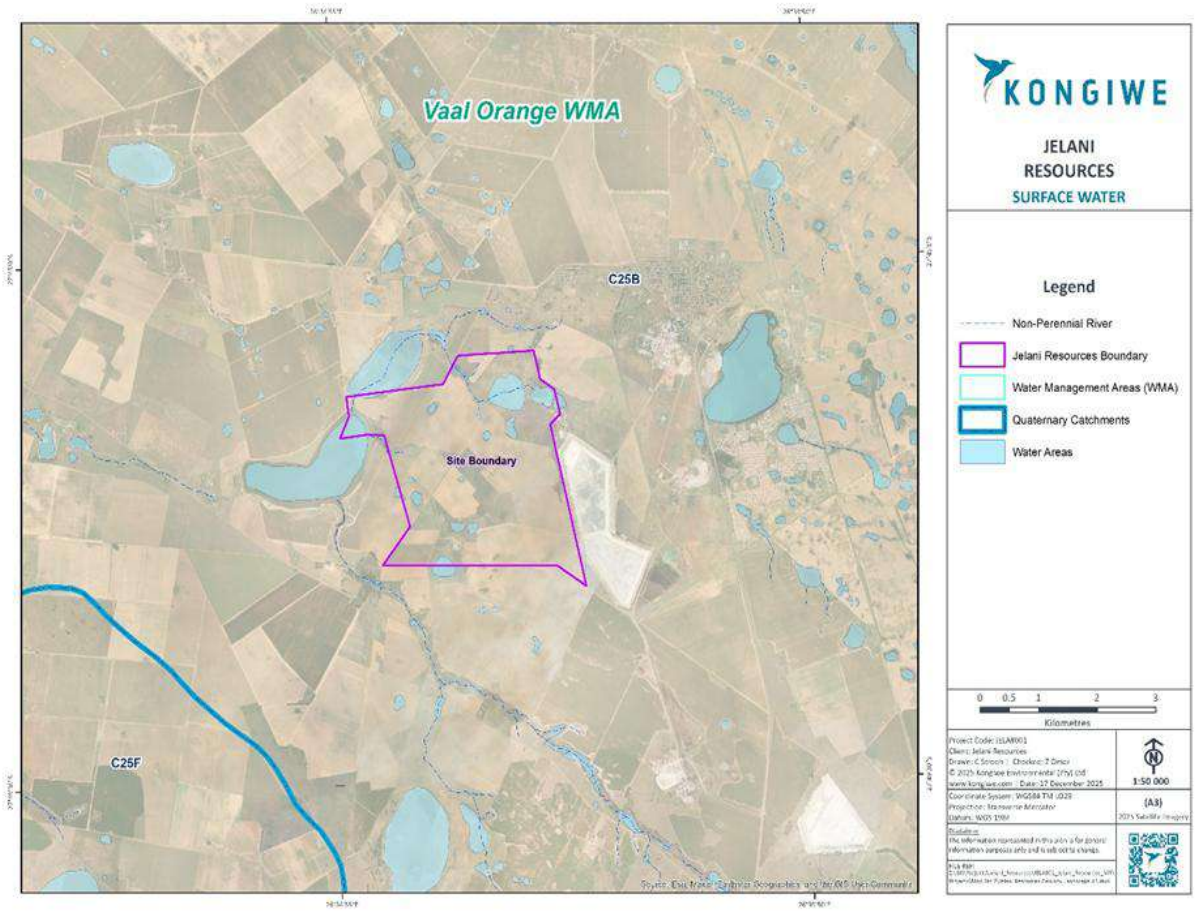
- The project boundary is currently utilised for agricultural purposes.
- Land uses within the immediate project boundary consist predominantly of cultivated fields, grassland, forested areas, waterbodies, and wetlands.
- The immediate surrounding landscape also includes existing mines and tailings storage facilities (TSFs), as well as transport infrastructure, electricity infrastructure, water supply infrastructure and various farming operations.
- Furthermore, the Proposed Project area is situated immediately adjacent to, and west of, the Harmony Gold Target Mine.



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Surface Water

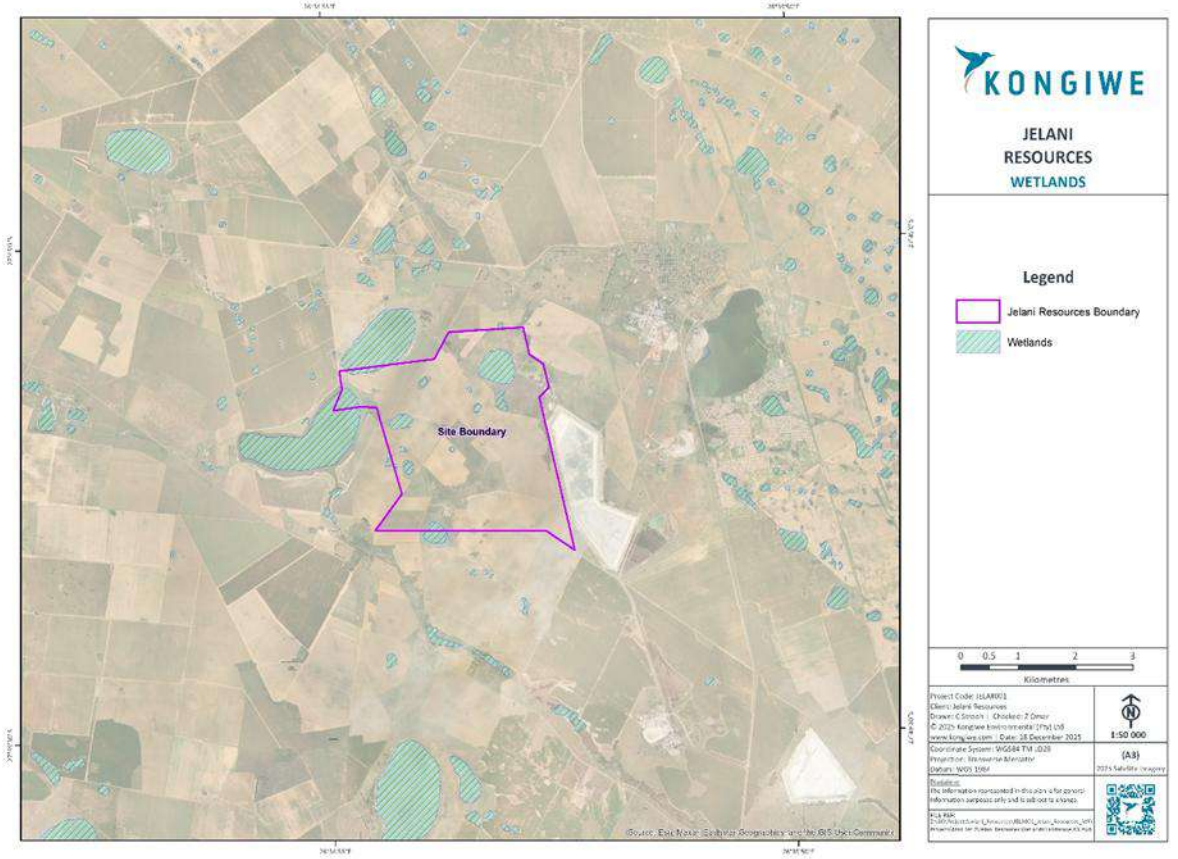
- The project is located within the Vaal Orange Water Management Area (WMA), specifically in quaternary catchment C25B.
- The surface water resource within the site boundary include a non-perennial river located to the north of the project area. Another non-perennial river is situated to the west of the site boundary.
- The surface water map indicates that the project area contains surface water areas, including wetlands.



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Wetland

- Several wetlands (wetlands depression and unchannelled valley-bottom (UVB) were identified and delineated occurring inside the project footprint with additional wetlands to the west, north, and south-central parts of the site.



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Biodiversity

- The Free State Conservation Plan (2024) classified areas on the basis of their contribution to reach the conservation targets within the province.
- These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. The CBAs are classified as either ‘Irreplaceable’ (must be conserved), or ‘Important’.
- Proposed Project falls within a CBA 1 and an ESA 2.

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Specialist Studies

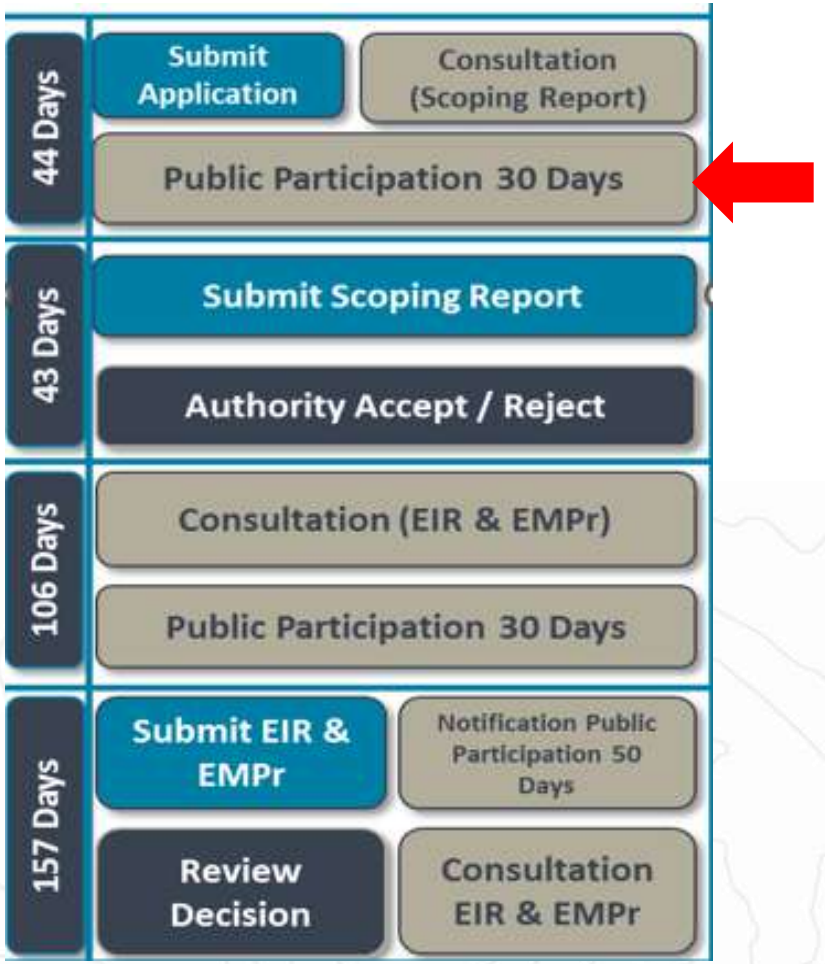
Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist Studies	
Biodiversity, Freshwater, including a Risk Assessment Matrix (RAM,) Soils and Agricultural Potential.	Mine Closure Plan
Desktop Heritage and Palaeontology	Hydrogeological Assessment
Hydrological Assessment	Climate Change Impact Assessment
Air Quality Impact Assessment	Blasting and Vibrations
Socio-Economic Impact Assessment	

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Legislative Framework

- A Scoping and Environmental Impact Assessment (S&EIA) process is being undertaken which evaluates the environmental impacts associated with the Proposed Project as part of an application for Environmental Authorisation (EA). The S&EIA and specialist studies to be undertaken will support the application for the required approval. The following applications have been made to the relevant departments:
  - EA application for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985 published pursuant to the EIA Regulations 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).
  - An Integrated Water Use Licence Application (IWULA) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) was submitted to the Department of Water and Sanitation (DWS) for any potential impact to water resources by the Proposed Project.



Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Underground Mining Operation	956,76 Hectares	GNR 325 - Activity 17	Any activity including the operation of that activity which requires a mining right in terms of section 22 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice, in Listing Notice 1 of 2014 or Listing Notice 3 of 2014, required to exercise the mining right	Section 21 (c) and (i)

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Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Development of gravel access tracks	Gravel access tracks approximately 1 km across all stations, with a width of 4 m wide	GNR 985 – Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **(b) Free State** (i) Outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Section 21 (c) and (i)

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Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity (ha) Ha or m²	Applicable Listing Notice GNR 983, 984 and 985 as amended by GNR 327, GNR 325 or GNR 324	Listed Activity	Water Use License Authorisation
Installation of the seismographic monitoring stations.	40 m²	GNR 985 - Activity 14	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse; **(b) Free State** (i) Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Section 21 (c) and (i)

Social and Labour Plan

- The Social and Labour Plan (SLP), setting out the social and labour programmes for Project's Life of Mine (LoM), has been prepared:
  - SLP outline specific initiatives such as projected number of employees by job grade.
  - Human resource development programmes to foster the development of requisite skills through training initiatives relating to basic adult education, learnerships, bursaries, mentorships and portable skills.
- As part of the SLP, the Nyakallong Community Hall will be refurbished under a Local Economic Development (LED) project.
- Jelani will be required to submit this SLP to the DMPR for approval as a prerequisite for a Mining Right (MR) to be granted.
- Upon receiving approval for the SLP, Jelani will be required to communicate the contents of the SLP:
  - To the public within 30 days (through various means, such as local newspapers, company website and hard copies placed at municipal offices);
  - To the local community within 180 days (through a process of public communication); and
  - To employees immediately upon their appointment.

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Public Participation

- The EA Application was submitted to the DMPR on Tuesday, 21 April 2026. The acceptance letter for the EA application was received on 18 May 2026.
- The Draft Scoping Report (DSR) was released for public review on 21 May 2026 . The review period will remain open for 30 days, from Thursday, 21 May 2026 to Monday, 22 June 2026. A Copy of the DSR will be made available at the following locations:
  - Allanridge Public Library (53 Caledon St, Allanridge)
  - Kongiwe website: http://www.Kongiwe.com/publications-view/public-documents/
- Online Meeting: Wednesday, 27 May 2026, from 10:00 to 11:00 via Microsoft Teams.
- An Open Day will be held on Saturday, 30 May 2026,at S.A. Mokhothu Primary School from 11H00 – 13H00
- Indirectly affected landowner and stakeholder meetings are ongoing.
- After public review, the Final Scoping Report will be finalised and submitted.
- Comments will be recorded in a Comments and Response Report and submitted to the relevant Competent Authorities.

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Comment & Discussion

- Discussion
- Action Points
- Closing



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Contact

- **Name: Vanessa Viljoen / Jean-Mari Williams**
- **Tel: 010 140 1725/26**
- **Email: stakeholders@kongiwe.com**

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.

info@kongiwe.com
www.kongiwe.com

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Kongiwe Stakeholder Engagement

From:	Kongiwe Stakeholder Engagement
Sent:	Friday, 26 June 2026 14:54
To:	Serake.Leeuw@matjhabeng.co.za; Lunga.Ncapai@matjhabeng.co.za; Johannes.Theunissen@matjhabeng.co.za
Cc:	Jean-Mari Williams; Umeshree Naicker; Ripfumelo Macevele
Subject:	Jelani Resources (Pty) Ltd: JV Area Underground Mining Project: Minutes of Online Meeting held on Thursday, 28 May 2026 with Matjhabeng Local Municipality
Attachments:	Matjhabeng_Local_Municipality_Meeting_Minutes_Final.pdf; JELA_001 _Matjhabeng_Presentation_EA_IWULA&SLP.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

Tracking:

Recipient	Read
Serake.Leeuw@matjhabeng.co.za	
Lunga.Ncapai@matjhabeng.co.za	
Johannes.Theunissen@matjhabeng.co.za	
Jean-Mari Williams	Read: 2026/06/26 15:07
Umeshree Naicker	Read: 2026/06/29 12:42
Ripfumelo Macevele	Read: 2026/06/26 14:56

Dear Stakeholders,

I hope this message finds you well.

Please find attached the minutes and associated appendices from the online meeting held with Matjhabeng Local Municipality on **Thursday, 28 May 2026**.

Should you have any queries, please do not hesitate to contact us.

Kind Regards,

Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 1725 | Email: stakeholders@kongiwe.com
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
PostNet Suite no 163, Private Bag X21, Bryanston, 2021, South Africa.
www.kongiwe.com

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Appendix C9: Written Comments

This appendix is not included in the publicly distributed version of this report.

Appendix C9 comprises the written comments received from interested and affected parties in the form in which they were submitted, being email correspondence containing the senders' names, email addresses and other personal contact details. This personal information may not be disclosed in a publicly distributed document without the consent of the data subjects, in terms of the Protection of Personal Information Act 4 of 2013.

Appendix C9 is submitted in full and unredacted to the Competent Authority. All written comments have been captured in Appendix C10.

Appendix C10: Comment and Response Report

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Environmental Authorisation and Integrated Water Use Licence Application for the Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province

Comments and Responses Report for the Draft Environmental Impact Assessment Report (DEIA)/Draft Environmental Management Programme (DEMPr)
DMPR reference number: FS30/5/1/2/3/2/1(10098) MR
DWS reference number: WU50090

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1 Competent Authority

1.1 Department of Water and Sanitation (DWS)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			No Comments received.		

1.2 Department of Mineral and Petroleum Resources (DMPR)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Comments raised during the Pre- Application Meeting with the DMPR for the draft Scoping Report, dated, Friday, 6 February 2026					
Mr Tuwani Monyai, Assistant Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Monyai enquired as to whether Harmony Target Shafts 2 and 3 form part of an existing Mining Right. Mr Monyai advised that a Memorandum of Understanding would be required between Harmany Gold and Jelani Recourses, given that all infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area and Jelani would be utilising Harmony Gold's shafts to access its underground mining area. This was noted as necessary to address operational and coordination challenges associated with multiple parties using the same infrastructure.	Ms Naicker explained that all existing infrastructure proposed to be included in the application falls under Harmony's Mining Right. No new operational mining infrastructure is planned within the project area. Mr Hoek clarified that Harmony Gold is a shareholder in the project through a joint venture arrangement. He further noted that, in terms of the joint venture agreement, no new infrastructure is required for the proposed project.	Section 1.3 Section 1.7 Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Mr Ripfumelo Macevele, Environmental Consultant, Kongiwe Environmental	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Macevele sought clarification regarding the requirement for a Memorandum of Understanding between Jelani Resources and Harmony Gold. It was queried whether such an agreement would be necessary, given that Harmony Gold is a shareholder in Jelani Resources and that the parties have entered into a joint venture agreement.	Mr Fhedzisani advised that a Memorandum of Understanding (MoU) would be required to clearly set out how the two parties would work together as well as to address the project's development plan which includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. He noted that this information should be sufficiently detailed and accessible for inclusion in the public participation process and is therefore not only relevant to the competent authority or the proponent. Mr Hoek reiterated that a Joint Venture Agreement is in place, which would be reviewed to determine whether it adequately addresses matters relating to shared infrastructure. It was further noted that, should the agreement not provide sufficient detail, a memorandum of agreement would be prepared for submission as part of the application	Section 1.3 Section 1.7 Appendix C
Mr Tuwani Monyai, Assistant Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Monyai stated that the specialist studies to be undertaken should not be informed solely by the screening tool. He further noted that, should any additional aspects be identified that require specialist input, these should also be included in the scope of studies.	Ms Naicker noted that any additional aspects identified that require specialist assessment will be undertaken as required.	Section 9.1 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Mr Monyai stated that EAPASA registration is a prerequisite for conducting the EIA. He further emphasised the importance of undertaking a robust cumulative impact assessment as part of the EIA process. It was noted that this is necessary to avoid situations where responsibility for cumulative impacts may be disputed, particularly where Harmony and Jelani could potentially attribute impacts to one another.	Ms Naicker confirmed that both herself and Mr Macevele are registered EAPs under EAPASA. She further confirmed that the relevant certificates would be included in the application. Ms Naicker also noted that, with regard to cumulative impacts, the S&EIA process will be conducted in accordance with NEMA, which includes the assessment of cumulative impacts. Mr Hoek acknowledged Mr Monyai's point and advised that Bara Engineering, who are responsible for the Mining Plans and associated engineering designs, are also involved in Harmony's operations. He noted that cumulative impacts are being considered within the engineering design process, including an assessment of whether the existing infrastructure is capable of accommodating the anticipated additional load associated with the Jelani project.	Section 8.3 Appendix A
Mr Cedrick Fhedzisani, Deputy Director: Mine	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Fhedzisani enquired if a new Tailings Storage Facility would be constructed or if they would make use of existing Tailing Storage Facilities.	Ms Naicker stated that the application does not include a Tailings Storage Facility and that an existing facility would be utilised for deposition which falls under Harmony's Target Mining right infrastructure.	Section 1.7

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Environmental Management			Mr Fhedzisani emphasized the importance of the Memorandum of Understanding, noting that it should include clear information regarding Tailings storage, specifically confirming that Jelani would be depositing onto Harmony's infrastructure. He referred to a precedent at Jagersfontein, where a storage facility failure was attributed to infrastructure not having been designed to accommodate increased deposition from a second operation. In this context, he stated that the Memorandum of Understanding would need to explicitly confirm that the Tailings Storage Facility is suitably designed and capable of receiving the additional load associated with the proposed Jelani operation.	Ms Naicker acknowledged this point and confirmed that the Memorandum of Understanding will be submitted as part of the application form.	-
			Mr Fhedzisani advised that the DWS should be consulted so that the DMPR and DWS can run the application process in parallel.	Ms Naicker acknowledged this point and added that a Water Use Licence Application (WULA) for the proposed underground mining project will be submitted to DWS.	Section 1.2
Mr Tuwani Monyai, Assistant Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Monyai expressed support for Mr Fhedzisani's comments, with the view that, in order to streamline the licensing process, the applications should be undertaken concurrently. This would allow the proponent to obtain the	Ms Naicker stated that Kongiwe has included engagement with SAHRA within the project timeline and that the Water Use Licencing process would be aligned with the EIA application.	Section 1.2 Section 9.1 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Environmental Authorisation and Water Use Licence simultaneously. He further emphasised the importance of engagement with SAHRA, noting that formal comments should be actively sought from SAHRA rather than merely informing them of the project, which he observed to be common industry practice.		
Ms Umeshree Naicker, Kongiwe	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Ms Naicker enquired whether the department is happy to receive one hard copy and one soft copy for both the scoping and EIA reports?	Mr Monyai stated that they would provide confirmation after the application has been received as they do not know who the project manager for the DMPR will be. He stated that once the application has been submitted, details relating to submission requirements would be communicated. Mr Hoek Stated that he would submit all the soft copies on to SAMRAD system and should any hard copies be required, Kongiwe would submit those.	Appendix C
Mr Tuwani Monyai, Assistant Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Monyai highlighted an issue with regard to climate change impacts, advicing that the proposed project would be required to consider how it may contribute to or impact climate change. He further noted that the Department has observed EIAs being challenged and appealed where insufficient consideration has	Ms Naicker stated that a climate change impact assessment has been included as a specialist study for the project.	Section 9.1 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			been given to the potential climate change impacts of proposed developments.		
			Mr Monyai stated that the EAP must consider the Financial Provision Regulations 2015 as they relate to mining project as well as relevant Environmental Regulations. He emphasised the importance of complying with these regulations and requested that the EAP take these requirements into account and ensure that they are included in the documentation.	Ms Naicker thanked Mr Moyai for his input and stated that this would be considered in the EIA process and will also be included in the submissions.	Section 1.9
Mr Cedrick Fhedzisani, Deputy Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Fhedzisani stated that once an application has been lodged for the Water and waste use licences, that information can be forwarded to the relevant person from the DMPR.	Ms Naicker confirmed that they would forward this information once it is available.	-
Mr Tuwani Monyai, Assistant Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Monyai stated that the application would be subjected to the regulations of the MPRDA and therefore the application would need to be lodged simultaneously with the application in terms of NEMA. He stated that the timeline would only begin counting for the NEMA process once the application has been submitted in terms of the MPRDA.	Ms Naicker noted this comment.	-

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Mr Cedrick Fhedzisani, Deputy Director: Mine Environmental Management	Online Meeting (Microsoft Teams)	Friday, 6 February 2026	Mr Fhedzisani stated that any further information requirements would be communicated in writing once the application has been lodged. Mr Fhedzisani further advice that in future the team should include all the relevant mining right reference numbers (specifically Harmony Target Mining Right), particularly where an application may require or involve infrastructure already authorised under other Mining Rights so that the department can include all the relevant project managers in the meetings.	Ms Naicker acknowledged that in future the team would include those reference numbers.	Appendix C

2 Organs of the State

2.1 Lejweleputswa District Municipality (LDM)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Comments raised during the Online Meeting with the District Municipality for the draft Scoping Report, dated, Tuesday, 26 May 2026					
Mr Dewald Kirsten, Manager Environmental Health Services, (LDM)	Online Meeting Microsoft Teams)	Tuesday, 26 May 2026	Mr Kirsten sought clarification regarding the baseline information that was considered and included in the Draft Scoping Report.	Ms Naicker responded that, the Department of Forestry, Fisheries and the Environment (DFFE) National Web-Based Environmental Screening Tool was used to identify environmental sensitivities and specialist study requirements associated with the proposed	Section 7 Section 9 Appendix D

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				development footprint. The tool assigns sensitivity ratings (Very High, High, Medium or Low) across a range of environmental themes, including biodiversity, terrestrial animal species, terrestrial plant species, aquatic biodiversity, agriculture, heritage, palaeontology, civil aviation and defence. Based on the identified sensitivities, the Screening Report indicates the specialist studies and assessment protocols that may be required for the application. She mentioned that the Scoping Report considered all baseline information in terms of vegetation, aquatic biodiversity, groundwater, heritage, palaeontology, as well as wetlands. She further added that for the Scoping phase, a desktop assessment of the baseline area is undertaken, and in the EIA phase, appointed specialist studies assess the impacts associated with the project. Refer to Section 7 of the Draft Scoping Report (DSR) for the baseline environment and Section 9, Table 9-1 of the DSR for the Plan of Study for specialist studies that is proposed for the EIA Phase.	
			Mr Kirsten enquired whether the specialist studies would be undertaken as desktop assessments rather than field-based investigations.	Ms Naicker responded that, at the Scoping phase stage, a desktop assessment was conducted to identify potential impacts for the Proposed Project. However, detailed specialist assessments will take place in the EIA	Section 9

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				phase (see Section 9, Table 9-1 of the DSR for the Plan of Study for specialist studies that is proposed for the EIA Phase). She mentioned that the specialist studies to be conducted consists of the following: Biodiversity and Freshwater Impact Assessment, Air Quality Impact Assessment, Hydrogeological, Hydrological Assessment and Climate Change Assessment. A desktop Heritage and Palaeontology Assessment will be conducted. She added that a Blasting and Vibration Assessment, Socio-Economic Impact Assessment, and a Mine Closure Plan will also be considered.	
			Mr Kirsten mentioned that he will send the questions to Kongiwe team for written responses. However, he requested that the specialist assessments also consider that, due to the presence of uranium-bearing material, a radioactive exposure assessment should be conducted. He added that, although the site is not currently in operation, it had been operational for many years in the surrounding area. He suggested that the question should be raised regarding the	Ms Naicker noted that the existing Radioactivity Study for the Harmony Target Mine will be used for the Proposed Project. The geology of the Proposed Project area is a direct extension of the geological formations occurring within the Harmony Target Mine mining right area (Section 7.3 of the DSR), which has already been subject to detailed radiological assessment and regulatory approval (2024 Free State Radiological Public Safety Assessment: System Description, undertaken by AquiSim Consulting	Section 7.3 Section 8.3

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			cumulative impacts of the existing Harmony Target operations together with the new Jelani JV project, and that these should also be evaluated. He noted that he believes most of the specialist studies may include this aspect; however, from his perspective, there are currently many desktop studies being undertaken for project similar to Jelani. Given that the area is already a mining-disturbed environment, he emphasised the need to consider the cumulative impacts involved. He pointed out that some specialist studies do not always take these into account, instead focusing on the specific operation in isolation. He clarified that his questions are not intended as an open critique of the entire development, but rather to highlight that, particularly from an environmental health perspective, it is important to assess impacts beyond the isolated environment in which the operation will take place.	(Pty) Ltd for Harmony Gold Mining Company Limited - Free State Operations). Ms Naicker also noted that the specialist studies conducted in the EIA phase will consider cumulative impacts.	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Mr Kirsten mentioned that, based on his observations from similar operations, very little attention is often given to mine closure and post-closure environmental risks, particularly with regard to rehabilitation and closure planning processes. He added that, upfront, he would like to request that the necessary attention be given to these aspects. He further noted that, in line with this, there is sometimes a breakdown in communication once operations have commenced or after closure, particularly regarding the financial aspects between the relevant authorities and the operating companies. Specifically, he referred to continuous monitoring data on water quality, air quality, radiation, waste management, and related aspects.	Mine Closure Risk Assessment will be conducted for the Proposed Project, including the estimated financial rehabilitation quantum calculation will be undertaken. The financial quantum for rehabilitation is required to be paid in full prior to the issuance of the Environmental Authorisation as per the Mineral and Petroleum Resources Development Act (MPRDA). This information will be included the EIA phase.	Section 1.9
			Mr Kirsten mentioned that, going forward, he will submit all his questions and inputs so that a good working relationship can be established with the Jelani Project, extending beyond the Scoping and EIA reporting processes.	Ms Naicker responded that Mr Kirsten is welcome to submit his comments, via the stakeholder email address.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Mr Neels Hoek, Project Manager, Jelani Resources	Online Meeting Microsoft Teams)	Tuesday, 26 May 2026	Mr Hoek mentioned that an open day will be held on Saturday, 30 May 2026, between 11:00 and 13:00, and that municipal personnel are welcome to attend.	Mr Kirsten responded that he appreciates and has noted the invitation. However, based on his past experience, he does not prefer attending such meetings, as he would be seated with the community and, at times, questions raised may create misunderstandings among community members, which could place the project in a difficult position.	Appendix C
			Mr Hoek mentioned that he believes it would be beneficial, once the project reaches the EIA phase, to arrange an in-person meeting. He noted that the EIA will also be available for public comment, and suggested that the team consider holding a separate, dedicated meeting with the municipality at that stage, distinct from the open days. He added that such a meeting could be arranged with the municipality at that time, should there be a requirement from the municipal representatives.	Mr Kirsten responded that he would support this approach. He noted that he will be raising some questions with the team, and while responses will be provided, there may still be a need for further clarification. He therefore suggested that an open discussion on some of the questions, to ensure mutual understanding, would be beneficial, and that such a meeting could be arranged. Ms Naicker agreed that this was a good suggestion and added that, in the next phase, the team will present all the identified impacts and the outcomes of the specialist studies. She further indicated that the municipality will be provided with a copy of the report, and by the time engagement takes place in the next phase, the municipality will have significantly more information available.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Mr Dewald Kirsten, Manager Environmental Health Services, (LDM)	Email Correspondence	Tuesday, 02 June 2026	Good morning, Jean-Mari Thank you for the short virtual engagement and presentation of the proposed project, held on 26 May 2026 Attached please find the questions related to the proposed project. Thank you with kind regards	Dear Mr Dewald Kirsten We refer to your email sent to our Stakeholder Engagement Team for the Jelani JV Underground Mining Project Environmental Impact Assessment/ Integrated Water Use Licence Application Process (DMPR Ref: FS10098 MR) (DWS: WU50090). Please find the attached responses to the comments you have raised. All comments raised by yourself will be included in the Comment and Response Report (CRR). Please do not hesitate to contact us if you have any further queries.	Appendix C
Comments on the attached letter received via email from Mr Dewald Kirsten (LDM) dated, Tuesday, 02 June 2026 as per the email correspondence above.					
			1. How were environmental health risks to surrounding communities have been identified and prioritised during the Scoping Phase? Can this process be explained?	Potential environmental risks to surrounding communities were identified during the Scoping Phase through a combination of the Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool, desktop studies, site verification, stakeholder engagement, and a review of existing environmental information.	Section 8.2 Section 9.2 Appendix D

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				The Environmental Assessment Practitioner (EAP) then evaluated how Proposed Project activities could interact with these sensitivities to give rise to potential environmental health risks, such as impacts related to air quality, water resources etc. (see Chapter 8.2 of the Draft Scoping Report (DSR), for possible positive and negative impacts identified). The Scoping Phase is intended to identify the key issues and define the scope of the Environmental Impact Assessment (EIA). The detailed assessment of environmental risks, including the evaluation of impact significance and the development of mitigation measures, will be undertaken during the EIA phase through the appointed specialist studies and documented in the Draft EIA Report and Environmental Management Programme (EMPr).	
			2. Has a dedicated assessment of public and environmental health impacts been undertaken for this project, particularly considering the mining of uranium-bearing and heavy-metal-bearing ore?	The purpose of the Scoping phase is to identify potential environmental and socio-economic issues, determine the specialist studies required, and define the scope of the EIA. During the Scoping phase, it was identified that the geology of the Proposed Project area is a direct extension of the geological formations occurring within the Harmony Target Mine mining right area (Section 7.3	Section 7.3

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				of the DSR), which has already been subject to detailed radiological assessment and regulatory approval (2024 Free State Radiological Public Safety Assessment: System Description, undertaken by AquiSim Consulting (Pty) Ltd for Harmony Gold Mining Company Limited - Free State Operations). Harmony Gold Mining Company Limited, a joint venture partner in Jelani Resources Pty Ltd, already holds a Radiological Public Safety Assessment for its Free State operations, as well as a valid Certificate of Registration (CoR Regulation 10) issued by the National Nuclear Regulator (NNR) for its Target Mine operation located adjacent to the Proposed Project area. During the Environmental Impact Assessment (EIA) phase, the existing radiological assessment and regulatory approval will be integrated into the Draft EIA Report.	
			3. What baseline environmental data and Health data has been collected for Allanridge, surrounding farms, and affected communities before project commencement?	Desktop baseline assessments were conducted for the Proposed Project during the Scoping Phase. The baseline environmental conditions are presented in Section 7 of the Draft Scoping Report.	Section 7 Section 9

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				Specialist assessments will provide additional baseline information, as well as detailed findings, which will be incorporated during the Draft EIA Report.	
			4. How will potential impacts on community health arising from dust, blasting, noise, vibration, sewage infrastructure, contaminated water, and hazardous waste be assessed?	The dust, blasting, noise and vibration aspects, as well as the groundwater and surface water assessments related to contaminated water, have been identified for evaluation as part of the EIA process. Chapter 9 of the Draft Scoping Report details the Plan of Study for the EIA, with Table 9-2 outlining the terms of reference for the assessment. Findings from the specialist assessments will be included in the Draft EIA Report. The management of contaminated water and hazardous waste will be further detailed in the Integrated Water and Waste Management Plan (IWWMP). The Proposed Project will not impact sewage infrastructure. The development plan includes the utilisation of existing Shaft 2 and Shaft 3, located within the Harmony Mining Right area. All operational mining infrastructure required for the Proposed Project will be situated within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Only seismic monitoring stations will be developed within the project area (Section 1.7).	Section 1.7 Section 8 Section 9

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			5. How will cumulative impacts from the existing Harmony operations together with the Jelani JV project be evaluated and included?	The identification and assessment of cumulative impacts will be undertaken, during the detailed EIA phase. The impact identification and calculation methodology employed by all specialists incorporates cumulative impacts Section 8.3). The mitigation measures presented by the specialist will be integrated into the EMPr.	
			6. How will the Air Quality Impact Assessment specifically assess potential respiratory health impacts on nearby communities?	The air quality aspect has been identified for evaluation as part of the EIA process. Table 9-2 of the DSR outlines the terms of reference for the assessment, including those for the Air Quality Assessment.	Section 9.2
			7. Has the specialist assessment considered possible radioactive exposure risks associated with uranium-bearing material, including dust and groundwater contamination?	The existing radiological assessment and regulatory approval will be integrated into the Draft EIA Report. Air quality and groundwater aspects have also been identified for evaluation as part of the EIA process. Table 9-2 of the DSR outlines the terms of reference for the assessments, including those for the Air Quality Assessment as well as the Groundwater Assessment.	Section 9.1 Section 9.2
			8. How will the hydrogeological and hydrological studies assess risks to groundwater used by communities, farmers, and municipal purposes?	A Groundwater Impact Assessment will be conducted during the EIA phase and findings of the assessment will be included in the Draft EIA Report. Refer to Table 9-2 of the DSR outlines the terms of reference for the Groundwater Impact Assessments.	Section 1.7 Section 8.3 Section 9.1

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
					Section 9.2
			9. What mitigation measures are proposed to prevent contamination from: • dirty water dams, • sewage infrastructure, • waste rock dumps, and • the proposed Tailings Storage Facility?	The Proposed Project will not impact sewage infrastructure. The development plan includes the utilisation of existing Shaft 2 and Shaft 3, located within the Harmony Mining Right area. All operational mining infrastructure required for the Proposed Project will be situated within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Only seismic monitoring stations will be developed within the project area (Section 1.7). Due to the ongoing mining operations at Harmony Gold Target Mine and the presence of agricultural activities within the development footprint and its immediate surroundings, the assessment of cumulative impacts is of significant importance. The identification and assessment of cumulative impacts will be undertaken, and mitigation measures suggested during the detailed EIA level investigation. The impact identification and calculation methodology employed by all specialists incorporates cumulative impacts in a quantitative manner to determine the final impact score and corresponding rating (Section 8.3).	Section 1.7 Section 8.3

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				The proposed Tailings Storage Facility will be assessed in a separate environmental process.	
			10. How will the EIA assess the adequacy and compliance of the proposed sewerage plant from an environmental health perspective?	The Proposed Project does not include sewerage plant. See Chapter 1.7 of the DSR, for detail project description, including infrastructure requirement.	Section 1.7
			11. What emergency response measures are being proposed for incidents such as: • sewage spills, • hazardous substance releases, • dust exceedances, • tailings failures, and • contaminated water discharges?	Emergency preparedness and response measures will be identified during the EIA phase and included in the EMPr to guide the management of potential emergency situations.	Section 9.2
			12. How will environmental complaints from communities be recorded, investigated, and resolved during the construction and operational phases?	The process for recording, managing, and investigating complaints will be addressed during the EIA phase and included in the EMPr.	Section 9.2
			13. What monitoring systems are proposed for ongoing environmental surveillance during the life of the mine? These monitoring mechanism/systems must	Air quality, surface water, groundwater, and biodiversity assessments will be conducted to support the EIA	Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			also address continuous reporting for the duration of the project and the operational process thereafter. Some environmental monitoring only takes place during commencement of the project, but fail to establish mechanisms for continuous monitoring, communication and engagement with enforcement authorities like Municipal Health Services. This especially important where potential long-term impacts affects nearby communities and the environmental stability.	process. Part of the scope of the assessment is to develop an environmental surveillance monitoring program. This monitoring program will be incorporated into the Draft EIA Report.	
			14. Will environmental monitoring data relating to air quality, water quality, radiation, and waste management be shared with the municipality on a regular basis?	Environmental monitoring requirements, including the parameters to be monitored and reporting obligations, will be determined through the Environmental Authorisation (EA), where applicable, and any other relevant licences or permits issued for the Proposed Project. Where reporting to regulatory authorities or other stakeholders, including the municipality, is required, this will be undertaken in accordance with the applicable legislative and authorisation requirements.	-
			15. How frequently will environmental management / health compliance	Should the Competent Authority grant the Environmental Authorisation (EA), the required	-

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			audits be conducted, and will Municipal Health Services have access to these reports?	frequency of compliance audits will be stipulated as a condition of the EA.	
			16. How does the Public Participation Process ensure meaningful participation by vulnerable groups, farm dwellers, and communities with limited access to online platforms?	The Public Participation Process has been designed to promote meaningful participation by all Interested and Affected Parties (I&APs), including vulnerable groups, farm dwellers, and communities with limited access to online platforms. The relevant Ward Councillors are included in the stakeholder database and are notified of all key public participation activities, including the Open Day held on 30 May 2026. In addition, a hard copy of the Draft Scoping Report was made available for public review at the Allanridge Public Library to ensure access to project information for those without reliable internet access. During stakeholder engagements, participants can express whether the methods of communication and access to project information are suitable for their needs. Where barriers to participation are identified, reasonable alternative measures are considered to facilitate effective and meaningful participation.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			17. What measures have been implemented to ensure environmental information is communicated in a language and format understandable to affected communities?	The relevant Ward Councillors are engaged throughout the Public Participation Process to assist in disseminating project information to their respective communities. In addition, feedback received during stakeholder engagement activities, is used to assess whether the information and communication methods are accessible and understandable. Where necessary, reasonable measures are implemented to improve accessibility and facilitate meaningful participation.	Appendix C
			18. How were potentially affected schools, clinics, community facilities, and sensitive receptors identified during stakeholder mapping?	Potentially affected schools, clinics, community facilities, and other sensitive receptors were identified through a desktop assessment using available spatial information and aerial imagery (including Google Earth). The findings of the desktop assessment were subsequently verified during a site visit undertaken by the EAP to confirm the location of sensitive receptors within and adjacent to the Proposed Project area.	Section 7
			19. In the opinion of the EIA consultant, are the current specialist studies sufficient to assess all environmental health risks associated with deep-level underground mining activities over the proposed 14-year life of mine?	The specialist studies being undertaken for the EIA phase are considered appropriate to assess the potential environmental impacts and associated environmental risks identified for the Proposed Project, including those relevant to the proposed deep-level underground mining activities over the 14-year life of mine.	Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			20. How will mine closure and post-closure environmental health risks be addressed within the rehabilitation and closure planning process?	A Mine Closure Report will be undertaken in the EIA phase.	Section 1.9
			21. What provisions are proposed to ensure long-term protection of groundwater and public health after mine closure?	The Groundwater Impact Assessment and Mine Closure Report will be conducted in the EIA phase. Provision for long term protection will be discussed in the Draft EIA Report.	Section 9.2
			22. How will the consultant ensure alignment between the project's environmental management commitments and the constitutional obligation of municipalities to provide a safe and healthy environment?	The EIA process is being undertaken in accordance with the applicable environmental legislation, including the National Environmental Management Act (NEMA), and its environmental management principles. The specialist assessments will identify and evaluate potential environmental and socio-economic impacts, and appropriate mitigation measures will be incorporated into the EMPr to avoid, minimise, manage, or remedy identified impacts.	Section 1.10 Section 2 Section 9.2
			23. What coordination mechanisms are proposed between the mine, the municipality, the Department of Water and Sanitation, and environmental health authorities for ongoing compliance and incident management?	The Proposed Project will be implemented in accordance with the conditions of the Environmental Authorisation (EA) and any other applicable licences or permits. Jelani will continue to engage with the relevant regulatory authorities, including the municipality, the Department of Water and Sanitation, and other	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				competent authorities, in accordance with applicable legislative requirements and authorisation conditions to ensure ongoing compliance and the appropriate management and reporting of environmental incidents.	
			24. Has consideration been given to the possible strain this project may place on municipal environmental services and infrastructure, and if so, what mitigation measures are proposed?	At this stage, the Proposed Project is planned to utilise existing Harmony Target mining infrastructure, where feasible, thereby reducing the need for additional municipal services and infrastructure.	Section 1.7
			25. What specific environmental health and management performance indicators will be included in the EMPr for monitoring compliance throughout the project lifecycle?	The EMPr will include appropriate monitoring requirements, performance indicators, compliance measures, reporting requirements, and corrective actions relevant to the construction, operation, and closure phases of the Proposed Project.	Section 9.2
			26. Can the consultant confirm whether the Draft Scoping Report adequately addresses all environmental health risks associated with the proposed underground mining project, and provide reasons for this conclusion?	The purpose of the DSR is to identify the potential environmental and socio-economic issues, determine the scope of the assessment, and identify the specialist studies required for the EIA phase. The detailed assessment of environmental impacts associated with the proposed underground mining activities will be undertaken during the EIA phase through the appointed specialist studies. The findings of these assessments, together with recommended	Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				mitigation measures, will be presented in the Draft EIA Report and incorporated into the EMPr. Accordingly, the DSR is considered appropriate for its intended purpose in accordance with the applicable EIA Regulations.	

2.2 Matjhabeng Local Municipality (MLM)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Comments raised during the Online Meeting with the Matjhabeng Local Municipality for the draft Scoping Report, dated, Thursday, 28 May 2026.					
Mr Johannes Theunissen, Manager: Waste Department	Online Meeting (Microsoft Teams)	Thursday, 28 May 2026	Mr Theunissen raised queries regarding the specialist assessments for the Proposed Project, including whether dewatering and groundwater impact assessments had been undertaken and whether potential impacts on Nyakallong had been considered. He also enquired about assessments relating to acid mine drainage (AMD), waste management, alignment with municipal services, and potential impacts on water, wastewater, and waste infrastructure. In addition, he requested clarity on the status and availability of the Air Quality Assessment and whether further engagement	Ms Naicker responded by explaining that, during the Scoping phase, the project team identifies all potential impacts that may arise from the Proposed Project together with the relevant specialist studies required to assess such impacts in detail. The relevant specialist studies are conducted in the Environmental Impact Assessment (EIA) phase (see Chapter 9 of the Draft Scoping Report, for the plan of study for the Environmental Impacts Assessment). Ms Naicker advised the groundwater impact assessment, have already commenced, while additional studies such as the air quality assessment and surface water assessment, blasting and vibration, closure risk	Section 6 Section 9

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			would be held to discuss the findings. Lastly, he queried whether any assessment or modelling of potential ground subsidence associated with the proposed mining activities would be undertaken.	assessment which will address potential ground subsidence would also be undertaken. She noted that these studies would contribute toward assessing potential pollution risks and related environmental impacts. She further explained that detailed findings relating to groundwater impacts, waste management, pollution risks, air quality, and associated mitigation measures would be presented during the EIA phase. The Draft EIA Report would be circulated for a 30-day public review and comment period, during which stakeholders would have the opportunity to submit additional comments and engage further on the findings of the specialist studies.	
			Mr Theunissen recommended that the specialist studies give particular consideration to waste management, noting that the Allanridge landfill site is relatively small and has limited capacity, and therefore recommended that this aspect be carefully considered during the relevant impact assessments.	Ms Naicker will inform the specialist accordingly.	-
Mr Serake Leeuw, Special Advisor to the	Online Meeting (Microsoft Teams)	Thursday, 28 May 2026	Mr Leeuw stated that a number of his key concern had already been addressed through the comments raised by Mr Theunissen, particularly relating to integrated waste management. He noted the following for the Social Labour Plan:		

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Office of the Executive Mayor			Clarification regarding the applicable Social Development Framework (SDF) and enquired what provisions or guidance the framework contains in relation to the proposed development.	**Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: To address identified skills gaps among employees, Jelani will implement various training programmes relating to AET, core business, learnerships and portable skills. It is proposed that limited funding for these training programmes be allocated over the final three years of the SLP cycle. Within six months of the appointment of Project employees (in Year 5 of the SLP cycle), the HR Department is to recruit a skills development facilitator to prepare detailed training programmes and associated budgets.	Appendix C Social and Labour Plan
			Local Economic Development (LED) initiatives associated with the proposed project should be aligned and integrated with existing local development planning processes.	**Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: Kongiwe contacted Matjhabeng Local Municipality (MLM's) Executive Director of LED (Dr. Sefako Ramphoma) in January 2026 regarding Jelani's proposed funding for a LED project. Following consultation with	Appendix C Social and Labour Plan

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				the Ward Councillor of Ward 19, Dr. Ramphoma advised Kongiwe (on 4 February 2026) that a priority LED project was the refurbishment of Nyakallong Community Hall. Nyakallong is a major sending area for the Target mine. On 11 February, Dr Ramphoma presented the LED proposal to the Matjhabeng Local Municipality Executive Committee. On 19 March 2026, the MLM issued a letter of approval (signed by Dr Vuyo Adonis, Acting Municipal Manager) for Jelani to allocate funds to the refurbishment of Nyakallong Community Hall. Funds would be distributed over three years, from Year 3 to Year 5 of the SLP cycle.	
			Noted that mining projects typically allocate a percentage of investment toward social development initiatives. He enquired whether the project proponents are considering the establishment of a community trust for the duration of the proposed project, which was indicated to be approximately 14 years.	**Post Meeting Note** Clarification was sought from the relevant specialist, note the response below: No employees will be appointed for the Project for the first four years of this SLP cycle. As the Mine Work Programme for the initial SLP cycle (Years 1 to 5) will be dedicated to feasibility/ engineering studies and implementation/ construction activities, the mandatory SLP Future Forum will be established at the commencement of Year 5. The Future Forum will comprise representatives from Jelani management,	Appendix C Social and Labour Plan

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				employees and contractors – and will act as a committee that addresses labour issues, worker rights, and strategies for job preservation or retrenchment.	
			Nyakallong Community Hall refurbishment mentioned during the presentation and enquired whether there are additional associated projects planned which stakeholders should be aware of.	As no revenue will be generated for the first SLP cycle (SLP-1), financial provisions for LED initiatives are limited for this cycle. Other LED initiatives will be considered only in the next SLP cycle (SLP-2).	Appendix C Social and Labour Plan
			Raised concerns relating to the Voëlpan, noting that it is currently creating challenges within the area. He enquired whether the proposed project has considered any measures or assistance in this regard.	Voëlpan is located approximately 2.6 km east of the Proposed Project within Harmony Target's Mining Right area. Where relevant and appropriate, potential cumulative impacts associated with Voëlpan will be considered as part of the EIA phase.	Section 8.3
Mr Lunga Ncapai, Solid Waste Manager	Online Meeting (Microsoft Teams)	Thursday, 28 May 2026	Mr Ncapai stated that a number of his questions had already been addressed through the comments raised for the SLP by previous speakers but wanted to raise the following points:		
			Mr Ncapai highlighted concerns regarding the high unemployment rate within the Matjhabeng area. Emphasised the need for local SMME (Small, Medium and Micro Enterprise) participation and inclusion in the Proposed Project.	The LED Project Plan specifies that, wherever possible, suitably qualified and skilled local contractors will be sourced. Contractor teams comprising women and youth will also be considered favourably.	Appendix C Social and Labour Plan
			Enquired about the proposed rehabilitation and closure plans following the anticipated 14-year life of mine. Requested information on the guarantees and measures that will be	A Closure and Rehabilitation Plan will be compiled during the EIA phase and included in the Draft EIA Report.	Section 1.9

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			implemented to ensure successful rehabilitation and restoration of affected land.		
			Highlighted the importance of assessing potential community health impacts associated with the Proposed Project. Requested that potential health risks to surrounding communities be considered as part of the environmental assessment process.	The Air Quality Impact Assessment will be conducted in the EIA phase. The specialist study will assess anticipated air quality impacts and develop mitigation and management measures for the identified potential impacts. This will include the implementation of an air quality monitoring programme.	Section 9.2
			Requested clarity on the percentage of employment opportunities that would be allocated to local community members.	Ms Naicker advised that she would need to consult with the relevant specialist before providing a response to the matter raised. **<u>Post Meeting Note</u>** Clarification was sought from the relevant specialist, note the response below: No employees will be appointed for the Project for the first four years of this SLP cycle. As the Mine Work Programme for this entire SLP cycle (Years 1 to 5) will be dedicated to feasibility/ engineering studies and implementation/ construction activities, it is likely that all 39 employees – to be appointed in Year 5 of the SLP cycle - will have professional qualifications. Suitably	Appendix C Social and Labour Plan

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<table>
<tr><th>Stakeholder</th><th>Consultation Method</th><th>Date of Comments Received</th><th>Issues Raised</th><th>Response to issues raised</th><th>Section Reference in the Report</th></tr>
<tr><td></td><td></td><td></td><td></td><td>qualified candidates will be selected at the discretion of Jelani through a formal interview process.

In Year 5, 506 contactors will be sourced from the Harmony Target Operation (as shown in Table 1 below). If Target cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area.

The Target SLP will apply to employees contracted from the Harmony Target Operation. Employees on the Harmony payroll are ineligible in terms of contributions from the Jelani SLP.

Table 1: Number of Employees on the Harmony Payroll, by Job Grading

<table>
<tr><th>Job Grade</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Total</th></tr>
<tr><td>Executive Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3</td><td>3</td></tr>
<tr><td>Senior Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23</td><td>23</td></tr>
<tr><td>Professionally qualified and experienced specialists and mid-management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>99</td><td>99</td></tr>
<tr><td>Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>159</td><td>159</td></tr>
<tr><td>Semi-skilled and discretionary decision making.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>222</td><td>222</td></tr>
<tr><td>Non-permanent employees.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>506</td><td>506</td></tr>
</table>
</td><td></td></tr>
</table>

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Suggested that social responsibility initiatives should consider additional community infrastructure and services, including schools, clinics, and support for the Allanridge landfill site, which has limited capacity.	The proposed initiatives will be considered for inclusion in future SLP activities, where feasible. Selection of LED programmes are subject to alignment with the Matjhabeng Local Municipality's Integrated Development Plan (IDP) (2024/2025) in conjunction with recommendations made by the Matjhabeng Local Municipality's Executive Director of LED. As the Matjhabeng Local Municipality has been placed under provincial administration due to a total breakdown of service delivery, the municipality in no position to contribute funds to the establishment and maintenance of public services at this stage. In light of the chronic lack of capacity by Matjhabeng Local Municipality to provide funds to support Jelani in LED projects, investment in the Nyakallong Community Hall for this initial SLP cycle – which requires minimal maintenance while providing long term functions for the community - is the preferred option for both the Matjhabeng Local Municipality and Jelani.	Appendix C Social and Labour Plan
Ms Umeshree Naicker, Principal Environmental Consultant, Kongiwe	Online Meeting (Microsoft Teams)	Thursday, 28 May 2026	Ms Naicker concluded the meeting by advising attendees that additional comments may still be submitted to the Kongiwe project team. Ms Naicker noted that comments requiring specialist input would be referred to the relevant specialists for review and response, and that adequate time would be needed to consider and address such submissions. She thanked attendees and indicated that the project team looks forward to receiving any additional feedback.		Appendix C

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2.3 National Transmission Company South Africa (NTCSA)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Mr Khululwa Matshoba, Senior Environmental Advisor	Email Correspondence	Friday, 22 May 2026	Kindly share the kmz file Thank you. Warm regards	Dear Mr Matshoba, Thank you for your email. Please find the KMZ file attached for your perusal. Kind Regards	Appendix C

2.4 Department of Forestry, Fisheries and the Environment (DFFE)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Ms Khuliso Khomari, Directorate: Biodiversity Conservation	Email Correspondence	Wednesday, 17 June 2026	Dear Sir/Madam RE: Department of Forestry Fisheries and the Environment Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation on the 25th of May 2026 for review and comment on the project mentioned in the subject line.	Ms Khuliso Khomari Thank you for your email and for confirming that the Proposed Project has been allocated to Ms P Makitla and Mr M Nsizwane. Thank you also for clarifying that all Public Participation Process documentation relating to the Biodiversity EIA review, as well as any biodiversity-related queries,	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Kindly note that the project has been allocated to Ms P Makitla and Mr Mthokozese Nsizwane (Copied in this email). Note, all Public Participation Process documents related to Biodiversity EIA review and Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation by email: BCAdmin@dffe.gov.za for attention of Mr Seoka Lekota. Regards, Ms Khuliso Khomari	should be submitted to the Directorate: Biodiversity Conservation via BCAdmin@dffe.gov.za for the attention of Mr Seoka Lekota. The Proposed Project stakeholder database has been updated to reflect the relevant contact details. We will ensure that all applicable documentation and future correspondence are submitted accordingly.	
Ms Khuliso Khomari, Directorate: Biodiversity Conservation	Email Correspondence	Monday, 13 July 2026	Dear Sir/Madam RE: Department of Forestry Fisheries and the Environment Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation on the 1st of July 2026 for review and comment on the project mentioned in the subject line.	Good day, Thank you for confirming the allocation of the project. The Directorate: Biodiversity Conservation's email address is included in the stakeholder database, and all relevant Public Participation Process (PPP) documentation, including the EIA Report for review, will continue to be shared with the Directorate throughout the process. Please do not hesitate to contact us if you have any further queries.	Appendix C

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Kindly note that the project has been allocated to Ms P Makitla and Mr Mthokozese Nsizwane (Copied in this email). Note, all Public Participation Process documents related to Biodiversity EIA review and Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation by email: BCAdmin@dffe.gov.za for attention of Mr Seoka Lekota. Regards, Ms Khuliso Khomari		
Ms Khuliso Khomari, Directorate: Biodiversity Conservation	Email Correspondence	Wednesday, 05 August 2026	Dear Sir / Madam Please find the attached comments from the Directorate: Biodiversity Conservation. Regards Mthokozese	Dear Mthokozese We refer to your email received Wednesday, 05 August 2026, sent by e-mail to Kongiwe Environmental on the Jelani Joint Venture (JV) Area Underground Mining Project, Free State Province. Please find the attached responses to the comments you have raised.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				All comments raised by yourself will be included in the Comment and Response Report (CRR). Please do not hesitate to contact us if you have any further queries.	
			Comments received from the Directorate: Biodiversity Conservation dated Wednesday, 05 August 2026 as per email above		
			The following aspects must, however, be duly considered: All specialist assessments must be conducted in accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, as amended.	Specialist assessments will be undertaken in accordance with the applicable legislative requirements, including the prescribed protocols and minimum reporting requirements for environmental themes in terms of the National Environmental Management Act, 1998, as amended. The Draft Environmental Impact Assessment (EIA) Report and Environmental Management Programme (EMPr) will integrate the findings of the specialist assessments and the mitigation measures.	Section 7 Section 8 Appendix E
			The specialist assessments must comply with the applicable assessment protocols, including, but not limited to, those relating to terrestrial biodiversity (flora and fauna). The Environmental Impact Assessment Report must clearly demonstrate compliance with the relevant protocols and provide justification where any protocol requirements are not applicable.		

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			To ensure the continued persistence of ecosystems and that national conservation targets are achieved, it is essential that impacts on sensitive and highly localised habitats are minimized or avoided altogether as per the mitigation hierarchy requirements.		
			The Public Participation Process documents related to Biodiversity EIA for review and queries should be submitted to the Directorate: Biodiversity Conservation at Email; BCAdmin@dffe.gov.za for the attention of Mr. Seoka Lekota.	All Biodiversity EIA-related reports and correspondence will be submitted to the Directorate: Biodiversity Conservation at the prescribed email address for the attention of the designated official.	

2.5 South African National Roads Agency SOC Ltd. (SANRAL)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Ms Ntsebo Mkhize, Environmental Coordinator	Email Correspondence	Wednesday, 1 July 2026	Good day Kongiwe Stakeholder Engagement and Jean- Mari Please share the KMZ file of the 'Jelani Resources Boundary' as presented in the Locality Map on page 32/308 of the DSR	Dear Ms Ntsebo Mkhize Thank you for your email. Attached please find the KMZ file for the Jelani Resources boundary for your perusal. Please contact us if you have any further queries.	-

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3 Interested and Affected Parties

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Comments raised during the Indirectly Affected Landowners Meeting for the draft Scoping Report, dated, Monday, 15 December 2025.					
Mr Tertius De Jager, Indirectly Affected Landowner	Online Meeting (Microsoft Teams)	Monday, 15 December 2025	Mr De Jager thanked (Mr Macevele) for his presentation. He stated that he did not understand why this was being presented as a new project, as he was under the impression that Harmony had owned the land for approximately 20 years and that exploration had already been conducted to depths of about 3,000 metres. The tunnels must be present throughout the area.	Mr Macevele explained that the blue area indicated on the map presented is the proposed project site. He clarified that the land does not belong to Harmony and that WRE has only acquired prospecting rights to search for minerals in the area.	Section 1.5 Appendix C
			Mr De Jager requested that Mr Macevele indicate the location of the existing operational underground tunnels. He noted that, to his knowledge, the underground tunnels are significantly wider than had been explained.	Mr Macevele indicated that they do not have drawings of the underground tunnels and only have information relating to the surface area. He further noted that the existing operational area is Target, which is currently operational. Ms Umeshree Naicker (Ms Naicker) added that the details relating to the underground activities, design, shaft usage, and the condition of the underground facilities are still under consultation. The appointed consultants are in the process of finalising the designs. She further acknowledged that Kongiwe understands the information Mr De Jager is requesting and	Appendix C

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				confirmed that Kongiwe also requires the same information. The information will be shared with all relevant parties once it has been received.	
			Mr De Jager stated that, from a farming perspective, their primary concern relates to the potential impact of the proposed mining operation on their existing water supply. He noted that an irrigation stream runs along the outer boundary of the property and is used for crop production and pecan trees. He asked what would happen to the water supply should the mining operation proceed as indicated.	Ms Naicker informed the meeting that, as part of the process, several specialist studies have been identified and will be undertaken. These include a groundwater assessment, which incorporates a hydro census component. Information will be obtained from existing boreholes and will form part of the groundwater impact assessment. She added that additional specialist studies such as surface water assessment, biodiversity assessment and others will also be conducted and that more detailed information will be available at a later stage once the studies have progressed. Ms Vanessa Viljoen (Ms Viljoen) informed Mr De Jager that the project is still in its initial stages and that a Scoping Report and an Environmental Impact Assessment (EIA) Report will be made available at a later stage. She explained that the purpose of the current meeting was to inform stakeholders of what is planned for the proposed project and to request permission/access for specialists to conduct their studies on the identified properties, she further added that detailed responses would be provided once	Section 9.1 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				additional information is received from the specialist studies.	
			Mr De Jager enquired about the scope of the specialists' work in relation to the boreholes, specifically what information they require and what activities will be undertaken.	Ms Naicker explained that a letter had been sent to all landowners outlining the scope of the specialist's site activities. She indicated that these activities include the identification and recording of the location of borehole(s), documenting their usage, measuring water levels within the borehole(s), and taking a preliminary water quality sample, should landowner agree.	Section 1.5 Appendix C
			Mr De Jager asked how the groundwater specialist would take water samples if a pump were already installed. He further indicated that, for the specialist to conduct a proper study, they would need assistance from the farmer (landowner), noting that the specialist should visit the site when the landowner is available.	Ms Naicker responded by stating that Kongiwe would engage with the specialist regarding the method for taking the samples, and that the specialist could provide a procedure to address this specific request. Ms Viljoen acknowledged the comment and indicated that she would request Jean, the Hydro Senses specialist, to contact the stakeholders directly to explain the scope of his work in more detail and what is required from the study. **Post note:** Jean contacted Mr De Jager to inform him that site access has been arranged for 12 January 2026. He also provided further details regarding the study he intends to conduct.	Appendix C

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Mr Johan De Jager, Indirectly Affected Landowner	Online Meeting (Microsoft Teams)	Monday, 15 December 2025	Mr De Jager expressed concern that not all relevant information had been presented and that the meeting seemed rushed, appearing to prioritise the commencement of the specialist study. He stated that he felt more preparation was needed from Kongiwe to adequately address questions regarding the scope and objectives of the study.	Ms Viljoen acknowledged the comment and explained that the project is still in its initial phase of the Scoping and Environmental Impact Assessment process. She further clarified that the purpose of the meeting was to provide an overview of the proposed Project, to provide an opportunity to raise initial comments and to inform landowners about the planned upcoming activities for the proposed project and to request permission or access for specialists to conduct their studies on the identified properties.	Appendix C
Mr Frans de Jager, Indirectly Affected Landowner, Grootspruit Family Trust	Email Correspondence	Tuesday, 19 May 2026	Good day, Attached please find the signed document as well as our formal feedback. Kind regards Frans de Jager	Dear Frans de Jager and Tertius de Jager, Kongiwe acknowledge receipt of your email and wish to confirm that your comments have been received.	Appendix C
			Comments received via email from Mr Frans de Jager dated, Tuesday, 19 May 2026 as per the email correspondence above.		
			We, Frans de Jager and Tertius de Jager, acting as Co-Trustees of the Grootspruit Familie Trust, hereby submit our formal comments regarding the Jelani Joint Venture (JV) Underground Mining Project.	Kongiwe acknowledge receipt of your email and wish to confirm that your comments have been received.	Appendix C
			The Trust is the owner of Farm Zuurbron, which falls within the broader hydrogeological influence area of the proposed underground mining	A Groundwater Impact Assessment will be available during the EIA phase of the Proposed Project.	Section 9.2

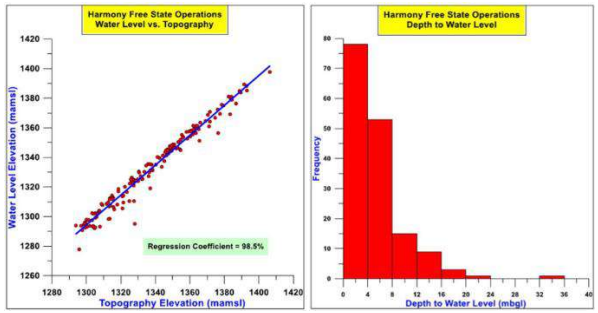
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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			activities. Our primary concern relates to the potential impact of deep-level mining on groundwater resources and the aquifer system that supplies Zuurbron.		
			1. Aquifer Sensitivity and Dependence Zuurbron relies entirely on a fractured-rock aquifer system for: • Livestock watering • Irrigation • Domestic use The aquifer is known to be sensitive to: • Groundwater drawdown • Changes in flow direction • Contamination migration through geological fractures	The Groundwater Impact Assessment will address concerns related to groundwater drawdown, changes in flow direction and the potential migration of contaminants through geological fractures.	Section 9.2
			2. Dewatering and Water Level Impacts Mining at depths of 1500–2600 m may cause significant lowering of groundwater levels. We request that the EIA/IWULA clearly quantify: • The predicted radius of influence	**<u>Response from Groundwater Specialist</u>** The quantifications are assumed to be requested for the aquifer from which landowner borehole sources tap groundwater, as this is the main concern for the owners of Zuurbron farm.	Section 9.2

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			• Expected drawdown in metres • The risk to existing boreholes on Zuurbron • Mitigation and compensation measures for affected landowners	The farms in close vicinity of the proposed and existing mining sites are underlain by the shallow Karoo aquifer, which is the main source of groundwater for individual landowner borehole sources. For the three boreholes at the Zuurbron Farm it was established that one borehole is 18 m deep and another one approximately 30 m; no depth could be derived from the third borehole. This suggests that these boreholes are indeed abstracting from the Karoo aquifer. A groundwater level was obtained from one of the boreholes and measured to be 5.6 below ground level (mbgl), illustrating groundwater levels at Zuurbron are not substantially impacted upon by exiting mining dewatering activities. Evidence from existing hydrogeological reports (AquiSim, 2025) indicates that the shallow Karoo aquifer is not hydraulically connected to the deep Witwatersrand mine workings (See Figure 1 below). This has been shown by groundwater level data for shallow boreholes in the entire Harmony mining area which vary between 0 and 33 mbgl, show an average depth to groundwater of 5.3 mbgl and are mostly between 0-4 mbgl. For the area close to the proposed Jelani mine activities in specific, groundwater levels measured in	

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				hydrocensus boreholes in December 2025 were observed to be between 0.6 and 5.3 mbgl. Where boreholes were pumped while visiting, deeper groundwater levels of 12.5 and 44.9 mbgl were observed, indicating drawdown effects due to the active borehole abstraction. This shows natural groundwater levels in the shallow Karoo aquifer are close to surface with no indication of any impacts by mine activities, and as such no regional radius of influence or drawdown effects have been observed in the shallow Karoo aquifer despite decades of mining at Target 2 and 3. Currently no evidence exists that mining has reduced regional shallow groundwater availability or has had a significant impact on shallow groundwater levels. 	

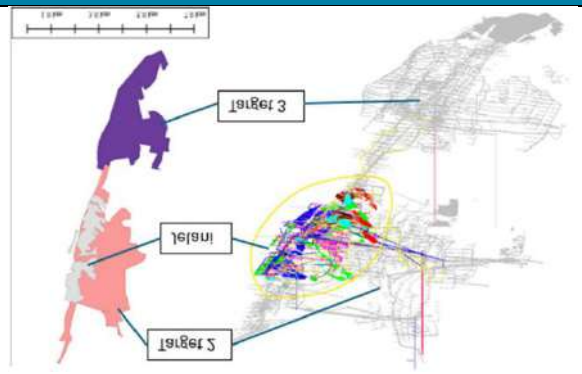
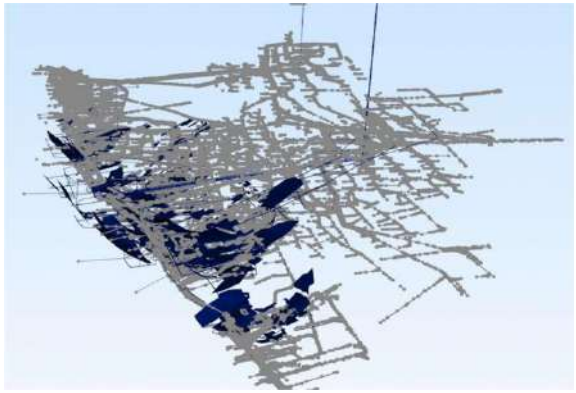
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				Figure 1: Groundwater Level Correlation with Topography and Depth to groundwater Level Existing mining at Target 2 dips to the west with a maximum mining depth of ~2 556 m below reference level. Mining at the Jelani project extends to a maximum depth of ~2 694 m below reference level (Figure 2, Figure 3 and Figure 4). The Target 3 mine to the south extends across an area of approximately 8 km2, with the Target 2 mine extending across an area of approximately 11 km2. In comparison, the Jelani project in covers only about 2.8 km2 with the vast majority aligning with the current Target 2 extent and as such represents a small, incremental extension within an existing mining footprint. Jelani extends only ~140 m deeper than existing Target 2 workings and is situated within an already dewatered deep mine environment. As there will be no new infrastructure built to connect to the surface as existing shafts will be used for access, groundwater inflows into the Jelani mine are expected to be controlled by surrounding fractures and existing	

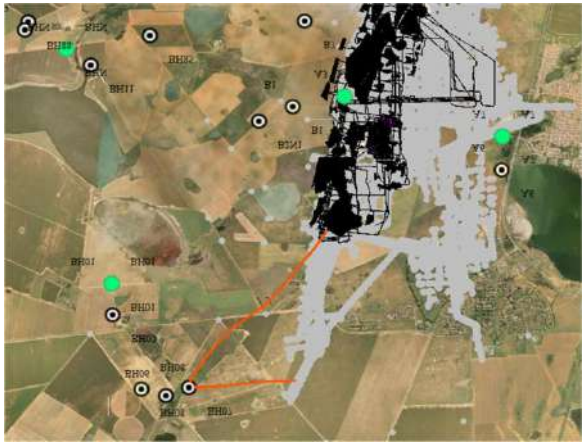
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				Target 2 mine voids rather than any new regional aquifer capture. As the existing mining operations over an extensive area have not caused widespread shallow groundwater depletion, and Jelani is a comparatively small extension within an already operational mining area, substantial risks to existing boreholes at Zuurbron or other nearby farms are not expected. Continued groundwater monitoring, mine closure mitigations, groundwater management measures and compensation in case it is proven that the mine is impacting on shallow groundwater sources will be included in the specialist report.	

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				 Figure 2: Jelani JV Mine Plan Compared to Existing Harmony Target 2 and 3 Mines. 	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				Figure 3: Jelani JV Mine Plan Compared to Existing Harmony Target 2 Mine, Showing Partial Overlap Between Existing Mining (Grey) and Proposed Mining (Blue).  Figure 4: Jelani JV Proposed Mine Extent (Black) in Comparison to Existing Target 2 Mine Extent (Grey), Showing a Significantly Smaller Extent and Larger Distance to Zuurbron Farm. Findings of the Groundwater Impact Assessment will be incorporated into the Draft Environmental Impact Assessment (EIA) Report and the Integrated Water and	

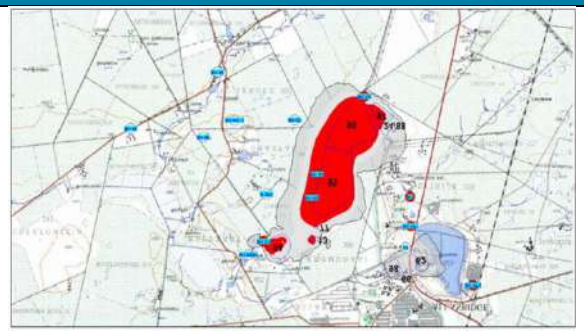
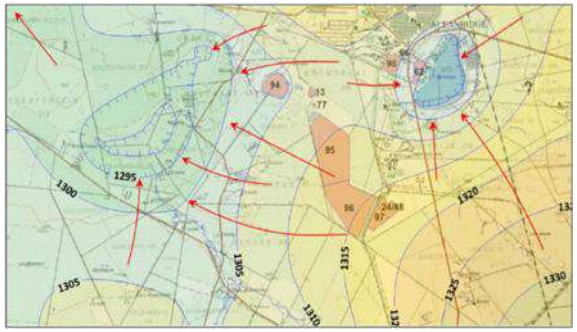
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				Waste Management Plan (IWWMP) for Integrated Water Use Licence Application (IWULA).	
			3. Groundwater Quality and Contamination Risk Given the fractured geology, contaminants can migrate rapidly. We request: • A detailed hydrogeological model that includes Zuurbron and neighbouring farms • Assessment of potential migration pathways for mine-affected water • Monitoring for heavy metals, sulphides, and radioactive elements (including uranium)	**<u>Response from Groundwater Specialist</u>** A detailed hydrogeological model that includes groundwater pathways and contaminant plume migration for the area including Zuurbron Farm and neighbouring farms was completed by AquiSim . In this study, the main sources of contamination in terms of size and contamination were determined to be the Target No. 1 and 2 Tailings Storage Facilities (TSFs), the Target 2 TSF Evaporation Dam and the Swart Pan (Figure 5). The study uses sulphate, which is present in appreciable quantities in gold tailings, as a conservative tracer to illustrate the release and dispersion of waterborne contaminants to the groundwater. The Proposed Project will utilise the existing surface infrastructure with no additional or new infrastructure proposed, and therefore no changes in sources are expected. The images below (Figure 5 and Figure 6) show: 1. that the extent of the simulated sulphate plume does not extend to the Zuurbron Farm, as well as the groundwater flow directions	Section 9.2

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				showing a general westerly flow direction, and as such not towards the Zuurbron Farm boreholes. 2. existing contaminant plume modelling reportedly indicates only limited migration from current Waste Rock Dumps (WRDs) and TSFs. No major new pollution source infrastructure is proposed for the Proposed Project. Jelani will use existing mining infrastructure and is not expected to materially increase seepage source areas. 3. in term of potential contamination through underground mine voids, existing studies conclude that post-closure water levels are expected to remain several hundred metres below the Karoo aquifer and surface, making potential migration of deep mine water into the shallow aquifer system unlikely.	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				 Figure 5: Simulated Contaminant Migration from Existing Mine Infrastructure.  Figure 6: Simulated Groundwater Contours (Karoo Aquifer) Indicating Main groundwater Flow Directions.	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				Monitoring for heavy metals, sulphides, and radioactive elements (including uranium) will be included during the EIA process. The findings of the Groundwater Impact Assessment will be incorporated into the Environmental Impact Assessment (EIA) report and the Integrated Water and Waste Management Plan (IWWMP).	
			4. Inclusion of Zuurbron in Baseline and Ongoing Monitoring We request that all Zuurbron boreholes be included in: • Baseline water-level measurements • Chemical and bacteriological water-quality testing • Long-term monitoring We will provide access for sampling.	This request is currently under deliberation and will be considered, where appropriate, as part of the Groundwater Impact Assessment. Kongiwe will engage with you further in due course regarding the outcome of this consideration.	-
			5. Accountability and Reporting The final EIA/IWULA should specify:	The Groundwater Impact Assessment will address accountability and reporting requirements. The findings of the assessment will be incorporated into the EIA report and the IWWMP, outlining remediation and compensation measures if impact is proven and should	Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			• Who is responsible for remediation or compensation if boreholes dry up or become contaminated • The frequency of monitoring • How monitoring results will be communicated to affected landowners and the Trust	it be determined that the project may result in the drying up of boreholes in the surrounding area. The Draft EIA Report, EMPr, and IWWMP will include a monitoring programme and specify how monitoring reports will be communicated to affected landowners.	
			6. Request for a Technical Groundwater Session We request a dedicated technical meeting with landowners and specialists to address groundwater risks, modelling assumptions, and mitigation strategies.	An engagement between the Groundwater specialist will be arranged during the EIA phase.	-
			7. Protection of Trust Property Rights As the lawful owners of Zuurbron, the Grootspruit Familie Trust requires confirmation that: • No mining-related activities, servitudes, infrastructure, or access routes will be placed on Zuurbron without prior written consent from the Trustees	All mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, with short gravel access tracks provided for each	Section 1.7

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			• Any future amendments to the groundwater model or impact predictions will be communicated to the Trust • The Trust will be consulted as an Interested and Affected Party throughout the project lifecycle	station. These installations represent the only surface infrastructures on the JV project area (see Chapter 1.7 of the Final Scoping Report). Any future amendments to the groundwater model or impact predictions will be communicated and subject to ongoing consultation between the Applicant and Interested and Affected Party as well as stakeholder throughout the project lifecycle. These will be included as considerations in the EIA Report and incorporated as conditions of the Environmental Authorisation (EA), should it be granted.	
			8. Need for Independent Professional Input on Underground Aquifer Impacts Given the depth and scale of the proposed underground workings, we request that the EIA/IWULA include independent specialist review by a professional hydrogeologist with proven experience in deep-level mining environments. This review must specifically address: • The vulnerability of the deep fractured aquifer system underlying Zuurbron • Potential long-term impacts on recharge, transmissivity, and fracture connectivity	The groundwater specialist appointed for the Proposed Project is an independent specialist with extensive experience and the necessary professional expertise to undertake the assessment in accordance with applicable legislative and technical requirements. An independent peer review will not be undertaken, as the assessment is being completed by an independent, suitably qualified and experienced hydrogeological specialist.	-

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			• The likelihood of irreversible aquifer dewatering • The risk of cross-aquifer contamination or hydraulic short-circuiting caused by mining voids • Expert recommendations for protection, monitoring, and mitigation		
			The Trust requires assurance that aquifer-related risks have been evaluated using best-practice hydrogeological methods, peer-reviewed modelling, and independent professional oversight.	The Groundwater Impact Assessment will present the aquifer related risks. The groundwater specialist appointed for the Proposed Project is an independent specialist with extensive experience and the necessary professional expertise to undertake the assessment in accordance with applicable legislative and technical requirements. An independent peer review will not be undertaken, as the assessment is being completed by an independent, suitably qualified and experienced hydrogeological specialist.	Section 9.2
Comments raised during the Broader Stakeholder Meeting for the draft Scoping Report, dated, Wednesday, 27 May 2026.					
Mr Frans De Jager, Indirectly Affected Landowner	Online Meeting Microsoft Teams)	Wednesday, 27 May 2026	Mr De Jager stated that written comments had already been submitted to Kongiwe. He further enquired whether Ms Naicker had received the document that had been sent through.	Ms Naicker acknowledged receipt of the comments from the Grootspruit Familie Trust. She noted that the comments were of a highly technical nature and had therefore been shared with the appointed groundwater specialist for review and input.	

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				Ms Naicker further advised that the groundwater specialist is currently in the process of preparing a response. Once the specialist's feedback has been received, further engagement would be undertaken with Mr De Jager. ***Post-meeting note:*** The response on the written comments that was sent to Kongiwe was emailed to the stakeholders on Monday, 29 June 2026.	
			Mr De Jager stated that he did not want the consultation process to be treated merely as an administrative exercise to indicate that engagement had taken place with landowners. He noted that his primary concern relates to the potential impact of the proposed mining activities on his borehole water source and water quality, as well as what actions would need to be taken should the project impact his borehole water. He further raised concern regarding the depth of the proposed mining activities and the potential implications this may have on groundwater resources, including the possibility of lowering the water table or affecting aquifer systems. He	Ms Naicker explained that the appointed groundwater specialist would be required to assess these aspects in detail as part of the specialist assessment being undertaken for the Proposed Project. She advised that the findings of the groundwater assessment would provide responses to the concerns and questions raised by Mr De Jager regarding potential impacts on groundwater resources and water quality. Ms Naicker further explained that the project is currently in the scoping phase, during which potential impacts associated with the proposed project are identified together with comments and concerns raised by interested and affected parties. She noted that the subsequent phase of the process would involve detailed	Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			queried what measures or actions would be implemented should adverse impacts on water resources occur. Mr De Jager emphasised the need for direct engagement with a qualified hydrologist or groundwater specialist with experience in underground mining projects, who could explain the location of aquifers, the depth of boreholes, and the potential implications of the proposed mining activities on surrounding groundwater resources. He further indicated that affected farmers would like to be shown the exact location of the proposed mining areas in relation to their water sources in order to better understand whether any impacts may occur. Mr De Jager concluded by reiterating that the availability and quality of water resources are of critical importance to farming operations and that this remains the primary concern of the affected landowners and further indicated that he would appreciate it if the submission from the Grootspruit Familie Trust could be shared with other affected landowners.	impact assessments relating to each identified potential impact, including a dedicated groundwater impact assessment. Ms Naicker confirmed that, once the groundwater assessment has been completed, further engagement would be undertaken with affected stakeholders. She further advised that the request for engagement with the groundwater specialist had been noted and that arrangements would be made for a session during which the findings of the groundwater assessment would be presented and discussed with the affected farmers and landowners.	

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			Mr De Jager stated that he had additional comments which had not been included in his previously submitted document. He noted that these comments relate to the proposed power supply requirements for the project. He estimated that a mine of the proposed scale would likely require a power supply capacity of approximately 20 Megavolt-Amperes (MVA). He therefore enquired whether new Eskom powerlines would be constructed to service the proposed mining operations and requested clarity regarding the proposed routing of such infrastructure. Mr De Jager further queried how the proposed powerline infrastructure may affect his property and surrounding farming properties. He noted that understanding the location and extent of the associated infrastructure is important in order for affected landowners to gain a clearer understanding of the overall project layout and its potential impacts. He reiterated that this remains an additional concern for affected farmers and landowners. Mr De Jager further noted that, prior to his retirement, he had served as a Planning Manager	Ms Naicker responded that a more detailed response regarding the power supply would be provided. However, at this stage, based on the Propose Project's infrastructure requirements, the intention is to utilise existing infrastructure that can be shared with the existing mine operations. **Post meeting Note:** Both Target No. 3 and Target No. 2 shafts have existing Eskom bulk supplies providing power for the care and maintenance operations. The 3 Shaft main substation has sufficient installed capacity in order supply the power requirements for the phase 1 mining operation. The 2 Shaft main substation will require a complete upgrade. Target No 3 Shaft Bulk Supply The No. 3 shaft substation is supplied at 6.6kV from the Eskom bulk supply 44/6.6kV substation, which includes the following 44/6.6kV transformers: • 2 x 10MVA transformers • 2 x 5 MVA transformers	Section 1.8

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			at Eskom and therefore had experience relating to electricity supply requirements. Based on his experience, he advised that a mine of the proposed scale would likely require approximately two 20 MVA power supplies and expressed the view that there may currently be insufficient electricity supply capacity available for the project. Mr De Jager stated that, in his opinion, additional 132 kV or 88 kV powerlines may need to be constructed to supply electricity to the proposed mining operations. He requested that these potential infrastructure requirements and associated impacts be taken into consideration as part of the project assessment process.	• 4 x 3.1 MVA transformers No. 3 shaft will supply the complete power requirements for the phase 1 mining, which includes the first two years of production. During this initial period the repair and upgrading of No. 2 shaft facilities will occur, following which the mining operation will be supplied from No. 2 shaft. The calculated peak demand for No. 3 shaft is as follows: • Phase 1 – 12.5 MVA • Phase 2 – 1 MVA (Only JV project load) The existing No. 2 shaft substation is supplied at 6.6kV from the Eskom bulk supply 44/6.6kV substation and consists of the following 44/6.6kV transformers: • 1 x 5 MVA transformers • 2 x 3.1 MVA transformers The No. 2 shaft substation will require complete upgrade of both the Eskom and mine substations in order to supply the additional load of the Jelani JV project.	

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Mr Willem Taljaard, Directly Affected Landowner	Online Meeting Microsoft Teams)	Wednesday, 27 May 2026	Mr Taljaard referred to the land tenure map presented during the meeting and stated that his family owns the farms Swartpan, Diamant Graspan and the majority of Welvaart. Mr Taljaard sought clarification regarding the proposed mining operations and indicated that, based on his understanding of the presentation, Target 2 and Target 3 Shaft would be utilised for the proposed mining activities together with the associated Harmony Target slimes dam. He queried whether his understanding of the Proposed Project infrastructure and operations was correct.	Ms Naicker responded that the proposed project intends to utilise existing infrastructure associated with Harmony Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Information regarding the new TSF will be provided in the EIA phase.	Section 1.7
			Mr Taljaard stated that the farms previously referenced are directly adjacent to the existing Harmony Target slimes dam. He further noted, in his capacity as a landowner operating adjacent to mining activities, that he has experienced ongoing operational and environmental concerns associated with the existing operations. He reported that he has previously raised complaints with the mine regarding contaminated water, which he described as cyanide-impacted water, reportedly discharging from the slimes dam area onto his agricultural land. He further expressed	Ms Naicker explained that, in terms of the impact assessment process, the next phase of the study, which is the Environmental Impact Assessment (EIA) phase would provide a more detailed evaluation of potential impacts, including those relating to underground water resources and potential pollution impacts. She reiterated that these aspects would be assessed in greater detail as part of the specialist studies to be undertaken.	Section 9.1 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			concern regarding the adequacy and reliability of maintenance responses to such incidents, stating that delays in pump repairs have occurred. With regards to potential pollution impacts on boreholes, Mr Taljaard commented that their galvanised pipes corrode rapidly. He stated that, as a result, the water is not suitable for human or animal consumption. He further noted that overflow from Harmony Target evaporation and return water dams, located within the Jelani project site, has occurred during periods of heavy rainfall in recent years, which he indicated has resulted in downstream impacts, including loss of grazing land. Mr Taljaard expressed that, in his view, the introduction of additional mining activities may exacerbate existing issues. He further stated that he shares the concerns previously raised by Mr De Jager regarding potential impacts on boreholes and the risk of reduced or lost groundwater availability.	The Groundwater Impact Assessment will be conducted in the EIA phase and will consider the assessment of impacted presented, where possible.	
Mr Eduard Steyn, Directly Affected Landowner.	Online Meeting	Wednesday, 27 May 2026	Mr Steyn stated that he is a neighbouring landowner to Mr Taljaard and indicated that he shares the concerns raised regarding underground	Ms Naicker responded that the Surface Water Assessment as well as the Groundwater Impact Assessment would be undertaken as part of the EIA	Section 9.1 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
	Microsoft Teams)		water resources. He further noted concerns relating to above-ground water resources, including dams, pans and surrounding wetland features. He enquired what impact the proposed mining activities would have on above-ground farming operations. In particular, he requested clarity on potential impacts on farm infrastructure, roads, water resources, and farm labour residing on the properties.	process. She explained that this specialist assessments would identify and assess potential impacts (including roads and surface water), including the significance of such impacts, and would also propose appropriate mitigation measures. This information would be included in the Draft EIA Report and Environmental Management Programme (EMPr). Ms Naicker further advised that, at this stage, the project considers the use of existing operational mining infrastructure.	
Ms Karabo Mabyana, Statutory Control Officer, SANRAL	Online Meeting Microsoft Teams)	Wednesday, 27 May 2026	Ms Mabyana stated that she generally shares the concerns raised by Mr De Jager and other attendees regarding the potential impacts of the proposed activities on neighbouring properties. She enquired how such activities would affect surrounding landowners and to what extent such impacts may be experienced.	Ms Naicker responded that, in terms of the surface infrastructure on directly affected properties, the project currently considers only monitoring stations and the associated access roads (see Section 1.7 of the DSR). Potential impacts associated with these infrastructures will be investigated further through specialist assessment such as the biodiversity, surface water etc, which are currently being undertaken to support the application for Environmental Authorisation (EA).	Section 1.7
			Ms Mabyana requested clarification on the intention regarding SANRAL's property, noting that although it may not be directly affected, she sought clarity on whether and how it may be impacted by the Proposed Project. She indicated	Ms Naicker advised that she would consult with the technical team regarding the potential future land use implications, as this matter requires further technical input. She reiterated that the current project proposes to utilise the existing Harmony Target Mine surface	Section 1.9 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			that understanding the extent of potential impact remains a key concern for affected stakeholders. Ms Mabyana sought further clarification regarding potential future land use implications, including whether any land uses classified as subservient to mining activities may affect surrounding properties in any manner.	infrastructure to support the underground mining operations. Ms Naicker confirmed that feedback would be provided to Ms Mabyana following consultation with the technical team. She further noted that, at this stage, the assessment considers monitoring stations located within the directly affected surface footprint. Specialist assessments for the Proposed Project will be conducted in the EIA phase. The findings of these assessments will be included in the Draft EIA Report. **Post Meeting Note:** Closure and Rehabilitation Planning The Mine Closure and Rehabilitation Plan to include post-closure land use, rehabilitation of tailings and waste rock dumps (WRDs), and water treatment measures as well as provide an estimate of the financial provisioning required for closure, in line with NEMA regulations and the Mine Works Programme as required by the MPRDA.	
Ms Mariette Liefferink, CEO, FSE	Online Meeting	Wednesday, 27 May 2026	Ms Liefferink indicated that her comments were comprehensive and requested that they be	Ms Naicker acknowledged that at this stage of the Scoping phase, only high-level desktop baseline studies have been conducted; however, specialist studies will	Section 7

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
	Microsoft Teams)		treated as recommendations rather than objections. She first commended Kongiwe, stating that she is familiar with the organisation and that there is a generally positive working relationship. She noted that the report is well structured and aligns with the EIA Regulations. However, she expressed the view that the Scoping Report remains largely a high-level desktop study with limited site-specific empirical specialist input. She further noted that the report acknowledges its baseline information is primarily derived from desktop investigation, which she indicated introduces uncertainty. Ms Liefferink concluded by reiterating that the comments should be considered recommendations and that a detailed response is requested. She further confirmed that she has no adversarial position toward the applicant and expressed willingness for constructive engagement.	be finalised in the EIA phase, and findings will be included in the Draft EIA Report.	
			Ms Liefferink raised concerns regarding the absence of a radiological assessment for the Proposed Project, given the uranium mining context and associated risks related to uranium,	The geology of the Proposed Project area is a direct extension of the geological formations occurring within the Harmony Target Mine mining right area (Section 7.3 of the DSR), which has already been subject to detailed	Section 2 Section 7.3

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			radioactive decay products, and long-term exposure pathways. She highlighted the need to consider radiological risks, including radon exposure, radioactive waste management, regulatory requirements, and potential radiological implications associated with other minerals such as molybdenum. She further recommended that water quality assessments consider uranium toxicity thresholds and human health risks. In addition, concerns were raised regarding legacy mining impacts, including acid mine drainage (AMD), sulphide oxidation, long-term environmental degradation, and the need to assess closure liabilities and post-closure water quality risks.	radiological assessment and regulatory approval (2024 Free State Radiological Public Safety Assessment: System Description, undertaken by AquiSim Consulting (Pty) Ltd for Harmony Gold Mining Company Limited - Free State Operations). Harmony Gold Mining Company Limited, a joint venture partner in Jelani Resources, already holds a Radiological Public Safety Assessment for its Free State operations, as well as a valid Certificate of Registration (CoR Regulation 10) issued by the National Nuclear Regulator (NNR) for its Target Mine operation located adjacent to the Proposed Project area. The proposed underground mining operation will involve the excavation of mineral resources within the Proposed Project area. However, access to and egress from the underground workings will be undertaken through the existing Harmony Target shafts, and the ore will be processed using the existing Harmony Target operational mining infrastructure. These shafts, operational systems and geological formations have already been assessed and approved by the NNR. Although uranium is listed as a potential co-product within the mineral resource, the Proposed Project does	Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				not introduce new processing streams or changes in radiological exposure pathways beyond those already authorised under Harmony's existing operations. Based on the above, it is considered that the Proposed Project does not introduce new or materially different radiological risks that would warrant a standalone Radioactivity assessment at this stage. It was further noted that a Radiological Public Safety Assessment is a key requirement for an initial CoR application. International best practice recommends that such assessments be reviewed and updated every 3 to 5 years. Should the project be authorised, the Jelani Project's contributions will be incorporated into the next scheduled update of the radiological assessment. The Radiological aspects will be included in the EIA report. It is further noted that the EIA phase will assess potential impacts associated with groundwater and surface water quality, including existing legacy mining influences, AMD-related risks, and relevant human health considerations where applicable. The assessment will also consider closure and post-closure	

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				environmental risks in accordance with the applicable regulatory requirements.	
			The high-level nature of the assessment does not adequately address cumulative impacts, including groundwater risks, seismicity, biodiversity sensitivity, socio-economic impacts, and radiological risks associated with uranium and its progeny. She emphasised that uranium has a very long half-life and that environmental impacts may persist over geological timeframes, not only biological timescales, which should be considered in closure liability planning. Existing Tailing Storage Facility (TSF) may present seepage and contamination risks; therefore, cumulative impacts should be assessed. In addition, the potential cumulative impact of a proposed new 69-hectare TSF should be assessed. It is noted that this will be a separate application undertaken by Harmony Gold.	The assessment of cumulative impacts will be undertaken during the detailed EIA phase, and appropriate mitigation measures will be proposed. The impact identification and evaluation methodology applied by all specialists incorporates cumulative impacts quantitatively to determine the final impact score and corresponding significance rating (refer to Section 8.3 of the DSR).	Section 8.3
			The Scoping Report is largely a high-level desktop assessment with limited site-specific empirical specialist input, creating uncertainty in the baseline conditions.	The Scoping Report is intended to provide a preliminary assessment of the receiving environment and identify potential issues, sensitivities, and information gaps requiring further investigation. Detailed site-specific	Section 9

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				baseline studies, fieldwork, and empirical data collection will be undertaken during the EIA phase through the relevant specialist assessments, which will refine the baseline conditions and inform the impact assessment. A Plan of Study for the EIA has been developed during the Scoping Phase.	
			The report states there are no alternative sites considered, and all required infrastructure will be located within the Harmony Target mining right area, indicating that this is not compatible with Section 24 of NEMA as well as the EIA Regulations, because it requires a comparative assessment of feasible and reasonable alternatives. The alternatives that must also be considered include, layout, technology, operational, and no-go alternatives. Reliance on existing infrastructure does not automatically make the site environmentally preferable. It was recommended that the assessment consider whether the proposed development represents the best practicable environmental options in	The Proposed Project intends to initiate an underground mining operation within the Joint Venture area to extract various minerals, primarily Gold, along with Silver, Uranium, and associated minerals. Jelani Resources Pty Ltd holds the Prospecting Rights for these minerals in this area. The Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development. Additionally, the Proposed Project intent to utilise available spare capacity within Harmony's existing infrastructure at the Target Mine, which is located adjacent to the JV area. As the potential mineral resources were confirmed within specific properties and the required supporting operational mining infrastructure already exists within Harmony's Target	Section 1.7 Section 5

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			terms of National Environmental Management Act (NEMA) principles.	Mine mining right area, the activity is constrained to these locations. Therefore, no alternative sites are feasible. Furthermore, Activity, Design and Technology and Operation alternatives have been considered, and the no go alternative has been included (see Section 5 of the DSR).	
			The report also appears to heavily relay on the argument that the infrastructure planned to be utilised for the project is already existing but this is not sufficient justification for excluding site assessment as the no-go alternative and the approach to site alternatives may be legally vulnerable because cumulative impacts in the region may already be severe due to the legacy of gold mining within the Witwatersrand and Free State goldfields. Concerns were also raised that, in addition to regional legacy impacts, existing impacts within the Harmony Target mine area itself should be considered.	The use of existing infrastructure is one of several factors considered and does not replace the assessment of alternatives. The No-Go Alternative will be assessed during the EIA phase. The EIA phase will include an assessment of cumulative impacts, taking into account both the legacy impacts of mining within the region and existing impacts associated with the Target Mine operations.	Section 5 Section 8.3
			The scoping report acknowledges the groundwater impacts such as the dewatering of deep aquifer causing groundwater level decline,	The Groundwater Impact Assessment will be conducted in the EIA phase and will consider the assessment of impacted presented, where possible.	Section 9.2

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			lowering of the water table in the shallow aquifer, groundwater flow alteration and potential seepage of mine water to the groundwater system, which may contaminate groundwater resources. Groundwater impacts require more detailed assessment, including: a. Deep aquifer dewatering, which may alter regional groundwater flow partners b. Aquifer connectivity and transmissivity c. Drawdown cone modelling d. Regional groundwater flow impacts beyond the mine area e. Decant risks and post-closure rewatering scenarios f. Long-term mobilisation of contaminants, including uranium and other metals. The hydrogeological assessment should include geochemical testing, sulphur balance analysis, radionuclide mobility, and long-term post-closure monitoring.		
			The scoping report confirms the project activities trigger section 21 water uses, necessitating the application for Water Use License. However, water balance information, water demand projections,	An application will be submitted to Department of Water and Sanitation (DWS). As part of the WUL application process, supporting technical report, including the Integrated Water and Waste Management	-

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			cumulative water stress analysis, and regional water status have not been presented. It was recommended that water quality discharges comply with Resource Quality Objectives and Water Use Licence conditions, with reference to uranium toxicity thresholds and associated human health risks	Plan (IWWMP) will be developed. The IWWMP will address the water balance information, water demand projections, cumulative water stress analysis, and regional water status as well as water quality objectives requirements.	
			Seismicity and subsidence risks require further assessment and monitoring plan.	Blasting and Vibration Assessment will be undertaken during the EIA phase, and the outcomes of this study will be presented and assessed in the Draft EIA Report.	Section 9.2
			Closure liabilities and long-term environmental risks, including post-closure AMD generation and water quality deterioration over geological timeframes, should be incorporated into assessments.	The Groundwater Impact Assessment will be conducted in the EIA phase and will consider the assessment of impacted presented, where possible.	Section 9.2
			Biodiversity and ecological impacts require further detailed assessment, including aquatic ecology, wetlands, grassland sensitivity, and cumulative biodiversity impacts, indicating that the project area is heavy disturbed and therefore stringent mitigation measure are required.	A Terrestrial Biodiversity (Flora and Fauna) Assessment Study and Freshwater and Aquatic Biodiversity Assessment Study will be conducted in the EIA phase. The EIA phase will include an assessment of cumulative impacts.	Section 9.2
			Socio-economic vulnerability in mining-affected communities was highlighted as an ongoing	A Socio-Economic Impact Assessment will be conducted during the EIA phase.	Section 9.2

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			concern and should be considered in the assessment.		
Mr Neels Hoek, Project Manager, Jelani Resources	Online Meeting Microsoft Teams)	Wednesday, 27 May 2026	Mr Hoek thanked all attendees for their participation in the meeting. He further extended specific appreciation to Ms Liefferink for her detailed comments.		Appendix C
Ms Umeshree Naicker, Principal Environmental Consultant, Kongiwe	Online Meeting Microsoft Teams)	Wednesday, 27 May 2026	Ms Naicker added a final comment, thanking all attendees for participating in the meeting and for providing their comments. She noted that the project team would work through and address all comments raised during the meeting. She further advised that the team would remain in communication with all attendees going forward and that feedback would be provided on the matters raised. She encouraged attendees to submit any additional comments not raised during the meeting directly to Kongiwe stakeholder engagement team, noting that contact details had been provided. Ms Naicker concluded by stating that the team looks forward to continuing engagement and addressing all inputs received in relation to the project.		Appendix C
Comments raised during the Open Day in-person Meeting for the draft Scoping Report, dated, Saturday, 30 May 2026.					
Community Member (Ms Khanyisile)			Ms Khanyisile enquired whether the community will experience additional Tailings Storage Facilities (TSFs), noting that dust emissions are currently affecting the community. She further indicated that crops (agricultural activities) near Shaft 2 are also impacted and raised concerns regarding water usage and water quality.	Mr Macevele explained that the Proposed Project's development plan includes the utilisation of available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes Target No. 2 and No. 3 shafts, the Target No. 1 Processing Plant, and associated surface infrastructure. All operational mining infrastructure, including Tailings Storage Facilities (TSFs) required for the Proposed Project, will be located within the existing Harmony Target Mine mining right area. No	Section 1.7 Section 8.3 Section 9

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	Open Day	Saturday, 30 May 2026		new operational mining infrastructure is planned within the project area (refer to Chapter 1.7 of the Final Scoping Report (DSR) for a detailed project description). He further noted that a new Tailings Storage Facility (TSF) is proposed to be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. However, this TSF forms part of a separate project and application being undertaken by Harmony Gold and is not included in the current Proposed Project. The project is currently in the Scoping Phase of the Environmental Impact Assessment (EIA) process. At this stage, the Final Scoping Report (FSR) has identified high-level potential impacts and associated mitigation measures for the Proposed Project (refer to Table 9-3 of the DSR). Should the application proceed to the EIA phase, Chapter 9 of the DSR outlines the proposed Plan of Study for the EIA. The Plan of Study includes detailed specialist assessments covering key environmental aspects such as biodiversity, surface water, groundwater, air quality, soil, agriculture, climate etc. These studies will assess potential impacts, including those related to water	

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				quality and air quality, in greater detail and propose mitigation measures. The findings of the specialist assessments will be included in the EIA Report and presented to stakeholders and interested and affected parties (I&APs) during the public participation process for the EIA phase. In accordance with the National Environmental Management Act (NEMA) and the Environmental Impact Assessment (EIA) Regulations, the environmental assessment will include an evaluation of cumulative impacts.	
			Ms Khanyisile requested that the EIA documents be translated into other languages used in the area, such as Sesotho and Afrikaans, during the next Public Participation Process window.	The Public Participation Process will continue to accommodate the predominant languages spoken within the Project area. Accordingly, key project information and engagement activities will be made available in English and Sesotho, where appropriate, to promote meaningful participation and understanding by Interested and Affected Parties. The full Environmental Impact Assessment report will remain available in English, as the official language of submission to the Competent Authority.	Appendix C Social and Labour Plan
Mr Molefi Abel Thebeeahae (Director of KB	Open Day	Saturday, 30 May 2026	Mr Molefi raised a concern regarding the Social and Labour Plan (SLP). He stated that the presentation did not adequately explain what the	**Public Engagement Discussion** Kongiwe has been appointed by Jelani Resources (Pty) Ltd to undertake the required applications for	Appendix C Social and Labour Plan

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Salman Civil Engineering and General Projects)			SLP entails and how it benefits the mine community. He further expressed concern that the presentation indicated the SLP would be treated as an expansion of the existing Harmony Target Mine SLP. He emphasised that the existing Harmony Target Mine SLP does not benefit the mine-affected community. He recommended that the Jelani Resources SLP be reviewed to ensure that it includes tangible benefits for the communities directly affected by the mining operations.	Environmental Authorisation (EA) and the Integrated Water Use Licence (IWUL), as well as the development of the Social and Labour Plan (SLP) for the Jelani Project. A key component of our scope includes facilitating the Public Participation Process (PPP) associated with the Proposed Project. As part of the PPP, stakeholders and interested and affected parties must be consulted. As mentioned above, Kongiwe is assisting Jelani Resources with developing its own SLP, which is currently under public review. Ms Naicker explained that an SLP is a legally required document that mining companies in South Africa must submit as part of their application for a Mining Right (MR). It is developed in terms of the Mineral and Petroleum Resources Development Act (MPRDA) and outlines how the company will contribute to the social and economic development of affected communities and employees. The SLP sets out the company's commitments in areas such as skills development, local economic development, employment equity, and improved living conditions for workers. With specific reference to the Jelani Project SLP, the Matjhabeng Local Municipality and the ward councillor	

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				were engaged to identify community needs and the SLP initiatives. Through this process, the refurbishment of the Community Hall was identified. Should the SLP be approved, it must therefore be reviewed every five years. As part of the initial phase (Jelani Project SLP 1), the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community. Given that the Jelani Project is not yet operational, limited funding is expected during this phase. In the second phase (Jelani Project SLP 2: Years 5–10), increased funding is anticipated, which may enable the implementation of larger community development projects. **Post Meeting Note** Kindly note the clarification as follows: The stakeholder engagement being undertaken relates to both the EA and the SLP. The public meeting included an overview of the SLP and specified the proposed LED Project. Selection of LED programmes are subject to	

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				alignment with the Matjhabeng Local Municipality's Integrated Development Plan (IDP) (2024/2025) in conjunction with recommendations made by the Matjhabeng Local Municipality's Executive Director of LED. In light of the chronic lack of capacity by Matjhabeng Local Municipality to provide funds to support Jelani in LED projects, investment in the Nyakallong Community Hall for this initial SLP cycle – which requires minimal maintenance while providing long term functions for the community - is the preferred option for both the Matjhabeng Local Municipality and Jelani. Although the Jelani Project is a joint venture (JV) between Harmony Gold and White Rivers Exploration (Pty) Ltd (WRE), Jelani Resources, as the applicant and prospective holder of the Mining Right (should it be granted), will be responsible for the implementation of the SLP. Accordingly, comments relating to Harmony Gold's existing SLP for the Target Mine fall outside the scope of this SLP process and should be directed to Harmony Gold through the appropriate engagement channels.	
Community Member	Open Day	Saturday, 30 May 2026	Community member commented that, in future, the Kongiwe project team should focus their	**Post Meeting Note**	Appendix C

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			presentations on the specific project they have been appointed to undertake, namely the development of the SLP for Jelani Resources. The inclusion of the existing Harmony Target Mine SLP was viewed as unnecessary, as it is perceived not to benefit the community and may lead to additional questions directed at the Kongiwe team.	Kindly note the clarification as follows: The stakeholder engagement being undertaken relates specifically to the **mining project proposed by Jelani**, and not **Harmony Gold Mining Company Limited**. Although the Jelani Project is a joint venture (JV) between Harmony Gold and White Rivers Exploration (Pty) Ltd (WRE), Jelani Resources, as the applicant and prospective holder of the Mining Right (should it be granted), will be responsible for the implementation of the SLP. Accordingly, comments relating to Harmony Gold's existing SLP for the Target Mine fall outside the scope of this SLP process and should be directed to Harmony Gold through the appropriate engagement channels.	Social and Labour Plan
Community Member	Open Day	Saturday, 30 May 2026	He further stated that the Jelani Project SLP should include provisions for bursaries for the community, rather than focusing solely on the refurbishment of the Nyakallong Community Hall. He emphasised that a more pressing community need is the development of a clinic, which would provide greater benefit, as the Community Hall is reportedly used more by the Municipality than by the community.	**Public Engagement Discussion** The LED project is only one of numerous social development initiatives. Jelani will implement various training programmes relating to AET, core business, learnerships and portable skills. **Post Meeting Note** In consultation with the MLM, Jelani will award a limited number of bursaries per year (no more than three) to	Appendix C Social and Labour Plan

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			He concluded by recommending that, when recruitment process begin, the mine community must be considered.	HDPs from the local community to study for a diploma or degree at an accredited tertiary institution in South Africa. The bursaries will be focused on engineering (particularly mine engineering and metallurgy), geology or environmental management. Jelani's SLP 2: will make provision for further bursary opportunities.	
Community Member	Open Day	Saturday, 30 May 2026	Community member stated that any company proposing to undertake mining activities within the Allanridge area should have a formal written agreement with the affected community. He expressed the view that the current consultation process appears to be a 'tick-box' exercise, indicating concern that signatures on attendance registers may be used to support authorisation applications.	**Post Meeting Notes** The purpose of the Public Participation Process is to provide Interested and Affected Parties with an opportunity to obtain information about the Proposed Project, raise concerns, and submit comments for consideration as part of the environmental assessment process. Attendance registers are used solely as a record of participation and do not constitute support for, or consent to, the Proposed Project or the environmental authorisation application. All comments received will be objectively considered and addressed in the Comments and Responses Report.	Appendix C
			Regarding the EIA process, he questioned where the Draft Scoping Report hard copy is made available for public review, noting that some community members may find it difficult to access the Allanridge Library. He emphasised that, during	Mr Macevele responded by stating that Kongiwe is an independent environmental consulting firm conducting EIA process, including an independent Public Participation Process (PPP), in accordance with the EIA Regulations. He referred to his presentation on the role	Appendix C

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			the next consultation period, more hard copies should be placed in easily accessible public areas throughout Allanridge to improve access.	of Kongiwe and the phases of the S&EIA process, emphasising that once a decision on the application for Environmental Authorisation (EA) has been made by DMPR (the Competent Authority), any I&APs who feel aggrieved by the decision have the right to appeal. He noted that the outcome of the application, along with information regarding the appeal process, will be communicated to all I&APs). Regarding copies of the Draft Scoping Report, he indicated that for those with internet access, the report is available on Kongiwe's website under the public documents section. He also highlighted that the Kongiwe team is available to assist attendees with downloading the report. Additionally, the Kongiwe stakeholder consultation team remains available to assist with any PPP matters, and community members are encouraged to reach out for support where needed.	
			He recommended that Jelani Resources should present its economic development plan to the community and engage them before finalising the SLP. This would allow the community to provide input on key development initiatives to be included in the SLP, such as SMME participation, targets for the inclusion of women in mining, and the involvement of persons living with disabilities.	**Public Engagement Discussion** With specific reference to the Jelani Project SLP. Ms Naicker explained that the Matjhabeng Local Municipality and the ward councillor were engaged to identify community needs and the SLP initiatives.	Appendix C Social and Labour Plan

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			He emphasised the need for a signed agreement outlining community benefits prior to submission of the SLP to the Department of Mineral and Petroleum Resources (DMPR).	Through this process, the refurbishment of the Nyakallong Community Hall was identified. She further indicated that the current consultation process is intended to present the contents of the SLP. All submissions are being recorded and will be included in the Comments and Responses Report to be submitted to the DMPR for evaluation and decision-making. She noted that the SLP timeframes differ from those of the EIA process. She also indicated that, upon receiving the outcome of the SLP, Jelani Resources will be required to communicate the contents of the approved SLP as follows: • to the public within 30 days; • to the local community within 180 days (through a public communication process); and • to employees immediately upon their appointment. **Post Meeting Notes** Local contractor teams/ SMMEs will be considered favourably during the procurement process for the LED	

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				programme, on the condition that they have the pre-requisite certifications for their trade.Selection of LED programmes are subject to alignment with the Matjhabeng Local Municipality's Integrated Development Plan (IDP) (2024/2025) in conjunction with recommendations made by the Matjhabeng Local Municipality's Executive Director of LED.	
			Future consultation meetings should be conducted through presentations delivered by a speaker using a projector, rather than posters.	Mr Macevele acknowledged the comments regarding the format of future consultation meetings. He noted the request that meetings be conducted through presentations delivered by a speaker using a projector rather than posters.	Appendix C
Community Member	Open Day	Saturday, 30 May 2026	Community member asked about all the potential mineral resources in the Proposed Project area, that Jelani plans to extract, as well as the current activities at Harmony Target 3.	Jelani intends to initiate underground mining operations. The Proposed Project involves obtaining licenses for the underground mining of the following potential mineral resources: • Gold ore (primary target), • Silver ore, • Uranium ore, • Sulphur, • Platinum Group Metals, • Rare earths, • Diamonds (alluvial), • Copper ore,	Section 1.7

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				• Cobalt ore, • Manganese ore, • Molybdenum ore, • Nickel ore, • Lead ore, • Tungsten ore, • Zinc ore, and • Iron ore. At present, the Harmony Target 3 Shaft is used for dewatering, while the Target 2 Shaft serves as an emergency exit for Target 1.	
Community Member	Open Day	Saturday, 30 May 2026	Community member raised concerns regarding how information was circulated, suggesting that it should be communicated to all interested and affected parties, taking into account the geographical layout of Nyakallong and Allanridge. He recommended that public consultation documents be placed in accessible public areas such as schools, municipal offices and other community facilities to improve access. Concern was noted that currently the documents are only available at the Allanridge Library.	The recommendation to make project documentation available at additional public facilities within Nyakallong and Allanridge, where feasible, will be considered for the EIA phase of the Public Participation Process to improve accessibility. Furthermore, future public engagements will continue to accommodate the predominant languages spoken within the Project area, with presentations and key project information being provided in English and Sesotho, where appropriate, to facilitate meaningful participation and understanding.	Appendix C

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			He further suggested that future presentations be conducted in Sesotho to ensure broader understanding.		
			Comment Register - Key Issues Recorded: Please refer to Appendix B for the submissions recorded in the comment register collected during the Open Day.		
			1. Unemployment	A Social Impact Assessment will be conducted in the EIA phase and will consider the Proposed Project's impact on unemployment. The findings of the assessment will be included in the Draft EIA Report and presented to the I&APs. At present, as part of the Social and Labour Plan, the Nyakallong Community Hall will be refurbished. This forms part of the Local Economic Development (LED) project approved by the Matjhabeng Local Municipality. This initiative is expected to contribute to short-term employment. There will be no employees on the Jelani payroll in the first four years of the SLP cycle. In Year 5, there will be 39 employees on the Jelani pay roll. The breakdown of these employees, based on job grading bands, there will be no personnel on contractor's payrolls or service provider payrolls.	Appendix C Social and Labour Plan

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<table>
<tr><th>Stakeholder</th><th>Consultation Method</th><th>Date of Comments Received</th><th>Issues Raised</th><th>Response to issues raised</th><th>Section Reference in the Report</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Where possible, Harmony workers will be sourced from Target. If Target cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area.

Table 1: Number of Jelani Employees, by Job Grading

<table>
<tr><th>Job Grade</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Total</th></tr>
<tr><td>Executive Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>Senior Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>7</td><td>7</td></tr>
<tr><td>Professionally qualified and experienced specialists and mid-management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>31</td><td>31</td></tr>
<tr><td>Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Semi-skilled and discretionary decision making.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Non-permanent employees.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>39</td><td>39</td></tr>
</table>

Table 2: Number of Employees on the Harmony Payroll, by Job Grading

<table>
<tr><th>Job Grade</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Total</th></tr>
<tr><td>Executive Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>3</td><td>3</td></tr>
<tr><td>Senior Management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>23</td><td>23</td></tr>
<tr><td>Professionally qualified and experienced specialists and mid-management.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>99</td><td>99</td></tr>
<tr><td>Skilled technical and academically qualified workers, junior management, supervisors, foreman and superintendents.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>159</td><td>159</td></tr>
<tr><td>Semi-skilled and discretionary decision making.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>222</td><td>222</td></tr>
<tr><td>Non-permanent employees.</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td>0</td><td>0</td><td>0</td><td>0</td><td>506</td><td>506</td></tr>
</table>
</td><td></td></tr>
</table>

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			2. Bursaries for the community	As part of the initial phase (Jelani Project SLP 1), the Nyakallong Community Hall will be refurbished to support and promote socio-economic development within the local community. Given that the Jelani Project is not yet operational, limited funding is expected during this phase. In the second phase (Jelani Project SLP 2: Years 5–10), increased funding is anticipated, which may enable the implementation of larger community development projects. The submissions regarding bursaries for the community and the consideration of a local surveying company have been noted.	Appendix C Social and Labour Plan
			3. Regular engagement and inclusivity during the process	Engagement with Interested and Affected Parties (I&APs) will continue throughout the environmental assessment process, providing opportunities for stakeholders to review project information, submit comments, and participate meaningfully in the decision-making process. All comments received will be recorded, considered, and addressed in the Comments and Responses Report.	Appendix C
			4. Consideration of a local surveying company	The appointment of service providers will be based on the required scope of work, demonstrated capability, compliance, and commercial considerations.	Appendix C

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			5. Commitment from Jelani Resources to supply tankered water should a decline in groundwater levels be recorded. Protection of water resources (borehole water) and monitoring programme	At this stage, Jelani Resources cannot commit to the request. A Groundwater Impact Assessment will be undertaken as part of the EIA phase to assess the potential impacts of the Proposed Project on groundwater resources. Where required, appropriate mitigation measures, monitoring requirements, and contingency actions will be incorporated into the Environmental Management Programme (EMPr). Should monitoring indicate that the Proposed Project has resulted in a demonstrable impact on groundwater resources affecting existing lawful users, appropriate mitigation and remedial measures will be implemented in consultation with the relevant authorities and affected parties. The nature of such measures, including the provision of an alternative water supply where warranted, will be determined based on the findings of the investigation and the confirmed cause of the impact	Section 9.2
Mr Qondane Tembani, Interested & Affected Party, Sisu Community Social	Email Correspondence	Wednesday, 03 June 2026	Dear Ms Williams and Ms Viljoen, Sisu Community Social Organization hereby submits its completed Stakeholder Registration	Dear Mr Tembani, Thank you for your registration form and noting your interest in the Proposed Project.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Organization, Chairperson			and Comments Form for the Jelani Resources (Pty) Ltd JV Area Underground Mining Project. SCSO appreciates the opportunity to register as an Interested and Affected Party and to participate in the public consultation process. As a community-based organisation operating within the broader Lejweleputswa and Matjhabeng community environment, SCSO has an interest in ensuring that community development, local participation, social responsibility, employment opportunities, skills development, environmental protection, and meaningful stakeholder engagement are properly considered throughout the project process. Attached please find the completed registration form for your attention and records. We kindly request that Sisu Community Social Organization be included in future stakeholder communication, consultation meetings, notices, updates, and opportunities to provide further comments regarding the project.	As per your request, Sisu Community Social Organisation, will be included in all correspondence for the Proposed Project.	
Mr Molefi Abel Thebeeahae, Interested &	Email Correspondence	Tuesday, 09 June 2026	Good Day	Good day Mr. Molefi,	Appendix C Social and Labour Plan

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Affected Party, KB Salman Civil Construction & General Projects, Director			Kongiwe Management/Team Hereby, I wish to send my comment as a contribution in line with your previous consultation with the community of Nyakallong Allanridge. I am Molefi Abel Thebeeahae, the director of KB Salman Civil Engineering and General Projects. I would like to base my comment on behalf of the above company and the entire community of Nyakallong Allanridge, including struggling small businesses in our respective area. As an individual member of Nyakallong Allanridge, also as the director of the above company, which has been struggling since it's inception in 2023, my personal comment concerns community upliftment and your social responsibility in line with the following aspects; 1. Jobs & Employment Opportunities 2. SMME's & Business Opportunities	Kongiwe hereby acknowledges receipt of your submission. The concerns relating to employment opportunities, SMME participation, skills development, youth and women empowerment, and environmental management have been recorded and will be considered as part of the Environmental Impact Assessment (EIA) process where relevant. The stakeholder engagement undertaken on 30 May 2026 relates specifically to the mining project proposed by Jelani Resources Pty Ltd (Jelani), and not Harmony Gold Mining Company Limited (Harmony). Jelani is not seeking to extend an existing Harmony's Social and Labour Plan (SLP). Although the Proposed Project is a joint venture (JV) between Harmony Gold and White Rivers Exploration (Pty) Ltd (WRE), Jelani, as the applicant and prospective holder of the Mining Right (should it be granted), will be responsible for the implementation of the Jelani Social SLP, therefore, the stakeholder engagement undertaken in is relation to the SLP that pertains	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			3. Skills Development 4. Youth & Women Empowerment 5. Water use and Environmental Kindly take note that in my personal capacity, I would like to kindly edge and plea with you to review Harmony Gold Mine SLP, which you intend to extend as per your operations, or rathe come up with your own independent SLP considering proper consultation with the community of Nyakallong Allanridge, hence Harmony Gold Mine SLP has never BENEFITED the community of Nyakallong Allanridge as a mining town, therefore as the host of the latter. Kindly bear with me in this regard. Sincerely	specifically to the Jelani Resources (Pty) Ltd Proposed Project. Accordingly, comments relating to Harmony's existing SLP for the Target Mine fall outside the scope of this SLP process and should be directed to Harmony through the appropriate engagement channels. For any questions regarding the Harmony Operations, please contact Sabelo Mgotywa: Senior Manager: Stakeholder Relationships of Harmony Gold. The comments submitted will be included in the Comment and Response Report and considered during the ongoing assessment process.	
Ms Lerato Mokonyane, Executive Secretary, Umkhonto WomNotho	Email Correspondence	Friday, 12 June 2026	**CONFIDENTIAL & URGENT** To: Kongiwe and Jelani JV partners Kindly find attached the formal, comprehensive legal objection and dispute notice submitted by	Dear Lerato Mokonyane and Musawenkosi Dyantyi **RE: FORMAL SUBMISSION OF COMPREHENSIVE OBJECTION TO THE DRAFT SCOPING REPORT FOR THE JELANI RESOURCES (PTY) LTD JV AREA UNDERGROUND**	Appendix C Social and Labour Plan

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Umkhonto Womnotho Community-Based Organisation regarding the Draft Scoping Report for the Jelani Resources JV Underground Mining Project (DMPR Ref: FS30/5/1/2/3/2/1(10098) EM). Please be advised that this submission serves as a formal registration of dispute concerning material administrative defects under the Promotion of Administrative Justice Act (PAJA), outstanding Section 11 Ministerial Consent protocols, and localised Social and Labour Plan (SLP) compliance requirements in terms of MPRDA, read with the Mining Charter III. Given that these material defects directly impact the underlying mining rights and international joint venture structures, this matter has been simultaneously escalated to the Office of the Minister, the Free State Regional DMPR, and the relevant stakeholders in South Africa and in London financial and regulatory advisors. We demand a formal acknowledgement of receipt within forty-eight (48) hours as requested in the	**MINING PROJECT, FREE STATE PROVINCE (DMPR REF NO: FS10098 MR) (DWS: WU50090).** We refer to your email dated 12 June 2026, sent to our Stakeholder Engagement Team. We respond to the comments raised in the email under reply as set out in the table overleaf. For ease of reference, we have extracted the comments and incorporated our input in the next column for your consideration. From the outset we must state the stakeholder engagement undertaken on 30 May 2026 relates specifically to the mining project proposed by Jelani Resources Pty Ltd (Jelani), and not Harmony Gold Mining Company Limited (Harmony). Although the Proposed Project is a joint venture (JV) between Harmony Gold and White Rivers Exploration (Pty) Ltd (WRE), Jelani, as the applicant and prospective holder of the Mining Right (should it be granted), will be responsible for the implementation of the Social Labour Plan (SLP). Accordingly, comments relating to Harmony's existing SLP for the Target Mine fall outside the scope of this SLP process and should be directed to	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			attached notification, alongside proposed dates for the mandatory multi-lateral roundtable sitting. UW-CBO reserves the right to reveal this information to media channels and take legal steps, post reasonable turnaround time. The formal submission is attached hereto in PDF format.	Harmony through the appropriate engagement channels. For any questions regarding the Harmony Operations, please contact Sabelo Mgotywa: Senior Manager: Stakeholder Relationships of Harmony Gold.	
Comments on the attached Objection Letter received via email from Ms Lerato Mokonyane dated, Friday, 12 June 2026 as per the email correspondence above.					
			Umkhonto Womnotho (hereinafter referred to as "UW") hereby formally registers as an Interested and Affected Party (I&AP) and submits its urgent, categorical objection to the Draft Scoping Report (DSR), the associated Integrated Water Use Licence Application (IWULA) for the proposed Jelani Resources Proprietary Limited (Formally called Friedshelf 1541 Proprietary Limited) JV Underground Mining Project and Proposed SLP extension from the existing one.	Kongiwe hereby confirms that Umkhonto Womnotho has been registered as an I&AP and is included in the database. We take note of your objection to the DSR and the IWULA for the proposed Jelani Underground Mining Project. It must be noted the Jelani SLP is a new SLP and not an extension of an existing one.	Section 1.5 Appendix C
			UW represents the primary economic, social, and developmental interests of the host community within Ward 36 and 19 of the Matjhabeng Local Municipality. The proposed project area comprising the farms Welvaart No. 63, Diamant No. 37, Graspan No. 40, and Swartpan No. 436	As part of the Scoping and Environmental Impact Assessment (S&EIA) process, Kongiwe identified the directly affected and adjacent landowners associated with the Proposed Project through a landowner identification process.	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			directly overlies the ancestral, living, and economic geography of the people we represent.	With reference to the farms specifically mentioned, the following landowners were identified: • **Welvaart No. 63:** Blaauwklip Trust; • **Diamant No. 37:** Taljaard Willem Hendrik; • **Graspan No. 40:** Taljaard Willem Hendrik; and • **Swartpan No. 436:** Taljaard Willem Hendrik. During engagements with the identified directly affected landowners, no indication was provided that they were represented by Umkhonto Womnotho. Should Umkhonto Womnotho be acting on behalf of any of the identified landowners or on behalf of the host community, kindly provide written confirmation of such representation. Upon receipt of the relevant authorisation, Kongiwe will update the stakeholder database accordingly and ensure that future correspondence is directed to the appointed representative, where applicable.	
			UW's objection is grounded in systemic failures regarding administrative justice, environmental risk concealment, and a blatant corporate strategy designed to bypass host-community equity and	We respond to the points as per below.	-

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			benefits that are legislative obligations, in line with the following legislation: • Mineral and Petroleum Resources Development Act 28 of 2002 • National Environmental Management Act 107 of 1998 • National Water Act 36 of 1998 • Promotion of Administrative Justice Act 3 of 2000 • Mining Charter III of 2018		
			1. Administrative Fatalities Regarding Section 11 Ministerial Consent UW notes with grave concern the public disclosure that Lexington Gold Ltd acquired 76% of White Rivers Exploration (Pty) Ltd (WRE), the 65% joint venture partner to Harmony Gold's subsidiary (Avgold Ltd) in the Jelani Resources JV. This transaction effectively transferred controlling interest of local mineral wealth to a foreign-listed corporate entity.	Jelani Resources is a joint venture company with participants White Rivers Exploration (Pty) Ltd, and Afgold Limited and Loraine Gold Mines Limited, both wholly owned subsidiaries of Harmony Gold Mining Company Limited. White Rivers Exploration is a privately owned company with shareholders in South Africa and Australia. The company is South Africa focused and has various prospecting rights for gold, coal and other minerals. During 2023, WRE was placed under business rescue proceedings. A combination of factors and events	Section 1.3

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			In terms of Section 11 of the Mineral and Petroleum Resources Development Act (MPRDA), such a transfer strictly requires Ministerial Consent. UW places it on the record that at no point was the host community ever notified, consulted, or informed by the Ministry or the applicants regarding this change of control as per section 10 of MPRDA. This constitutes a fatal procedural flaw under the PAJA. A transaction that dispossesses local community oversight without consultation is constitutionally invalid.	during the years preceding the commencement of Proceedings, all contributed to the Company's Financial Distress. Lexington Gold (AIM: LEX), a gold exploration and development company, announced on 15 May 2023 to shareholders (published on 2 June 2023), the completion of its acquisition of White Rivers Exploration Proprietary Limited ("WRE"), an exploration and development company with significant gold assets in South Africa. Accordingly, WRE exited its business rescue process with no creditors other than the Lexington Gold group, and the Company, through its wholly owned subsidiary Lexington Gold South Africa Proprietary Limited, subject to approval from the Minister of Mineral Resources and Energy in terms of Section 11 of the MPRDA, will be the sole shareholder of WRE, with a 26% in WRE to be issued to Lexington Gold's Broad-Based Black Economic Empowerment Partners ("BBBEE"), Masana Exploration. On 12 December 2024, the Deputy Director General, Mineral and Petroleum Regulation of the Department of Mineral and Petroleum Resources granted consent	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				for the cession of 100% of the issued shares held in WRE to Lexington Gold South Africa (Pty) Ltd and Masana Exploration (Pty) Ltd. Subsequently to Section 11 approval, 74% interest in White Rivers Exploration has been issued to Lexington Gold South Africa (Pty) Ltd, a subsidiary of Lexington Gold PLC (AIM:LEX); and 26% interest in White Rivers Exploration has been issued to Masana Exploration (Pty) Ltd, a subsidiary of Letsema Holdings (Pty) Ltd, a 100% Broad-Based Black Economic Empowerment Company. The Final Scoping Report has been updated to include the information presented above.	
			2. The Expiring License Subterfuge & Expired SLP Compliance It is a matter of public record that Harmony Gold's primary mining rights and operating licenses in this region are set to lapse next year, in 2027. Kongiwe and Harmony are attempting an impermissible regulatory maneuver by trying to EXTEND an existing Social and Labour Plan (SLP) and consolidate historic water permits to launch a	The Proposed Project is not seeking to extend an expiring mining right or to avoid the applicable regulatory requirements through the extension of an existing Social and Labour Plan (SLP) or the consolidation of existing authorisations. The stakeholder engagement undertaken in relation to the SLP pertains specifically to the Jelani Resources (Pty) Ltd Proposed Project. The SLP process is being undertaken in accordance with the applicable legislative	Appendix C Social and Labour Plan

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			brand-new, 14-year Life of Mine underground project. The host community remains entirely in the dark regarding Harmony's compliance metrics for previous years' licenses. Harmony cannot legally extend an SLP for a new 14-year venture when its underlying regional right expires in 2027, and when historic compliance has never been transparently audited or presented to the community.	requirements and independently of the environmental authorisation process. The status of existing mining rights, compliance with previous SLP commitments, and the administration of mining rights and SLPs fall within the jurisdiction of the relevant regulatory authorities and are administered in terms of the applicable mining legislation. The current EIA process is intended to assess the potential environmental and socio-economic impacts of the Proposed Project and does not constitute an audit of historical compliance. All applicable statutory processes and approvals required for the Proposed Project will be undertaken in accordance with the relevant legislative requirements.	
			3. Deliberate Infrastructure Overlap to Bypass Community Equity The Background Information Document (BID) states that all operational mining infrastructure for the Jelani project will leverage the existing Harmony Target Mine rights area (specifically Shafts No#2 and #3). It further states that no new	The Proposed Project is being assessed as a proposed underground mining development through the prescribed Scoping and Environmental Impact Assessment (EIA) process in accordance with the National Environmental Management Act (NEMA) and the Environmental Impact Assessment Regulations. As described in the project documentation, the Proposed Project intends to utilise the existing Harmony Target Mine infrastructure, where feasible, with	Section 1.7 Appendix C

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			operational mining infrastructure is planned within the project area. UW sees this for what it is: a structural sleight of hand. By tunneling horizontally from old mining areas into the new 956.76-hectare Jelani JV project area, the JV partners are trying to camouflage a brand-new mining operation as a mere "extension" of an old one. This is being done deliberately to bypass the modern, localized Black Economic Empowerment (BEE) and community-trust asset allocations required for new mining right applications under the Mining Charter of 2018. You are extracting fresh wealth (Gold, Silver, and Uranium) from our soil while utilizing old structures to shut the community out.	upgrades and modifications to the existing infrastructure undertaken where necessary to safely support the proposed mining activities. The use of existing infrastructure has been considered as a means of reducing the need for additional surface infrastructure and, where practicable, minimising the associated environmental disturbance. The environmental assessment considers the proposed underground mining activities within the Proposed Project's area and the potential environmental impacts associated with those activities. The statutory Public Participation Process forms part of the EIA and provides Interested and Affected Parties (I&APs), including host and neighbouring communities, with the opportunity to review the project information and submit comments for consideration. All comments received during the process are recorded (in the Comments and Responses Report) and considered as part of the environmental assessment.	
			4. Unmitigated Environmental and Aquifer Liability The host community notes the severe historical environmental degradation caused by mining	The Draft EIA Report will assess the environmental impacts of the Proposed Project, including cumulative impacts where applicable, taking into account the existing environmental baseline. Where potential impacts are identified, appropriate mitigation measures	Section 8.3 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			operations in the area, including the documented radioactivity risks to the Karoo aquifer, unregularized discharges, and the flooding of Allanridge pan. The proposed project aims to hoist 60,000 tonnes of mined ore per month. The community will absolutely not absorb the massive cumulative environmental footprint, acid mine drainage risk, and water-use stress of this new 14-year operation while being entirely excluded from the economic structure of the joint venture.	will be incorporated into the Environmental Management Programme (EMPr).	
			MANDATORY DEMANDS TO REMEDY THIS OBJECTION To prevent this application from being tied up in protracted, indefinite litigation, all media channels, High Court reviews, and formal appeals to the Department of Water and Sanitation (DWS) and the DMPR, UW demands the following:		
			• Immediate Multi-Lateral Sitting: The immediate suspension of the processing of this Scoping Report pending a formal, round-table meeting between the Jelani Resources JV partners (Harmony Gold and Lexington Gold) and the leadership of Umkhonto Womnotho to negotiate a localized Joint Venture allocation.	For any questions regarding the Harmony Operations, please contact Sabelo Mgotywa: Senior Manager: Stakeholder Relationships of Harmony Gold as above mentioned. With regards any questions on the application process on the Jelani applications please continue to engage Kongiwe. We suggest a meeting in the week 6 - 11 July 2026. Please indicate if a MS Teams meeting is adequate or if you prefer an in-person meeting.	Appendix C

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			• Dedicated Technical Presentation: As per the commitment made by Kongiwe's executive directors at previous open days to address representative councils, we demand a dedicated stakeholder engagement meeting specifically for UW to interrogate the Scoping and EIA frameworks	Kongiwe's Executive Directors were not present at the Open Day; the meeting was attended by two Environmental Assessment Practitioners (EAPs). No commitment of the nature described was made by the Kongiwe representatives. During the Open Day, Kongiwe presented an overview of the Scoping and EIA process and informed attendees that, during the EIA phase, a further Open Day will be held to present the findings of the Draft EIA Report and provide stakeholders with an opportunity to comment. As above mentioned, we would be happy to have a separate meeting with you to discuss any technical queries you may have.	Appendix C
			• Full Disclosure of Compliance Data: Immediate disclosure of Harmony's historical SLP compliance audits for host communities in Free State Operations and the full text of the Section 11 Ministerial Consent given for the WRE/Lexington transaction.	For any questions regarding the Harmony Operations, please contact Sabelo Mgotywa: Senior Manager: Stakeholder Relationships of Harmony Gold.	Appendix C
			• Supplier Operations: Immediate stop to the Allanridge rock dump project until an	For any questions regarding the Harmony Operations, please contact Sabelo Mgotywa: Senior Manager: Stakeholder Relationships of Harmony Gold.	Appendix C

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			amicable solution is reached at the requested round table.		
			Umkhonto Womnotho understands that the MPRDA seeks to promote mining development, employment creation and socio-economic development which is what we stand for. We are not here to obstruct lawful development, but because section 2 of MPRDA obliges mines to contribute toward the socio-economic welfare and development of the areas in which it operates. As the host community, we therefore seek meaningful participation, transparency and partnership as legislatively required	The Public Participation Process for the Proposed Project is being undertaken in accordance with the applicable Environmental Impact Assessment (EIA) Regulations and is intended to facilitate meaningful stakeholder participation. I&APs are afforded the opportunity to access project information, submit comments, and participate constructively in public engagement activities throughout the S&EIA process. All comments received will be considered and addressed in the Comments and Responses Report. This is the opportunity to meaningfully participate in socio-economic development.	Appendix C
			Please acknowledge receipt of this formal objection within 48 hours and provide proposed dates for the mandatory round-table engagement. Should Kongiwe or the applicants proceed to submit the Final Scoping Report to the DMPR without resolving these host-community defects, UW will not hesitate to interdict the process to protect the economic and constitutional rights of our community.	An acknowledgement of receipt of the correspondence issued by Kongiwe via email on 12 June 2026. With respect to the request for a round-table engagement, stakeholders are requested to engage directly with Harmony. The submission of the Final Scoping Report is subject to the statutory timeframes prescribed by the EIA Regulations. Accordingly, the Final Scoping Report is scheduled to be submitted to the Department of	Appendix C

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				Mineral and Petroleum Resources (DMPR) by 1 July 2026. The comments received for the Proposed Project have been recorded in the Comment and Response Report, which forms part of the Final Scoping Report submitted to the Competent Authority.	
Mr Tinashe Maramba, Environmental Manager, Tetra4	Email Correspondence	Tuesday, 30 June 2026	Dear, Vanessa Viljoen / Jean-Mari Williams The project described below bears reference. **Jelani Resources (Pty) Ltd** **Environmental Authorisation and Integrated Water Use License Application for the Proposed Jelani Underground Mining Project** **DMPR Reference Number: FS30/5/1/2/3/2/1(10098)EM** **DWS Reference Number: WU38176** We would like to have a look at the extent of your project relative to our Production Right boundary and the extent of our various Exploration Rights.	Dear Mr Maramba This email confirms that Tetra4 has been registered as an Interested and Affected Party and has been included in the database. As required, please find the KMZ file attached. Please do not hesitate to contact us if you have any further queries.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Please kindly furnish us with a kml/kmz for our reference. In addition, please register Tetra4 as an official I&AP. Regards,		
Mr Lucky Tshepang, Interested & Affected Party	Email Correspondence	Wednesday, 01 July 2026	Dear Jelani JV Environmental Team, My name is MazibukoTshepang Lucky. I am an Interested & Affected Party and a resident of Nyakallong, which is located adjacent to the proposed Jelani JV underground mining area in Odendaalsrus, Free State. I acknowledge receipt of the Final Scoping Report and have reviewed the Executive Summary. I support responsible mining development in the area. As a member of the closest host community, I request that: 1. I be registered and considered for local employment and skills development opportunities in line with the project's Social and Labour Plan SLP, should the Mining Right be approved.	Good day Mr Mazibuko, Kongiwe hereby confirms that you have been registered as an Interested and Affected Party (I&AP) and have been included in the project database. We also thank you for taking the time to review the FSR and provide your comments. 1. There will be no employees on the Jelani payroll in the first four years of the SLP cycle. In Year 5, there will be 39 employees on the Jelani pay-roll. As the Mine Work Programme for this entire SLP cycle (Years 1 to 5) will be dedicated to feasibility/ engineering studies and implementation/ construction activities, it is likely that all (or mostly all) employees in this cycle will have professional qualifications. In Year 5, approximately 506 Harmony workers will be sourced/ contracted from Target. If Target cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area.	Appendix C Social Labour Plan

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			2. I be kept informed of all future public participation meetings, recruitment drives, and learnership/apprenticeship programs related to the project. Please confirm that my details are captured on the I&AP database.	The Local Economic Development (LED) project will provide further opportunities for local employment. The LED Project, as identified by Matjhabeng Local Municipality (MLM) and the Ward Councillor of Ward 19, is to refurbish the Nyakallong Community Hall. MLM identified this project as being in alignment with the municipality's Integrated Development Plan (2024/2025) (IDP), which involved consultations with community members in all wards throughout the municipality. On 19 March 2026, the MLM issued a letter of approval for Jelani to allocate R1,000,000 to the refurbishment of Nyakallong Community Hall. Wherever possible, suitably qualified and skilled local contractors will be sourced locally. Contractor teams comprising women and youth will also be considered favourably. 2. You will be notified of future public participation meetings and engagement opportunities during the EIA phase of the project. Please do not hesitate to contact us if you have any further queries.	
Mr Pule Theodore Sekaja,	Email Correspondence	Friday, 03 July 2026	Good afternoon, Sir/Ma'am,	Good day Mr Sekaja,	Appendix C

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
Director, Titan TP Tradings (Pty) Ltd			My name is Pule Theodore Sekaja (Director)from a developing Company (Titan TP Tradings Pty Ltd). Furthermore, we provide with deferent types of services including (Waste Management Service) and we are so much interested in making business with Kongiwe as a big Company that is going to operate within our community. Your reply will give more positive drive to (Titan TP Trading), I thank you. Yours Sincerely TP Sekaja(Director)	Kongiwe hereby confirms that you have been registered as an Interested and Affected Party (I&AP). Please note that Kongiwe has been appointed by Jelani Resources (Jelani) to assist with the Environmental Authorisation (EA) and Integrated Water Use Licence (IWUL) application processes for the Jelani Underground Mining Project. Following the completion of these application processes, our involvement in the project will cease. Should the EA and IWUL be granted, Jelani will be authorised to commence with the proposed mining project. Kongiwe will not be involved during the mining phase of the project. However, your comment regarding the registration of your company, Titan TP Trading (Pty) Ltd, on the SMME database has been received and will be included in the Comment and Response Report (CRR).	
Mr Tinashe Maramba, Environmental Manager, Tetra4	Email Correspondence	Friday, 17 July 2026	Good day, This communiqué serves as a formal request for information.	Dear Mr Maramba; We refer to your email received Friday, 17 July 2026, sent by e-mail to Kongiwe Environmental Stakeholder Engagement Team.	Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
			Please kindly forward us the following information as it relates to your project;	Please find the attached responses to the comments you have raised. All comments raised by yourself will be included in the Comment and Response Report (CRR). Please do not hesitate to contact us if you have any further queries.	
			1. Mine Works Programme	The Mine Works Programme (MWP) cannot be shared as it contains confidential technical and financial information. Secondly, the MWP is currently still in draft form and has not yet been approved by the Department of Mineral and Petroleum Resources (DMPR). However, Renergen Limited is welcome to contact Jelani Representatives at nhoek@mera.co.za , should they wish to discuss operational matters, etc.	-
			2. Mine Works Schedule	Prior to the initiation of mine implementation and construction activities, various stages of design work will be required to be undertaken. It is expected that these activities will take approximately four years before implementation can be initiated. Active mining can commence during year 7. The key timelines are listed in Table 2 below: **Table 1: Project Timelines**	Section 1.7.5

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<table>
<tr><th>Stakeholder</th><th>Consultation Method</th><th>Date of Comments Received</th><th>Issues Raised</th><th>Response to issues raised</th><th>Section Reference in the Report</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
<table>
<tr><th>Period</th><th>Description</th></tr>
<tr><td>Year 1 - 3</td><td>Site data gathering and feasibility studies</td></tr>
<tr><td>Year 4</td><td>Detailed engineering design</td></tr>
<tr><td>Year 5 - 8</td><td>Implementation and construction activities</td></tr>
<tr><td>Year 7</td><td>Hiring of employees</td></tr>
<tr><td>Year 7</td><td>Initiation of mining activities underground</td></tr>
</table>

The production build-up is planned to occur in two phases:

In Phase 1, which is planned to last for four years starting in Year 5, with construction and refurbishment with mining starting in Year 7. The first two years are required for level access and refurbishment, after which Target No 3 shaft will be used for hoisting of men, material and rock.

Phase 2 commences in Year 9, whereby access to the underground workings is via Target No 2 shaft, with Target No 3 shaft being reserved as a second outlet.

As mine development progresses over the first four years, new mining areas will be developed which will</td><td></td></tr>
</table>

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of ore per month, which is achieved in Year 10. 10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years.	
			3. Location of all activities (prospecting drilling to underground workings)	The proposed Jelani Project involves underground mining activities within the joint venture (JV) area. The JV area is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution). Project development will utilise the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. The Project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 1,5km west of	Section 1.1 Section 1.5 Figure 1.3 Section 1.7.1

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				Allanridge town, and 22km east of Wesselsbron, in the Free State Province of South Africa. Refer to Figure 1 for the Project local orientation.  **Figure 1: Local Orientation of the proposed JV Area Underground Mining Project**	
			4. List of Minerals for which the right is applied for	Jelani Project entails licensing the underground mining of the following potential mineral resources: • Gold ore (primary target), • Silver ore, • Uranium ore, • Sulphur, • Platinum Group Metals,	Project Introduction and Background

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues raised	Section Reference in the Report
				• Rare earths, • Diamonds (alluvial), • Copper ore, • Cobalt ore, • Manganese ore, • Molybdenum ore, • Nickel ore, • Lead ore, • Tungsten ore, • Zinc ore, and • Iron ore.	
			5. Contact details of your subsurface and engineering lead; and	Jelani Resources intends to initiate underground mining operation, to extract various minerals, primarily focusing on Gold ore, along with Silver, Uranium, and other associated minerals. The Project is currently in the licensing phase, during which the necessary Mining Rights are being obtained. Mining activities have not yet commenced. At this stage, no subsurface or engineering lead has been appointed.	Executive Summary
			6. A copy of the acceptance letter for the mining right application.	Refer to the attached acceptance letter for the Jelani Project Mining Right application.	-

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Appendix C11: Social and Labour Plan Consultation

MINUTES OF MEETING			
Date	Tuesday, 25 November 2025	**Time**	10:00 – 11:00
Venue	MS Teams Online Meeting		
Subject	**Department of Mineral and Petroleum Resources (DMPR) Meeting**		
List of Attendees			
Organisation	**Name of Attendee**	**Designation**	
Department of Mineral and Petroleum Resources (DMPR)	Ms Cecelia Sedutla	Officer for the Promotion of Access to Information Act (PAIA)	
DMPR	Mr Mphatheleni Khomola	Social and Labour Plan Officer	
Jelani Resources (Pty) Ltd (Jelani)	Neels Hoek	Applicant	
Kongiwe Environmental (Pty) Ltd	Mr Bradly Thornton	Project Director	
Kongiwe Environmental (Pty) Ltd	Mr Andrew Hamlet	Principal Social Consultant	
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement Consultant	
Apologies			
Organisation	**Name of Attendee**	**Designation**	
None			

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place

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No	Item	Responsible Person	Due Date
1	**Welcome and Introductions**		
1.1	Mr Bradly Thorton welcomed all the atteendees	N/A	N/A
2	**Meeting Purpose**		
2.1	Discuss the Social and Labour Plan's project details.		
2.2	To discuss the Social and Labour Plan approach		
2.3	To discuss the budget for the SLP and way forward in terms of project		
3	**Meeting Agenda**		
3.1	Project Details		
3.2	Project Location		
3.3	Social and Labour Plan		
3.4	Comment and Discussion		
3.5	Closing		
4	**Discussion**		
	Comment	**Discussion**	
4.1	Ms Sedutla clarified that she had initially assumed the meeting was intended specifically to discuss the Social and Labour Plan (SLP). However, she noted that the discussion also required the involvement of mineral law officials, as certain matters fell outside the SLP team's area of specialisation. She emphasised that the issues raised relate more to mine economics and mineral law than to SLP. She referred to Mr Thorton's presentation regarding an incorporated gold exploration Joint Venture (JV) company, comprising 65% ownership by White Rivers Exploration (WRE), a subsidiary of Lexington Gold, and 35% held by Harmony Gold subsidiaries (Lorraine Gold Mines Limited and Avgold Limited).	Mr Hoek indicated that he has already had a discussion with the Unit related to mineral law within the Department. He explained that his participation in this meeting is not to address operational matters, but rather to provide clarity on the SLP.	

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4.2	Ms Sedutla suggested that Jelani should develop and submit its own separate SLP.	Mr Hoek explained that Jelani's intention is to ensure meaningful impact through the SLP. He noted that if Jelani selects its own standalone LED projects, these may not achieve the desired long-term impact. He suggested that Jelani considers contributing to existing long-term projects such as the agricultural project and the youth development project rather than initiating short-term initiatives. He added that the idea is to link Jelani's commitments with Harmony's existing LED projects to enhance sustainability and community benefit.
4.3	Ms Sedutla noted and explained that, from a reporting perspective, it would be problematic if Jelani did not have its own SLP, as each company is required to submit and report on its own SLP.	Mr Hoek acknowledged the comment.
4.4	Ms Sedutla sought clarity and asked what budget Jelani intended to allocate for its LED projects.	Mr Hoek indicated that the first five years of the project will be focused on development, during which limited funds will be available for LED expenditure. He added that the preliminary estimate for the LED budget is approximately R800,000 over the first four-year period. Mr Hoek further explained that the team still needs to engage with the municipality, as consultations and alignment with all stakeholders have not yet been completed.
4.5	Ms Sedutla confirmed that discussions with the municipality are necessary to identify suitable projects. She further emphasized that, since the municipality is responsible for the Integrated Development Plan (IDP), any proposed projects must be aligned with their IDP.	The comment was acknowledged.
4.6	Ms Sedutla inquired for clarification, stating that, according to the presentation, there would be no employees from Year 1 to Year 4. She asked whether this means that there would be no Human Resource and Training (HRT) elements during that period.	Mr Hoek explained that provisions will be made for bursaries and other training initiatives as required. He confirmed that mentorship and internal employee training will also be accounted for. He further clarified that while these provisions will be made, the funds may not necessarily be spent during the initial period, but they will be allocated and planned for.
4.7	Ms Sedutla acknowledged Mr Hoek's comments and added that any provisions made for training, bursaries, or other initiatives within the first five years would need to be fully utilised during that same period.	Mr Hoek explained that the project will involve a gradual ramp-up. He noted that while the main operational activities may start in Year 5, the appointment process for employees would begin around Year 3. Provisions will be made

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		accordingly, and funds will be spent progressively rather than in a large upfront allocation. He added that there will likely be a need for internal training, particularly for Jelani's own staff, even in the early stages.		
4.8	Ms Sedutla inquired whether Jelani has engaged with Harmony regarding the LED programme and its potential contributions.	Mr Hoek indicated that Jelani is in the process of engaging with Harmony and that a meeting will be scheduled with them to discuss the LED programme and potential contributions.		
4.9	Mr Hoek explained that the Jelani project is intended as part of a broader strategy to extend the life of the Target Mine. He emphasised that the project is primarily focused on preserving jobs.	The comment was noted by the attendees.		
4.10	Ms Sedutla inquired whether Jelani intends to mine under the existing Target Mine mining right or if it plans to apply for a new mining right.	Mr Hoek explained that Jelani will submit a new mining right application.		
4.11	Mr Khomola suggested providing Jelani with the SLP guidelines to follow. These guidelines will include a preamble introducing Jelani, specifying the location of the mine, and outlining the required structure for submissions.	The comment was noted.		
4.12	Mr Thorton thanked the attendees and noted that the outstanding matters would be addressed offline. He indicated that a follow-up session will be scheduled once Jelani has finalised some figures, and Kongiwe has met with the municipality, and clarified a few remaining details.	The comment was noted.		
4.13	Mr Hamlet highlighted that the municipality's priority issues, particularly in the wards surrounding the mine, include access to water, improved sanitation, electricity, LED programmes, and road and stormwater management. He noted that the team already has an understanding of these priorities but needs to confirm them with the municipality.	Ms Sedutla recommended engaging directly with the municipality and liaise with the LED Manager.		
5	**Closing**			
5.1	The meeting adjourned at 10:30 AM.		ALL	-

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Jelani Resources (Pty) Ltd

Social & Labour Plan (SLP) for the Jelani Resources JV Project (Jelani JV Project) in Free State Province

25 November 2025

Agenda

1. Welcome and Introduction
2. Project Details
3. Project Location
4. Social & Labour Plan
5. Comment & Discussion
6. Closing

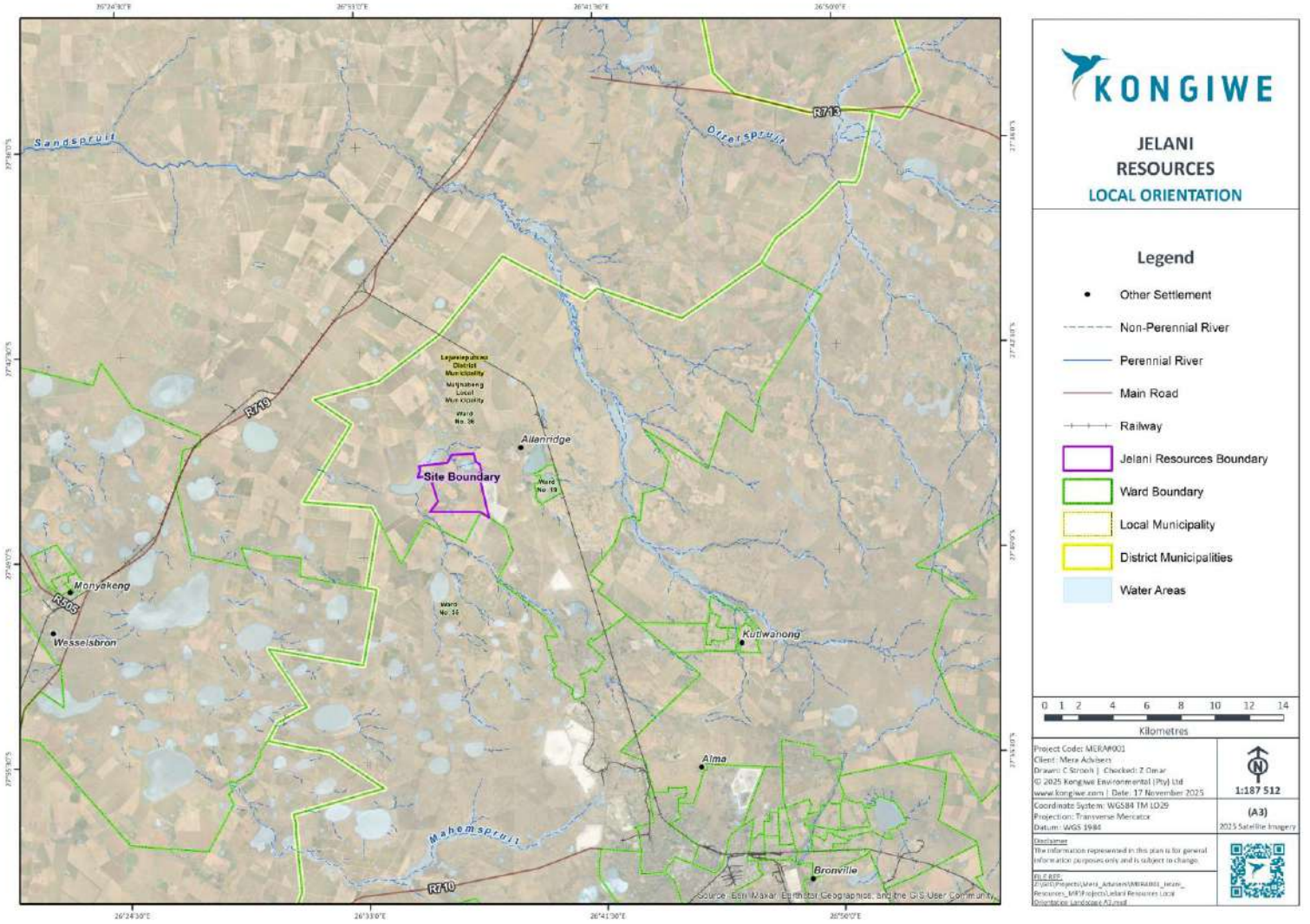
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Project Details

- Applicant: **Jelani Resources (Pty) Ltd.**
- An incorporated gold exploration **Joint Venture (JV)** company comprised of **65% held by White Rivers Exploration (WRE)** (a subsidiary of Lexington Gold) and **35% by subsidiaries of Harmony Gold** (Lorraine Gold Mines Limited and Avgold Limited).
- Proposed project located adjacent to **Harmony Gold's Target Mine.**
- Current prospecting right entitles Jelani to prospect for gold under registration number 17/2024.
- **Infrastructure used for the Project will be the existing Harmony Target Mine.**
- A Mining Right Application is being prepared supported by a **Social and Labour Plan (SLP).**
- 10 340 Mt of ore mined over the Life of Mine (LOM) **which is 23 years.**

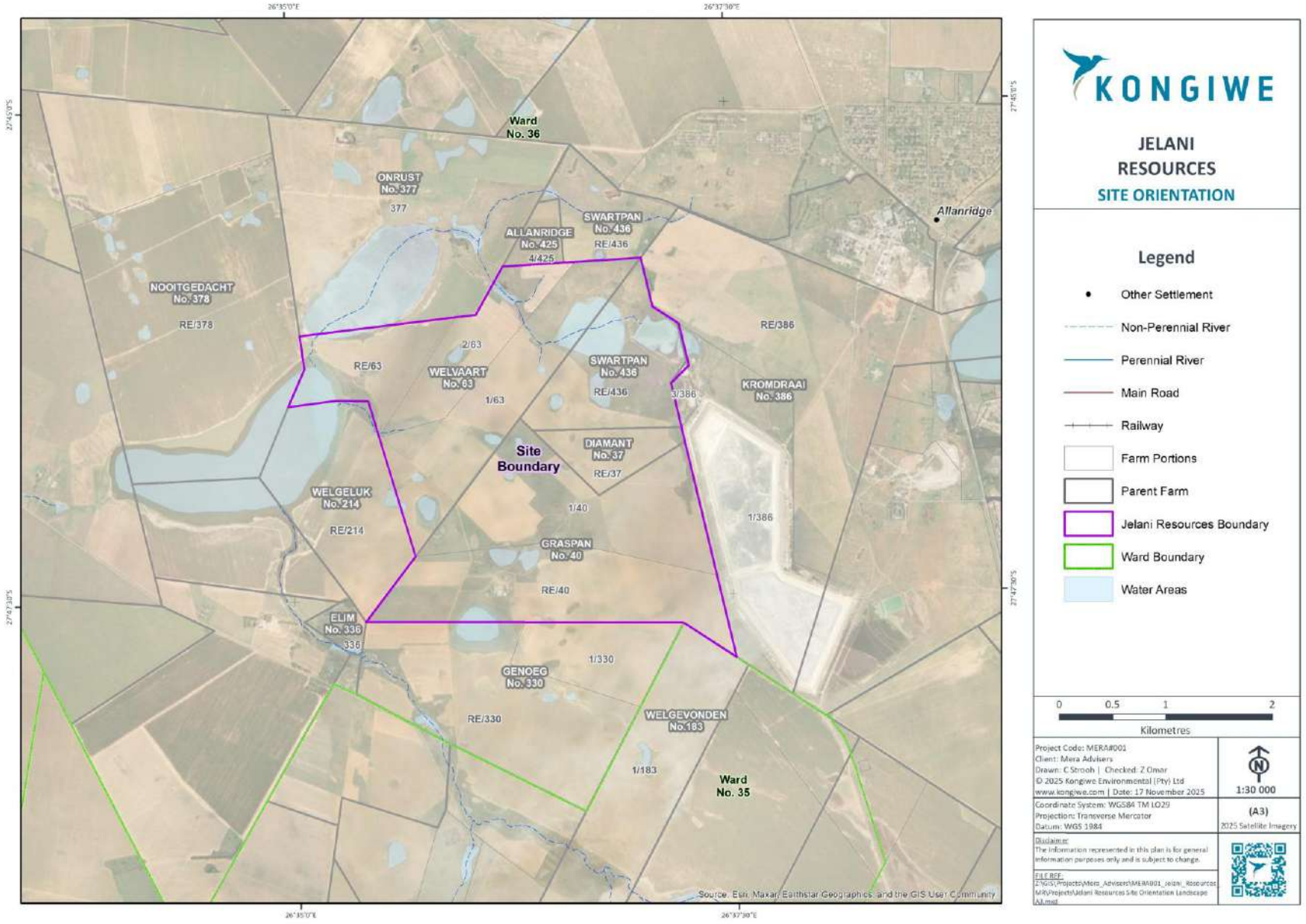
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Project Location



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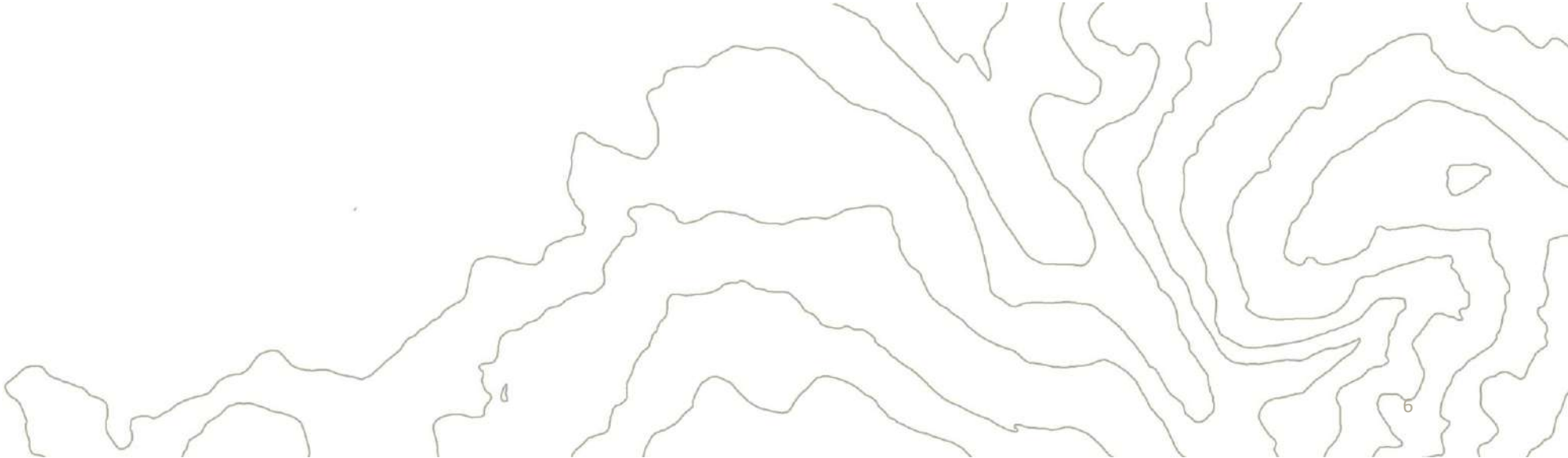
Project Location



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Social and Labour Plan

- Ore will be mined underground and brought to surface at Target. Target's surface infrastructure will be used.
- There will be no employees / staff from Year 1 to Year 4 from the date that the Mining Right is granted.
- Employment for the Project will only take place in Year 5, upon commencement of the development phase.
- Where possible, Harmony workers will be sourced from the Target Operation. If Target cannot provide workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area.



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Social and Labour Plan

- As most – if not all – Harmony personnel will be sourced from Target Operation, the **Jelani SLP is closely aligned to the current Target SLP (2023-2027).** Consequently, the planning and proposed activities in the Jelani SLP are collaborative with the Target SLP.
- In particular, the **Jelani SLP proposes to contribute to the existing LED programmes** already being implemented by Target Operation (1% of net profit).
- HR spend will be 5% of payroll.
- Approximately 39 employees over the LoM which will be employed from year 5, the rest will be Harmony employees.
- Most of the this initial 5-year SLP cycle will occur during the planning phase of the Project.

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Comment and Discussion

- **Discussion**
  - General.
- **Way Forward**
  - Discuss municipal consultation expectations.
  - Additional meeting with DMPR will be set up to present the draft SLP for discussion.
- **Closing**



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Contact

- **Name: Andrew Hamlet**
- **Tel: 079 303 8484**
- **Email: ahamlet@kongiwe.com**

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa

info@kongiwe.com
www.kongiwe.com

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Wednesday, January 21, 2026

Memorandum	
To	Sefako Ramphoma (Executive Director LED: Matjhbeng Local Municipality)
From	Andrew Hamlet
Subject	**Proposed Jelani Resources Project and SLP**

Dear Sefako,

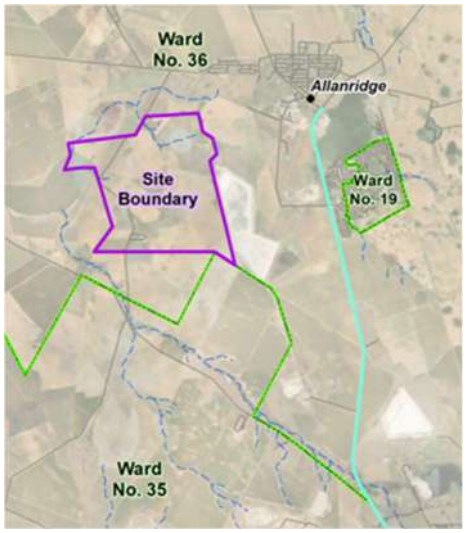
Thank you for confirming a time for a phone call tomorrow. For some context for our discussion, I have provided some information about the mining proponent and the SLP being developed.

Company Background

- Jelani Resources Pty Ltd (Jelani) is preparing a Mining Right Application that will be supported by a SLP.
- Jelani is an incorporated gold exploration Joint Venture company comprised of 65% held by White Rivers Exploration (a subsidiary of Lexington Gold) and 35% by subsidiaries of Harmony Gold (Lorraine Gold Mines Limited and Avgold Limited).

Mine Details

- Adjacent to Harmony Target Mine, 2km to the west of Allanridge. Located in Ward 36. Wards 19 and 35 are nearby.
- Project will use existing surface infrastructure from Harmony Target Mine to process ore.
- 10 340 Mt of ore will be mined underground over the Life of Mine (23 years).



Employment Projection

- There will be no employees / staff from Year 1 to Year 4 from the date that the Mining Right is granted.
- Employment for the Project will only take place in Year 5, upon commencement of the development phase.
- The Mine will have approximately 39 employees over the LoM. All other workers will be Harmony employees.
- Harmony workers will be sourced from Target Operation. Workers from other Harmony mines will be sourced if Target Operation cannot provide all workers.

SLP Cycle

- Most of the initial 5-year SLP cycle will occur during the planning phase of the Project.
- LED spend is to equate to 1% of nett profit after tax. As there will be no profit in this SLP cycle, a total of R600,000 is proposed over a 3-year period (commencing in Year-3 of the SLP cycle).

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
LED Project	-	-	R 200,000	R 200,000	R 200,000	R 600,000

Possible LED Project

- Jelani is seeking to implement a LED project that provides outcomes from limited funding within a three-year period.
- Possible LED Project: Development of facilities at a school near the project area, such as building a new classroom or installation of water tanks/ solar panels.

I look forward to our discussion tomorrow.

Your faithfully,

Andrew Hamlet
Principal Social Consultant

Kongiwe Environmental (Pty) Ltd
Registration Number 2016/135562/07
Directors: N Banks, GE Cornish-Bowden (COO), AM Lemon, GL Smith, BJ Thornton (CEO)
Telephone: +27 (10) 140 6508, Email: info@kongiwe.com
Registered Address: 150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
www.kongiwe.com

MATJHABENG

Municipality
Umasipala
P O Box 708
Welkom, 9460
South Africa

Mmasepala
Munisipaliteit
Tel: (057) 391 3711
Fax: (057) 357 4393
E-mail: mm@matjhabeng.co.za

OFFICE OF THE MUNICIPAL MANAGER

Enquiries/Navrae/Dipatlisi : **Dr S.S Ramphoma**
Room no/ Kamer nr/ Kamore ya : **Room 408, 4th Floor, Procor Building, One Reinet Street**
Date/ Datum/Letsatsi : **27 February 2026**

Programme Manager (SLP)
JELANI GROUP
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
Bryanston
Sandton
2191
Email: ahamlet@kongiwe.com

Attention: Mr. A.Hamlet

SOCIAL LABOR PLAN PROJECTS FOR THE IDP & LED 2026 - 2028 FINANCIAL YEARS

Your attention is drawn in terms of the Social Labor Plan (SLP) review in compliance with the **Minerals and Petroleum Resource Development Act (Act 28 of 2002) and its Regulations.** The municipality has reviewed its Integrated Development Plan (IDP) 2024/25. The revised IDP has identified a number of priority projects which are listed in the table below falling within the jurisdiction of your mining operation.

Section 4.4. of SLP guidelines and Section 46 (c)(iii) of the Minerals and Petroleum Resource Development Regulations requires your development contributions in terms of infrastructure and poverty eradication projects that the mine would undertake in line with the **IDP** of the areas and other relevant frameworks in which the mine operates and the major sending areas. The identified IDP priority infrastructure projects should be implemented in terms of section 4.5.1 of 4.5 of the SLP guideline. Below are three (04) identified IDP priority projects:

No.	Project Name	Est Cost	Financial Year
1.	Refurbishment of Nyakallong Community Hall	R 1 000 000	2026 - 2028

The Municipality urges your company to fund the full scope of the projects including consultants' fees for technical reports and designs for all projects as well as full contract fees for actual works. An implementation plan of the identified projects must be provided to the municipality in line with the section 4.4.3 and 4.4.4 of 4.4 of the SLP guidelines. It is important to note that your development contribution in line with the mining license must conform to the IDP cycles. **Note that council may review these projects based on the IDP reviews.**

Yours in development partnership

Dr V Adonis
Acting Municipal Manager

Environmental Authorisation, Integrated Water Use Licence Application, and Social Labour Plan for the Jelani Joint Venture (JV) Underground Mining Project, Free State Province

DMPR reference number: FS30/5/1/2/3/2/1(10098) EM

DWS reference number: WU50090

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture between White Rivers Exploration (WRE) and Harmony Gold, formed to conduct underground mining operations in the Free State Province of South Africa. The joint venture area includes portions of Harmony Gold's existing Target Mine mining right area (Harmony contribution) and prospecting right areas located west of the Target Mine (WRE contribution).

Jelani is proposing to develop and to commence underground mining within the same area (the Project). The primary mineral resource targeted is gold, with additional potential resources including silver, uranium, sulphur, platinum group metals, rare earth elements, diamonds (alluvial), and a range of base and ferrous metals such as copper, cobalt, manganese, molybdenum, nickel, lead, tungsten, zinc, and iron.

Mining will initially focus on shallower ore bodies at approximately 1,200 metres below surface. As mine development progresses, further mining areas will be opened, allowing production to gradually increase to a planned steady-state rate of 60,000 tonnes of ore per month.

Two underground mining methods have been identified as most suitable: conventional breast mining and shrinkage stoping. The selection of method is primarily determined by the dip of the mineralised reef, with shrinkage stoping applied to steeper reef sections, representing approximately 3% of the total stope tonnage. Where the orebody dips below 55°, conventional breast mining will be used.

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area. Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary, with short gravel access tracks provided for each station. These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

The Social Labour Plan (SLP), which sets out the social and labour programmes for Project's Life of Mine (LoM), has been prepared in accordance with requirements of Mineral and Petroleum Resources Development (MPRDA) Act (Act No. 28 of 2002). Jelani will be required to submit this SLP to the Department of Mineral and Petroleum Resources (DMPR) for approval as a prerequisite for a Mining Right (MR) to be granted.

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

Availability of the Draft Scoping Report (DSR) for Public Review and Comment:

The **DSR** for the Project is available for public review and comment for 30 days, from **Thursday, 21 May 2026 to Monday, 22 June 2026.**

The **DSR** is available on Kongiwe's website https://kongiwe.com/projects/, and an electronic copy can be made available upon request. In addition, non-technical summaries of the **DSR** are also available electronically.

A hard copy of the **DSR** is available at the following public place: **Allanridge Public Library** (53 Caledon St, Allanridge, Contact: Ms Anna Matjelo, Librarian - (078) 713 2063).

Stakeholder Meeting:

Open Day: The purpose of this meeting is to discuss the Project, the contents of the **DSR and SLP,** and to provide Interested and Affected Parties (I&APs) with the opportunity to raise their comments and to interact with the Project team. Please see below the proposed stakeholder meeting details:

Proposed Date	Available Time Slot	Method of Engagement / Venue
In-Person Meeting: Open Day		
Saturday, 30 May 2026	**11H00 – 13H00**	**S.A. Mokhothu Primary School, 3073 Nyakallong, Allanridge, 9490**

To register as an I&AP, contact:
Kongiwe Environmental Stakeholder Engagement Team
Ms Jean-Mari Williams - Phone: (010) 140 1726
Ms Vanessa Viljoen - Phone: (010) 140 1725
E-mail: stakeholders@kongiwe.com

Our team welcomes your participation and looks forward to your involvement throughout this process.

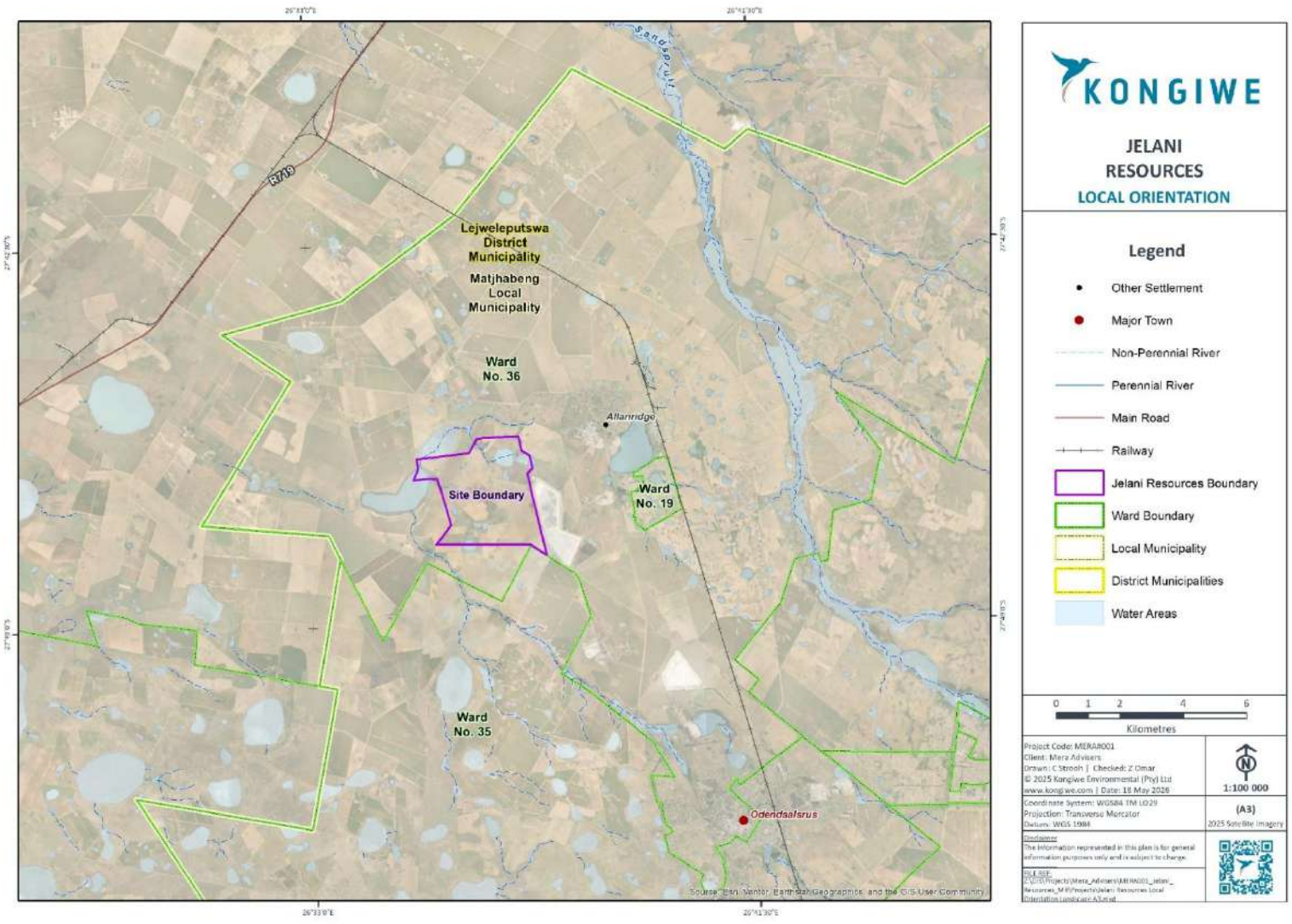


Figure 1: Locality Map

Appendix D: Specialist Studies

Appendix D1 – Environmental Screening Tool

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number:

Project name: Jelani Underground Mining Operation

Project title: Underground Mining Project

Date screening report generated: 16/03/2026 15:01:34

Applicant: Jelani Resources (Pty) Ltd

Compiler: Kongiwe Environmental (Pty) Ltd

Compiler signature: .....

Application Category: Mining|Mining Right

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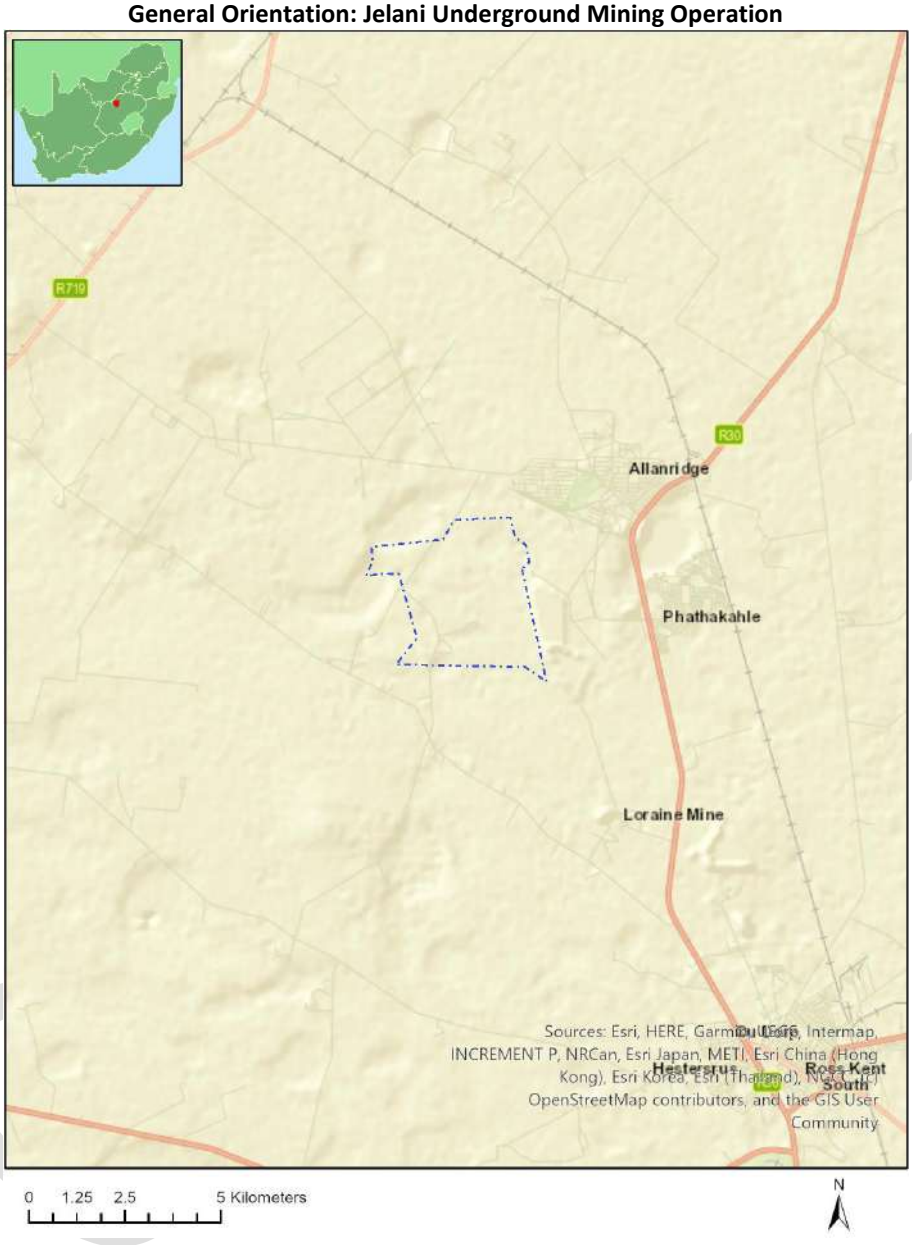
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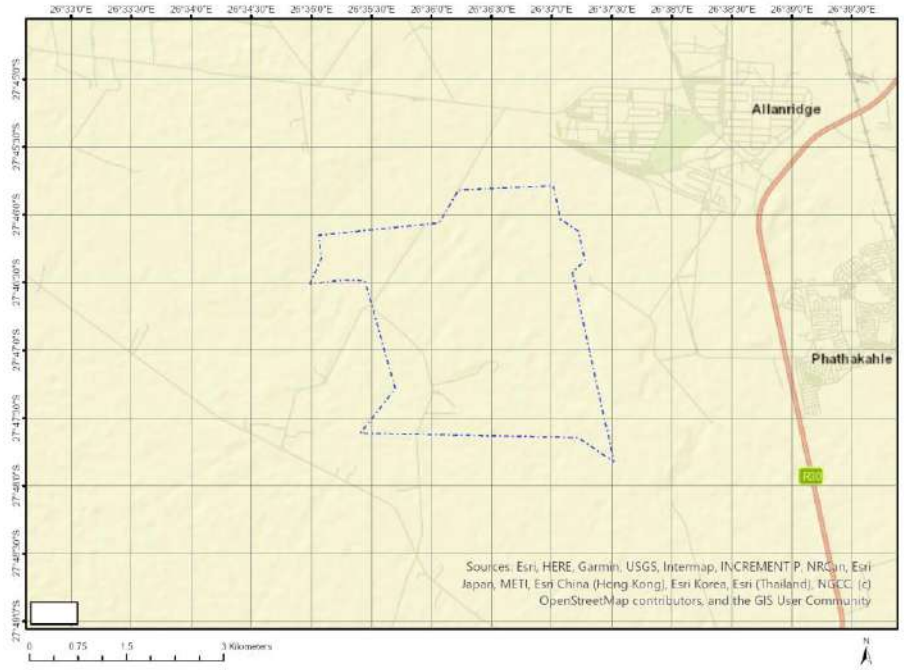
Proposed Project Location

Orientation map 1: General location

General Orientation: Jelani Underground Mining Operation



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	SWARTPAN	436	0	27°46'21S	26°36'51.72E	Farm
2	KROMDRAAI	386	0	27°46'35.86S	26°37'49.31E	Farm
3	WELVAART	63	0	27°46'22.49S	26°35'57.64E	Farm
4	GRASPAN	40	0	27°47'15.48S	26°36'33.59E	Farm
5	DIAMANT	37	0	27°46'46S	26°36'49.36E	Farm
6	KROMDRAAI	386	0	27°46'16.35S	26°37'59.48E	Farm Portion
7	KROMDRAAI	386	1	27°47'4.3S	26°37'36.89E	Farm Portion
8	KROMDRAAI	386	3	27°46'28.95S	26°37'14.75E	Farm Portion
9	SWARTPAN	436	0	27°46'21S	26°36'51.72E	Farm Portion
10	GRASPAN	40	1	27°47'3.01S	26°36'37.73E	Farm Portion
11	GRASPAN	40	0	27°47'27.95S	26°36'29.45E	Farm Portion
12	DIAMANT	37	0	27°46'46S	26°36'49.36E	Farm Portion
13	WELVAART	63	2	27°46'12.37S	26°36'3.66E	Farm Portion
14	WELVAART	63	1	27°46'29.6S	26°36'9.99E	Farm Portion
15	WELVAART	63	0	27°46'18.36S	26°35'26.72E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

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Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/376	Solar PV	Approved	16.6
2	14/12/16/3/3/1/2410	Solar PV	Approved	1.1
3	14/12/16/3/3/2/515	Solar PV	Approved	10.3
4	14/12/16/3/3/2/2218	Solar PV	Approved	25.5
5	14/12/16/3/3/1/1472	Solar PV	Approved	13.4
6	14/12/16/3/3/2/2221	Solar PV	Approved	27.8
7	14/12/16/3/3/2/376/2	Solar PV	Approved	16.6
8	14/12/16/3/3/2/376/2/AM6	Solar PV	Approved	16.6
9	14/12/16/3/3/1/1471	Solar PV	Approved	15
10	14/12/16/3/3/2/2220	Solar PV	Approved	25.5
11	14/12/16/3/3/2/2091	Solar PV	Approved	7.1
12	14/12/16/3/3/3/1/644/AM1	Solar PV	Approved	16.6
13	14/12/16/3/3/2/376/1	Solar PV	Approved	16.6
14	14/12/16/3/3/2/376/AM2	Solar PV	Approved	16.6
15	14/12/16/3/3/1/2499	Solar PV	Approved	16.6
16	14/12/16/3/3/3/1/644	Solar PV	Approved	16.6
17	14/12/16/3/3/2/2219	Solar PV	Approved	26.6
18	14/12/16/3/3/1/1444	Solar PV	Approved	11.7
19	14/12/16/3/3/1/1471/AM1	Solar PV	Approved	15

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Mining|Mining Right**.

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-Central corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf

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Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme	X			
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the known impacts associated with the proposed development, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforHIA.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/GuidanceforPIA.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf
7	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
8	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.

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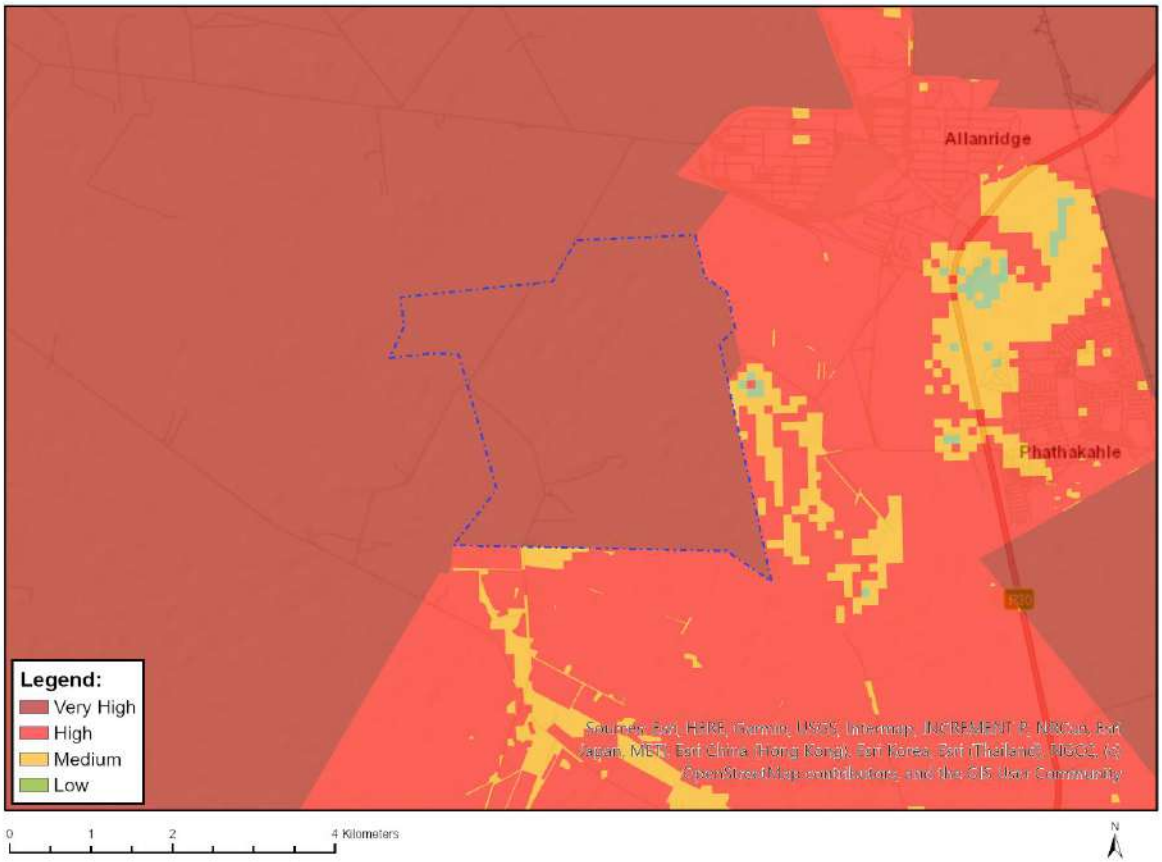
		pdf
9	Radioactivity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Climate Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
13	Health Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
14	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
15	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
16	Seismicity Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
17	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
18	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

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Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

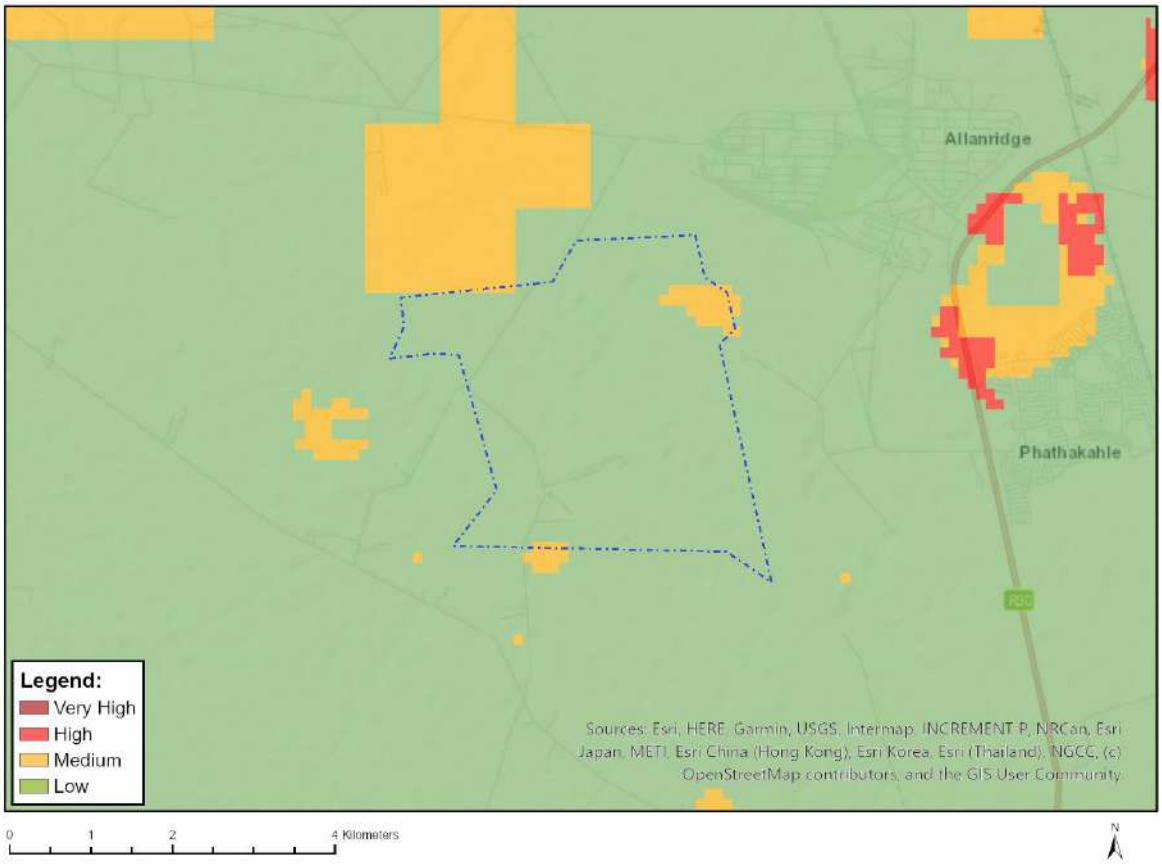


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Old_Fields
High	Rainfed Annual Crop Cultivation / Planted Pastures
High	08. Moderate
High	09. Moderate-High
High	10. Moderate-High
Low	05. Low
Medium	06. Low-Moderate
Medium	07. Low-Moderate
Very High	Bothaville PAA

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

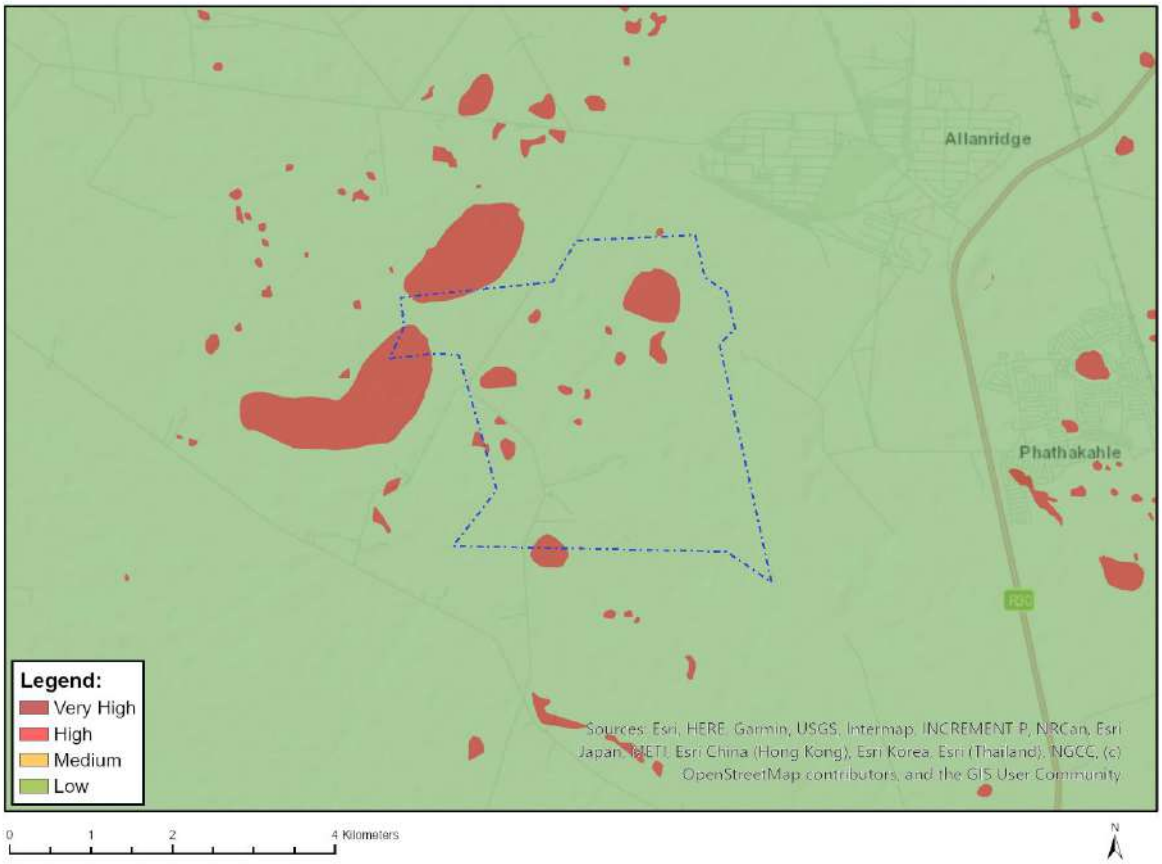
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Hydroprogne caspia
Medium	Mammalia-Hydrictis maculicollis

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MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



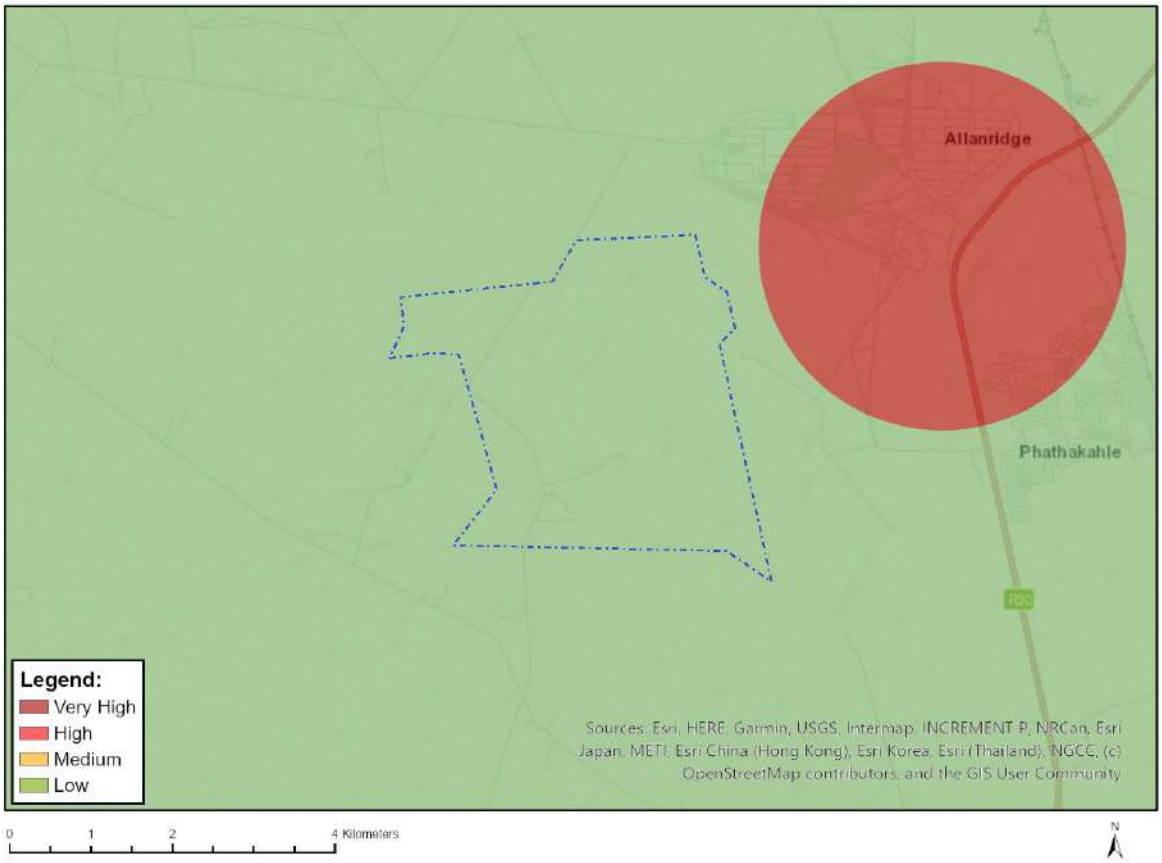
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Wetlands_Depression
Very High	Wetlands_Unchannelled valley-bottom

Disclaimer applies
16/03/2026

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY



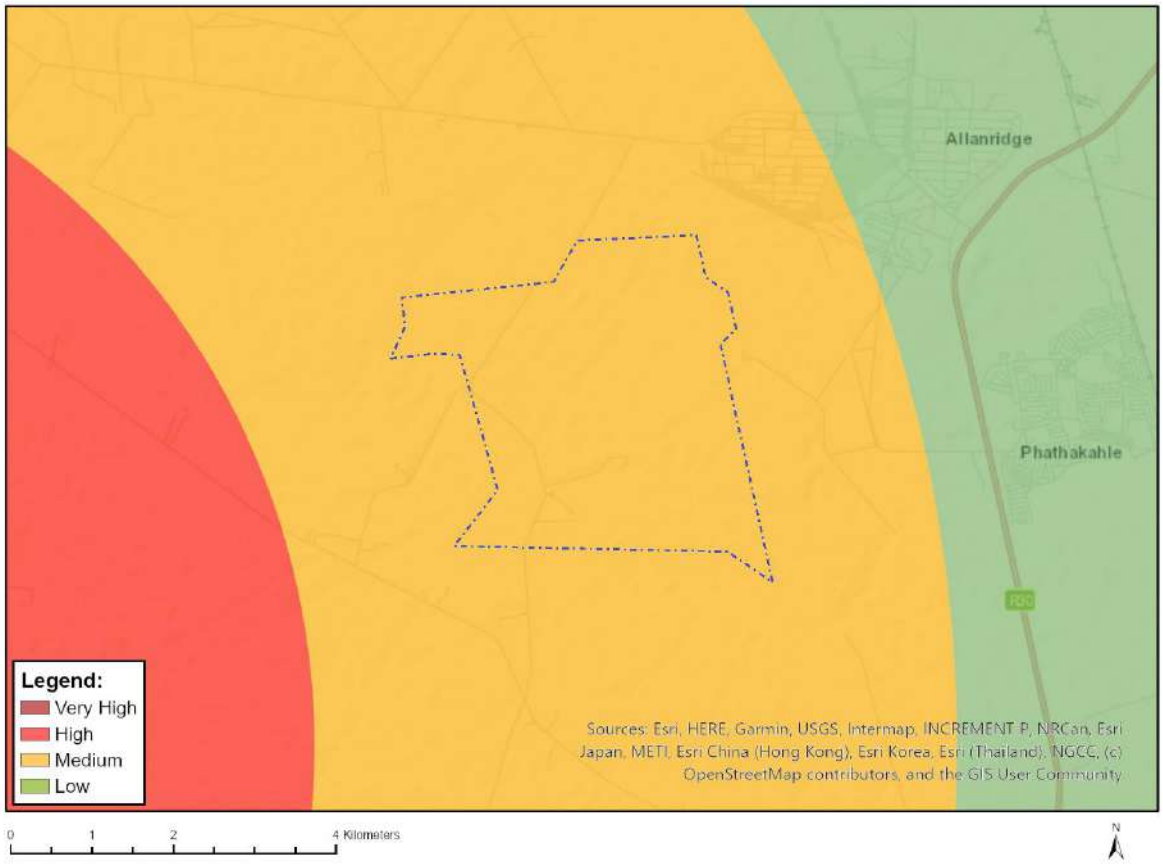
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
16/03/2026

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Between 8 and 15 km of other civil aviation aerodrome

Disclaimer applies

MAP OF RELATIVE DEFENCE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

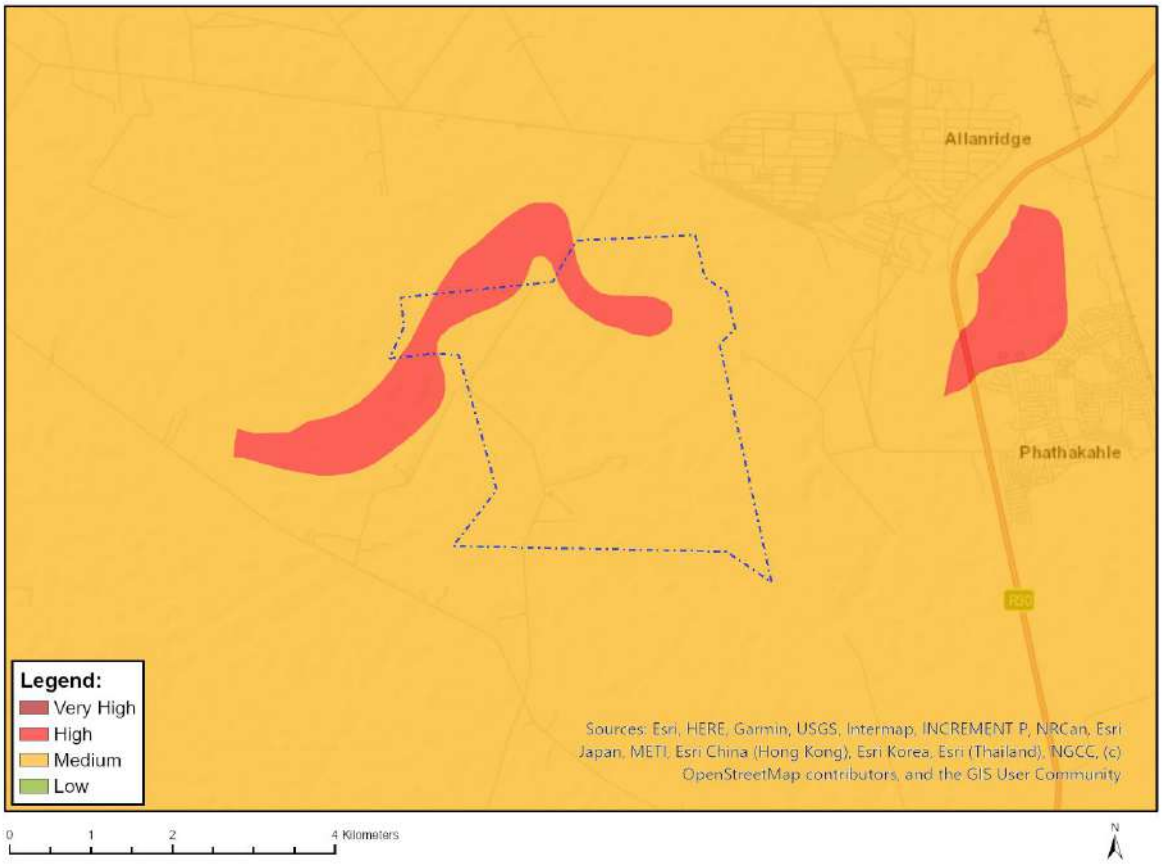
Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

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MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Features with a High paleontological sensitivity
Medium	Features with a Medium paleontological sensitivity

Disclaimer applies

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

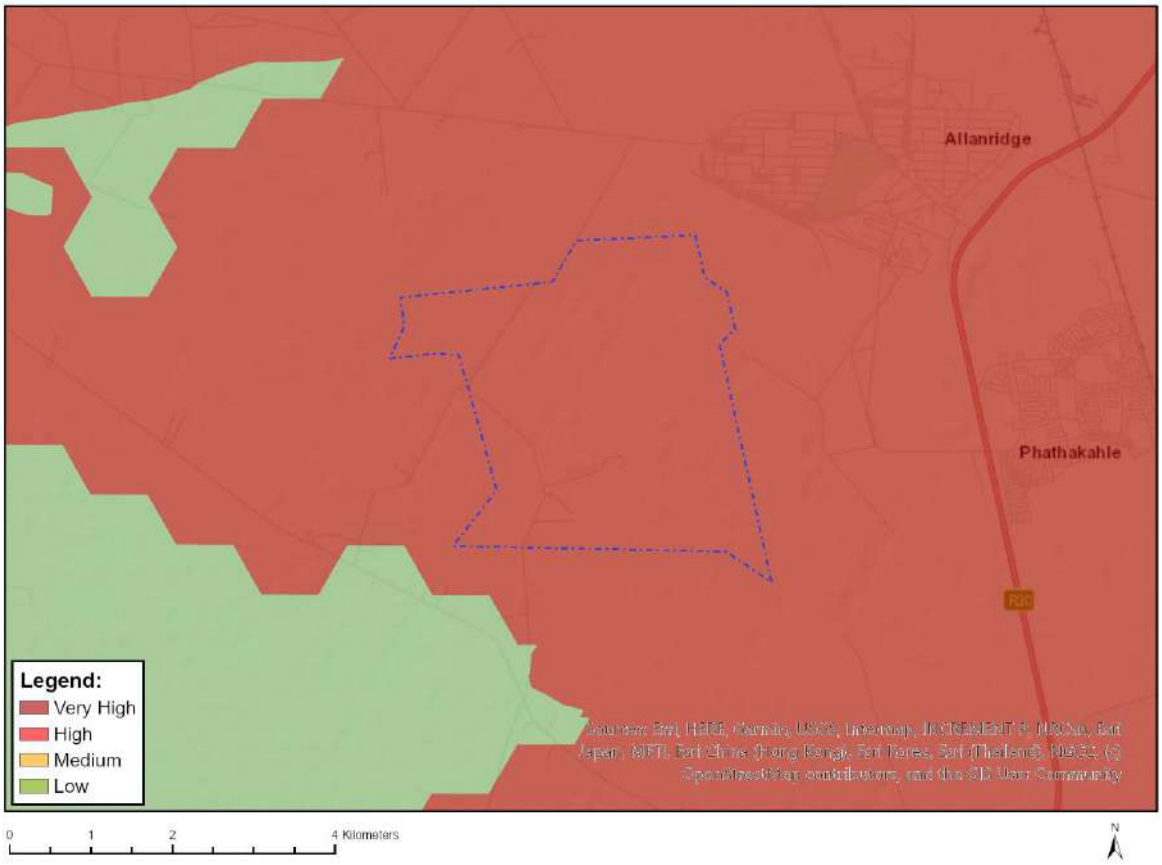
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Disclaimer applies
16/03/2026

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	CBA 1
Very High	ESA 1
Very High	ESA 2
Very High	EN_Vaal-Vet Sandy Grassland

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Appendix D2 - Air Quality Impact Quality Assessment

Rayten
ENGINEERING SOLUTIONS
Environmental and Engineering Consultants

JELANI RESOURCES (PTY) LTD

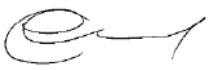
AIR QUALITY IMPACT ASSESSMENT REPORT – PROPOSED UNDERGROUND MINING PROJECT

September 2026

Rayten Project Number: SCI-KON-254264

Rayten Report Number: KON-2026-Report-0002-01-Air Quality Impact Assessment for Jelani Resources

REVISION AND APPROVAL PAGE

Revision Number	**0.1**		
Rayten Project Number	**SCI-KON-254264**		
Rayten Report Number	**KON-2026-Report-0002-01-Air Quality Impact Assessment for Jelani Resources**		
Report Title	**JELANI RESOURCES (PTY) LTD** **AIR QUALITY IMPACT ASSESSMENT REPORT – PROPOSED UNDERGROUND MINING PROJECT**		
	Name	**Signature**	**Date**
Author	**Gertrude Mafusire** ***(Pri. Sci. Nat)*** *Senior Associate*		23 September 2026
Reviewer	**Clive Wray** ***(Pri. Eng)*** *Engineering Manager*		23 September 2026
Document Authorisation	**Claire Wray** ***(Pri.Sci. Nat)*** *Atmospheric Scientist*		23 September 2026

Report Submission Summary		
Report Revision Number	**0.0**	Date Submitted: 18 September 2026
Report Revision Number	**0.1**	Date Submitted: 23 September 2026

DISCLAIMER

Information contained in this report was based on the last information received from Kongiwe Environmental (Pty) Ltd in July 2026. Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Rayten Engineering Solutions (Pty) Ltd for incomplete or inaccurate data supplied by others. We are aware of the fact that there might have been changes since this report was submitted, however, this report and its findings are based on the last information received from the client in July 2026. To the best of our knowledge, the assumptions and findings are correct at the time of submission of the specialist report. Should any of the assumptions or findings prove to be incorrect subsequent to submission of the report we as the specialist cannot be held accountable. Note that although every effort has been made by Rayten Engineering Solutions (Pty) Ltd to obtain the correct information and to carry out an appropriate, independent, impartial and competent study, Rayten Engineering Solutions (Pty) Ltd cannot be held liable for any incident which directly or indirectly relates to the work in this document, and which may have an effect on the client or on any other third party.

CONFIDENTIALITY

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EXECUTIVE SUMMARY

Rayten Engineering Solutions (Pty) Ltd (hereafter referred to as “Rayten”) was appointed by Kongiwe Environmental (Pty) Ltd to compile an Air Quality Impact Assessment report (AQIAr) for the proposed Jelani Resources underground mining project near Allanridge, in the Lejweleputswa District Municipality, Free State Province.

The proposed project entails licensing the underground mining of the following potential mineral resources: Gold ore (primary target), Silver ore, Uranium ore, Sulphur, Platinum Group Metals, Rare earths, Diamonds (alluvial), Copper ore, Cobalt ore, Manganese ore, Molybdenum ore, Nickel ore, Lead ore, Tungsten ore, Zinc ore, and Iron ore.

This AQIAr has been compiled as a supporting document for the Mining Right (MR) application for the proposed project, specifically to inform the Scoping and Environmental Impact Assessment phases of the project. The main objective of the AQIA is to determine the potential impact of emissions associated with the proposed project, in terms of dustfall (as Total Suspended Particulates (TSP)) and criteria air pollutants (PM_{10} and $PM_{2.5}$).

As part of the AQIA, a baseline air quality assessment was undertaken to determine the following:

- the prevailing meteorological conditions at the site;
- establish baseline concentrations of key air pollutants of concern;
- identify existing sources of emissions; and
- identify key sensitive receptors surrounding the project site.

Summary of conclusions for baseline assessment

The land use immediately surrounding the project site within a 20km radius, consists of a mixture of grassland, cultivated land, mining areas, water bodies, exposed areas – in the form of fallow land, and built-up areas. Built-up areas mainly include formal and informal residential areas. In addition, some natural and planted trees, as well as commercial areas form part of the land use in surrounding areas, but to a minimal extent. The larger area surrounding the project site is classified as rural in nature. The project area does not fall within a Nationally Declared Air Quality Priority Area. Existing sources of airborne emissions surrounding the project site have been identified as follows:

- Commercial agricultural activity (surrounding areas);
- Mining activities (surrounding areas);
- Wind erosion from exposed/bare surfaces (surrounding areas); and
- Vehicle dust entrainment on unpaved roads (surrounding areas).

MM5 modelled meteorological data for the period 01 January 2023 – 31 December 2025 was used for input into the dispersion model and to determine prevailing meteorological conditions for the project site. Based on the prevailing wind fields for the period January 2023 to December 2025, emissions from the proposed activities will likely be transported towards the south-westerly wind quadrant. Wind speeds observed during all time periods were generally classified as light air to fresh breezes, which may help in effective dispersion of pollutants from the proposed operations. However, higher wind speeds can facilitate fugitive dust emissions from open exposed areas such as stockpile areas and waste rock dumps.

The existing air quality situation is usually evaluated using available monitoring data from permanent ambient air quality monitoring stations and dustfall networks near the project site. The nearest air quality monitoring station to the project site is located at the Bayswater Clinic (-29.085052°S; 26.242689°E) in Bloemfontein, however, this station is located more than 10km away from the proposed mine (i.e., ~150km south-west of the mine) and would not provide an accurate representation of background concentrations for criteria air pollutants (PM_{10}, PM_2.5, CO, SO_2, NO_2) at the project site. There is no other ambient air quality monitoring station operated near the project site (within a ~10km radius) that data could be used to represent background air quality, thus, baseline air quality concentrations for the criteria air pollutants could not be determined for the project site.

Dustfall monitoring is undertaken near the project site, by Harmony Gold, using single-unit dust bucket stations. Thus, background dustfall data for the project area was obtained from Harmony's monitoring network for the July 2024 to June 2025 monitoring periods. The dustfall monitoring network consists of seven (7) dustfall monitoring sites. Six (6) of the sites are classified as non-residential, while the seventh site is classified as residential.

Out of 70 dustfall rates recorded at the Harmony sites for the July 2024 – June 2025 monitoring periods, only one (1) exceedance of the residential area standard of 600 mg/m^2/day was recorded at site HAR1 (Nyakallong). However, causes of the exceedance were unknown at the time of compilation of this report. The exceedance was recorded in March 2025. In terms of the National Dust Control Regulations, 2026, a total of two non-consecutive exceedances of the residential and non-residential area limits are permitted within a calendar year. Thus, based on Harmony's dustfall monitoring data for the July 2024 – June 2025 monitoring periods, background dustfall rates at the project site are compliant with the Dust Control Regulations.

Summary of conclusions for the impact assessment

The main conclusions for the AQIA for the project can be summarised as follows:

Dustfall, PM_{10} and $PM_{2.5}$ are key pollutants of concern associated with the proposed mining activities, and are emitted from the following activities:

- Refurbishment and/or construction at Target No. 2 and No.3 Shafts;
- Materials handling operations (truck loading/offloading operations during Phase 1);
- Wind erosion from exposed areas: waste rock dumps;
- Vehicle dust entrainment on unpaved roads; and
- Conveyor transfer points (rock hoisting and run-of mine ore transport).

Processing operations at the Target 1 Plant fall outside the scope of this assessment, as they are undertaken as part of Harmony's operations and are not included in the proposed JV project.

It was confirmed that mining will be done in phases, i.e., Phase 1 and Phase 2. Mined ore will be transported to the Target 1 Plant by truck during Phase 1 when Target 3 Shaft is used for rock hoisting. In Phase 2, when mining operations are relocated to Target 2 Shaft, the ore will be transported to the plant via a series of overland conveyors. In this study, two scenarios were modelled:

a) The **construction phase scenario**, where emissions associated with construction and refurbishment activity due to the development and/or upgrade of infrastructure at Target No 2 Shaft were modelled.
- Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.

b) The **operational phase scenario**, where emissions associated with surface activities at the proposed mine were modelled. This scenario represents the potential impacts if the proposed mine were emitting under normal operating conditions and comprises two different operational configurations, representing Phase 1 and Phase 2, respectively.

The closure phase was not assessed in this AQIAr. However, the impacts associated with closure should be similar to those observed for the construction phase. Thus, the incremental concentrations projected, and isopleth plots created for the construction phase in this AQIAr are considered as applicable to the closure phase.

Dispersion Model Results for Construction Phase

Predicted dustfall deposition rates, as well as PM_{10} and $PM_{2.5}$ concentrations, are indicated to be highest in the immediate vicinity of the construction area and decrease rapidly with increasing distance from the source. Localised on-site exceedances of the non-residential dustfall standard of 1 200 mg/m^2/day (and, consequently, the more stringent residential standard of 600 mg/m^2/day, the daily and annual PM_{10} NAAQS, and the daily $PM_{2.5}$ NAAQS are observed within the shaft boundary. Of these pollutants, only the short-term PM_{10} exceedances are predicted to extend locally just beyond the southern shaft boundary. However, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM standards. Incremental annual $PM_{2.5}$ concentrations remain below the respective standard throughout the modelling domain.

Dispersion Model Results for Operational Phase 1

Phase 1 surface operations will be centred on the No. 3 Shaft. Based on the dispersion model output plots for the operational phase 1, predicted incremental dustfall deposition rates, as well as PM_{10} and $PM_{2.5}$ concentrations, are generally low, except for two isolated exceedances of the daily and annual PM_{10} NAAQS observed along the north-western shaft boundary. Higher incremental concentrations are predicted in the vicinity of the shaft and along the haul route, with concentrations decreasing with increasing distance from the emission sources. The Phase 1 results show a relatively elongated dispersion footprint extending between the No. 3 Shaft and Target 1 Plant, reflecting the use of the approximately 7.67km haul route for transporting ore. The relatively elongated footprint also reflects the distributed nature of emissions from the approximately 7.67km haul route. Low incremental concentrations are predicted to disperse from the shaft area to the surrounding sensitive receptor areas, with no exceedances of the respective standards occurring outside the shaft boundary.

Dispersion Model Results for Operational Phase 2

Phase 2 surface operations will be centred on the No. 2 Shaft. Based on the dispersion model output plots for the operational phase 2, predicted incremental dustfall deposition rates, as well as PM_{10} and $PM_{2.5}$ concentrations, are generally low at all the off-site locations surrounding the shaft. The Phase

2 dispersion model results show a more concentrated area of elevated dustfall, PM_{10} and $PM_{2.5}$ incremental concentrations around the No. 2 Shaft, with the impact footprint extending towards Target 1 Plant along the conveyor alignment. This reflects the concentration of emissions associated with material handling and the open conveyor system around the No. 2 Shaft and along the approximately 2.45km conveyor route. Localised on-site exceedances of the respective dustfall and PM_{10} limits are predicted within the shaft boundary, with the short-term and long-term PM_{10} exceedances extending to a small section of the eastern shaft boundary. The proximity of the No. 2 Shaft to the Nyakallong residential area also results in receptors being located relatively close to the principal Phase 2 emission sources. However, despite predicted exceedances within the shaft boundary, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM_{10} standards. Predicted concentrations at all the sensitive receptors are very low. Predicted incremental daily and annual $PM_{2.5}$ concentrations remain below the respective standards throughout the modelling domain.

Specialist Reasoned Opinion Regarding the Acceptability of the Project

In conclusion, Rayten is of the opinion that the proposed project could be authorised, provided that the recommendations contained in this report (in Section 6) are implemented, where feasible, to minimise potential air quality impacts and reduce on-site predicted exceedances of the applicable NAAQS to acceptable levels. Overall, low negative impact significance ratings (i.e., low residual risk) for air quality are predicted at the sensitive receptor locations for the proposed activities, while moderate impact significance ratings are predicted at the shaft boundaries.

Cumulative impacts of the proposed activities were also assessed, with the predicted cumulative impacts at the shaft boundaries ranging from low to moderate. Predicted pollutant concentrations decrease with increasing distance from the emission sources. Consequently, the highest cumulative impacts are expected in areas located in close proximity to the operational areas, with lower impacts anticipated at increasing distances from these sources. At the sensitive receptor areas, cumulative impacts are generally expected to be low to negligible.

At the Nyakallong residential area (DR6), however, elevated cumulative dustfall impacts may occur due to the relatively high maximum background dustfall recorded at this location. The residential area dustfall limit of 600 mg/m^2/day was exceeded on one occasion during the July 2024 to June 2025 monitoring period, with a dustfall rate of 1 570 mg/m^2/day recorded in March 2025. Therefore, even relatively low incremental dustfall from the proposed activities could contribute to elevated cumulative dustfall levels at DR6.

Based on the assessment undertaken, the proposed project is considered acceptable from an air quality perspective, provided that the recommended mitigation and management measures are implemented and maintained throughout the construction and operational phases. Monthly dustfall monitoring is also recommended to meet various objectives, including compliance monitoring and tracking progress made by control measures. Where practical, the JV project's dustfall monitoring network could be coordinated with or complement the existing Harmony Gold monitoring network.

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LIST OF ABBREVIATIONS

ADT	Articulated Dump Truck
AEL	Atmospheric Emission License
AQIA	Air Quality Impact Assessment
AQIAr	Air Quality Impact Assessment Report
AQMP	Air Quality Management Plan
AQMS	Air Quality Monitoring Station
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
$CO_{2\text{-eq}}$	Carbon dioxide equivalent
DEA	Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)
DFFE	Department of Forestry, Fisheries and the Environment
DMP	Dust Management Plan
DR	Discrete Receptor
EMPr	Environmental Management Programme Report
EIA	Environmental Impact Assessment
GHG	Greenhouse gas
GMT	Greenwich Meridian Time
Ha	Hectares
HFC	Hydrofluorocarbons
JV	Joint Venture
MR	Mining Right
MPTRO	Mineral and Petroleum Titles Registration Office
Mtpa	Million Tonnes per Annum
NAEIS	National Atmospheric Emissions Inventory System
NAAQS	National Ambient Air Quality Standards
NDCR	National Dust Control Regulations
NEMA	National Environmental Management Act
NEM: AQA	National Environmental Management Air Quality Act
NPI	National Pollutant Inventory
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
N_2O	Nitrous Oxide
Mtpa	Million tonnes per annum
O_3	Ozone
PBL	Planetary Boundary Layer
PFC	Perfluorocarbons
PM_{10}	Particulate Matter, aerodynamic diameter equal to or size less than 10µm
$PM_{2.5}$	Particulate Matter, aerodynamic diameter size equal to or less than 2.5µm
PR	Prospecting Rights

PRIME	Plume Rise Model Enhancements
ROM	Run-of-Mine
RWD	Return Water Dam
SAAQIS	South African Air Quality Information System
SAIGE	System for Administration of Integrated Greenhouse Gas Emissions
SANAS	South African National Accreditation System
SANS	South African National Standard
SF_6	Sulphur hexafluoride
SO_2	Sulphur Dioxide
TSF	Tailings Storage Facility
TSP	Total Suspended Particulates
USEPA	United States Environmental Protection Agency
WRD	Waste Rock Dump
WRE	White Rivers Exploration

1. INTRODUCTION

Rayten Engineering Solutions (Pty) Ltd (hereafter referred to as “Rayten”) was appointed by Kongiwe Environmental (Pty) Ltd to compile an Air Quality Impact Assessment report (AQIAr) for the proposed Jelani Resources underground mining project near Allanridge, in the Lejweleputswa District Municipality, Free State Province.

The proposed project entails licensing the underground mining of the following potential mineral resources: Gold ore (primary target), Silver ore, Uranium ore, Sulphur, Platinum Group Metals, Rare earths, Diamonds (alluvial), Copper ore, Cobalt ore, Manganese ore, Molybdenum ore, Nickel ore, Lead ore, Tungsten ore, Zinc ore, and Iron ore.

This AQIAr has been compiled as a supporting document for the Mining Right (MR) application for the proposed project, specifically to inform the Scoping and Environmental Impact Assessment phases of the project. The main objective of the AQIA is to determine the potential impact of emissions associated with the proposed project, in terms of dustfall (as Total Suspended Particulates (TSP)) and criteria air pollutants (PM_{10} and $PM_{2.5}$).

As part of the AQIA, a baseline air quality assessment was undertaken through a review of meteorological monitoring data, available air quality monitoring data, air quality legislation and the identification of nearby sensitive receptors and existing emission sources surrounding the project site. The potential impact of emissions from the operational activities associated with the proposed project on air quality is evaluated through the compilation of an emissions inventory and subsequent dispersion modelling simulations using AERMOD. Comparison of predicted concentrations for criteria air pollutants is made with the South African National Ambient Air Quality Standards (NAAQS, 2009 and 2012) and the South African National Dust Control Regulations, 2026 where applicable.

This AQIAr has been compiled in a manner that complies with the regulations prescribing the format of the Atmospheric Impact Report (Government Gazette No. 36904 of 11 October), as amended (General Notice 284 in Government Notice 38633 of 02 April 2015), as well as the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment Regulations, 2014 (as amended) (EIA Regulations) - Requirements for Specialist Reports (Appendix 6), where applicable.

1.1. Project Details

Applicant	Jelani Resources (Pty) Ltd
Physical Address	N/A
Description of Site	Remainder/Portion 0 and Portion 1 of Farm Graspan 40, Remainder/Portion 0, Portion 1 and Portion 2 of Farm Welvaart 63, Remainder/Portion 0 of Farm Diamant 37, Portion of Farm Swartpan 436.
Co-ordinates (approximate centre of operations)	27.777687°S 26.606616°E

Mining Right Reference	FS30/5/1/2/3/2/1(10098) MR
EIA Reference	FS30/5/1/2/3/2/1(10098) MR
Province	Free State Province
District Municipality	Lejweleputswa District Municipality
Local Municipality	Matjhabeng Local Municipality
Designated Air Quality Priority Area	N/A
Modelling contractor	Rayten Engineering Solutions (Pty) Ltd *Gertrude Mafusire (Pr. Sci. Nat)* *Snr Associate.* *9.5 years working experience.* *0117920880* *info@rayten.co.za*

1.2. Brief Project Description

1.2.1. *Project Background*

Jelani Resources Ltd (Jelani) is a joint venture (JV) company formed by White Rivers Exploration (WRE) and Harmony Gold Mining Company Ltd (Harmony). WRE holds various prospecting rights for gold, coal, and other minerals, and currently operates as an exploration company with no active operations. Harmony is a gold-focused mining company with operations in South Africa and Papua New Guinea. The JV partners have vested a range of prospecting and mining rights in Jelani over an area designated as the JV Area for the proposed underground mining project.

Jelani held a Prospecting Right (PR) for various minerals within the JV area. This PR (Ref: (FS) 30/5/1/1/2/10350 PR) was notarially executed on 21 June 2017 and registered in the Mineral and Petroleum Titles Registration Office (MPTRO) on 11 December 2017 under registration number 95/2017. The right entitled Jelani to prospect for Silver ore, Gold ore, Uranium ore, Sulphur, Platinum Group Metals, Rare earths, Alluvial diamonds, Copper ore, Cobalt ore, Manganese ore, Molybdenum ore, Nickel ore, Lead ore, Tungsten ore, Zinc ore, and Iron ore occurring in, on, and under various farms situated in the District of Odendaalsrus. Additionally, the renewal application was granted for a further period of three years by the Deputy Director-General on 30 May 2023, ending on 29 May 2026. This renewal was executed on 5 March 2024 and registered in the MPTRO on 30 April 2024 under registration number 17/2024.

Jelani has submitted a Mining Right (MR) application for the areas currently covered by the Prospecting Rights to the Department of Mineral and Petroleum Resources (DMPR), which issued acceptance of the MR application on 18 May 2026. The total extent of the application area is 956.76 hectares (ha).

Jelani intends to initiate underground mining operation within the JV area, to extract various minerals, primarily focusing on Gold ore, along with Silver, Uranium, and other associated minerals. The

proposed project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development.

In addition, the project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 Shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All mining infrastructure required for the proposed project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the JV project area.

Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory and operational functions associated with the respective underground mining operations/targets. Target 3 Shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 Shaft is being refurbished. The Target No 2 Shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 Shaft will be maintained as a second outlet.

The Target No 2 Shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the Shaft has been refurbished and surface infrastructure is completed and the Shaft commissioned, mining operations associated with the proposed project will be relocated to this Shaft.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5 –10m²), basic power/comms setup, 6m of perimeter fencing per station (total 24m), and short gravel access tracks (total approximately 1km across all stations, 4m wide). These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project (and application) being undertaken by Harmony Gold.

1.2.2. *Overview of Mining Method*

Two mining methods have been identified as the most practical means to exploit the Mineral Resource. These are conventional breast mining and shrinkage stoping. The application of each method is primarily related to how steep the mineralised reef is, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). The life-of-mine for underground mining is expected to be 14 years from the start of production activities (i.e., from Year 7).

Run-of-mine ore from the underground mining operations will be transported to the Target 1 Processing Plant where it will be processed into gold bullion. Silver and uranium form an insignificant

part of the production profile, therefore, the emphasis of the market requirements in the Mining Works Programme has been placed on gold. Processing of the ore will take place through a typical crush, mill, floatation, elution, electrowinning and filtration process.

Mined ore will be transported to the Target 1 Plant by truck during Phase 1 when Target 3 Shaft is used for rock hoisting. In Phase 2, when mining operations are relocated to Target 2 Shaft, the ore will be transported to the plant via a series of overland conveyors. The ore will be either stockpiled on the surface or fed directly into one of two semi-autogenous mills (SAG), before undergoing the remainder of the production process.

The focus of this study is to quantify emissions of dustfall, PM_{10} and $PM_{2.5}$ associated with the proposed mining activities at the JV project area, which include:

- Refurbishment and/or construction at Target No. 2 and No.3 Shafts;
- Materials handling operations (truck loading/offloading operations during Phase 1);
- Wind erosion from exposed areas: waste rock dumps;
- Vehicle dust entrainment on unpaved roads; and
- Conveyor transfer points (rock hoisting and run-of mine ore transport).

Processing operations at the Target 1 Plant fall outside the scope of this assessment, as they are undertaken as part of Harmony's operations and are not included in the proposed JV project.

A preliminary layout of the project area is presented in Figure 1-1 and was used for modelling purposes.

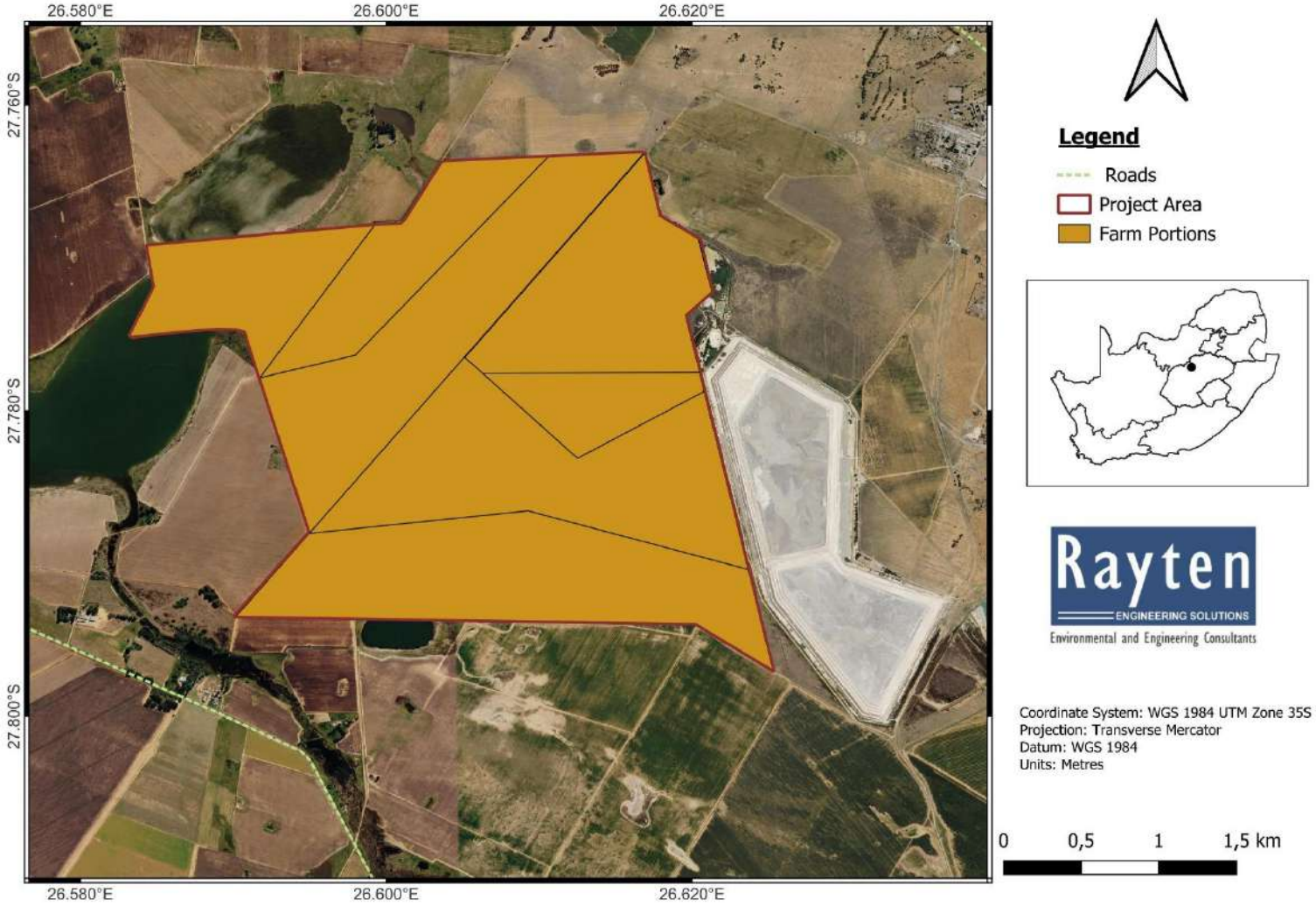


Figure 1-1: Preliminary site layout diagram for the proposed project area.

1.3. Terms of Reference

The scope of work for the AQIA is as follows:

- A review of the study site and activities;
- An overview of the prevailing meteorological conditions in the area, which influence the dilution and dispersion of pollutants in the atmosphere;
- The identification of proposed sources of emissions;
- The identification of key air pollutants of concern that may be emitted from proposed mining activities (dustfall, PM_{10} and $PM_{2.5}$);
- Characterisation of the ambient air quality within the area using available air quality monitoring data;
- A review of the current South African legislative and regulatory requirements for air quality;
- The identification of sensitive receptors, such as local communities, surrounding the study area;
- The compilation of an emissions inventory for key sources of emissions;
- Dispersion modelling simulations of ground level particulate emissions for incremental impacts; and
- Provision of general recommendations for the mitigation and management of identified potential impacts.

1.4. Outline of Report

An overview of the site location, including surrounding receptors, is given in **Section 2**. National Ambient Air Quality Standards, Dust Control Regulations and associated health impacts for the relevant criteria air pollutants are discussed in **Section 3**. The local meteorological conditions and baseline air pollutant concentrations are provided in **Section 4**. Potential emissions and their impact on air quality associated with the proposed operations are outlined in **Section 5**. Mitigation measures, recommendations and a summary report are presented in **Section 6**.

2. SITE CHARACTERISTICS

2.1. Site Location

The project site is located immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km north-west of Odendaalsrus, 1,5km west of Allanridge town, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality (Figure 2-1). The project area does not fall within a Nationally Declared Air Quality Priority Area.

2.2. Surrounding Land Use

The land use immediately surrounding the project site within a 20km radius, consists of a mixture of grassland, cultivated land, mining areas, water bodies, exposed areas – in the form of fallow land, and built-up areas. Built-up areas mainly include formal and informal residential areas. In addition, some natural and planted trees, as well as commercial areas form part of the land use in surrounding areas, but to a minimal extent (Figure 2-2). The larger area surrounding the project site is classified as rural in nature.

2.3. Topography

The topography surrounding the project site is shown in Figure 2-3. Surrounding elevations range from 1 224m – 1 993m above sea level, while the project site is situated at approximately 1 300m above sea level. Higher topographical features are mainly observed south-east of the project site, but beyond a 20km radius.

2.4. Sensitive Receptors

A sensitive receptor is defined as a person or place where involuntary exposure to air pollutants released by the site's activities could occur. Identified sensitive (discrete) receptors within a 20km radius of the project site are shown in Table 2-1 and Figure 2-4.

The discrete receptors detailed in Table 2-1 were used for modelling purposes. Maximum predicted incremental concentrations are provided for the identified discrete receptors. Identified sensitive receptor points are located at the centre of residential areas, or near schools, hospitals, and old age homes, to determine the maximum concentrations that could be expected at or near the sensitive receptors. Discrete points are not plotted for each individual sensitive receptor but are used to represent a group of sensitive receptors located near to each other (e.g., several schools).

Table 2-1: Discrete receptors within 20km radius of the project site. Receptors were identified through a desktop study.

SURROUNDING RECEPTORS (<20KM)				
Discrete Receptor ID	Name Edu = educational/school/training facilities HC = healthcare/clinic/hospital facilities Old = old age home Residential = Dwellings/ farmhouses	UTM Co-ordinates (35S)		Elevation (m)
		X (m)	Y (m)	
DR1	Dwellings (Farmhouse)	458673.77	6925594.00	1302.55
DR2	Dwellings (Farmhouse)/Stynenal (Pty) Ltd (Pig Farm)	459459.67	6925044.27	1301.77
DR3	Res (Allanridge)	464715.67	6929791.24	1322.69
DR4	Dwellings (Farmhouse)- inside boundary	460901.22	6925886.62	1304.31
DR5	Edu (Allanridge Combined School)	465123.36	6929768.96	1323.46
DR6	Res (Nyakallong)	465872.54	6926947.42	1313.18
DR7	Edu (SA Mokgothu Primary School)	466979.67	6927049.19	1319.64
DR8	Dwellings	454468.17	6931054.10	1300.80
DR9	Dwellings/Edu (Saamkom Primary School)	456619.84	6932180.89	1300.15
DR10	Dwellings	456718.95	6927019.53	1297.36
DR11	Dwellings	454231.69	6927822.98	1287.91
DR12	Dwellings/Edu (Thabang Primary School)	452867.81	6928708.75	1292.38
DR13	Dwellings	451876.86	6929216.96	1288.68
DR14	Dwellings/Edu (Itumeleng Primary School)	459935.97	6937383.59	1296.59
DR15	Res (Hospital Park)	467064.92	6917110.02	1331.77
DR16	Res (Ross Kent North)	469209.40	6917522.06	1335.60
DR17	Res (Kutlwanong)	475425.17	6919402.33	1342.07
DR18	Res (Thelma)	471214.69	6916993.48	1341.79
DR19	Res (Odandelruus)	469231.97	6916292.28	1336.71
DR20	Edu (Eendvogelkuil Primary School)	449668.84	6924151.20	1285.25
DR21	Dwellings (Farmhouse)	447635.60	6927065.24	1280.91

SURROUNDING RECEPTORS (<20KM)				
Discrete Receptor ID	Name Edu = educational/school/training facilities HC = healthcare/clinic/hospital facilities Old = old age home Residential = Dwellings/ farmhouses	UTM Co-ordinates (35S)		Elevation (m)
		X (m)	Y (m)	

Notes:
*DR = discrete receptor
*No hospitals/healthcare/clinic facilities identified within 20km of the project site.
*<10 school/training/educational facilities within 20km of the project site (located in surrounding areas).
*No old age home facilities identified within 20km of the project site.
*Numerous dwellings in surrounding areas.

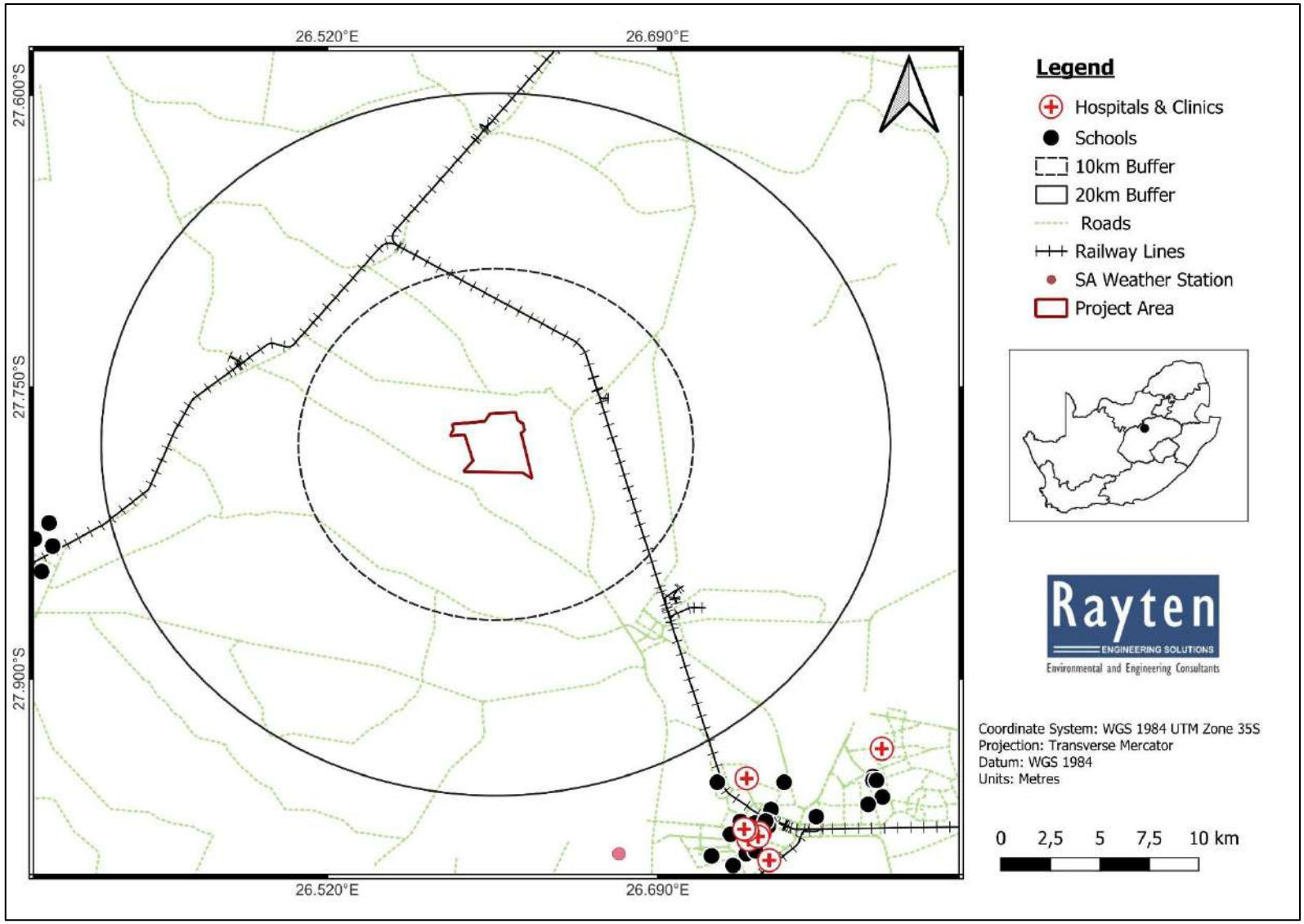


Figure 2-1: Site locality for the project site.

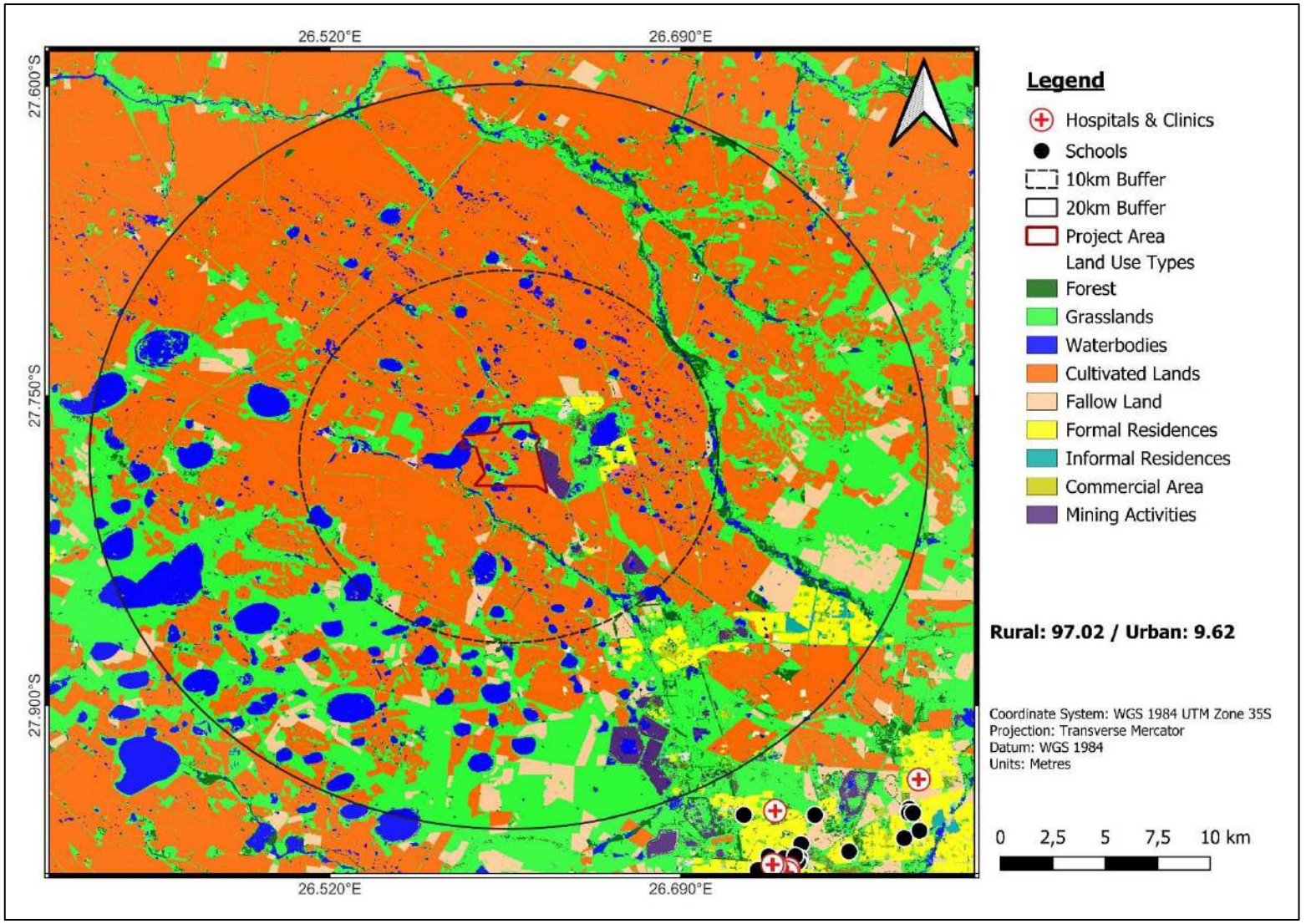


Figure 2-2: Land use surrounding the project site.

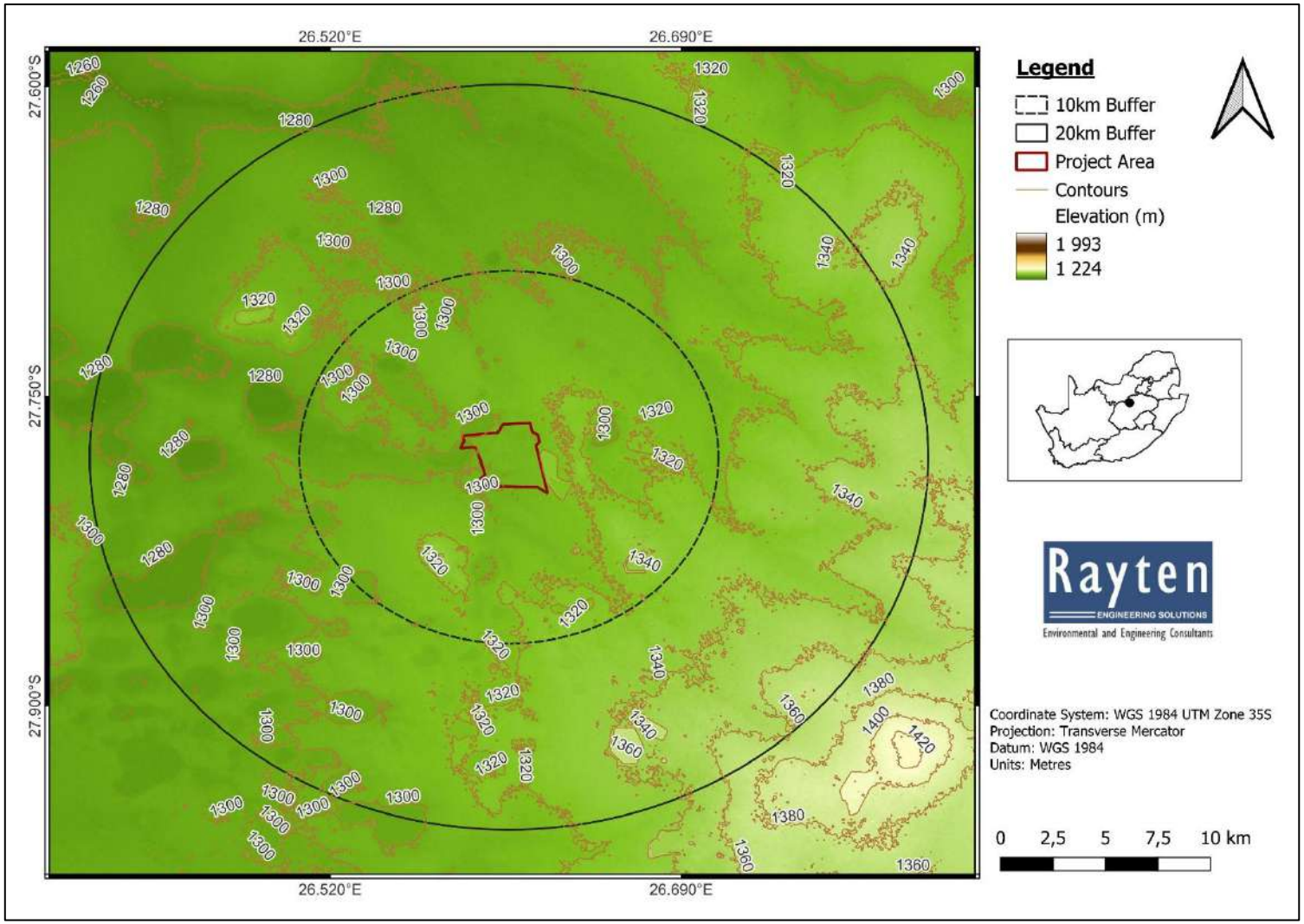


Figure 2-3: Digital elevation surrounding the project site.

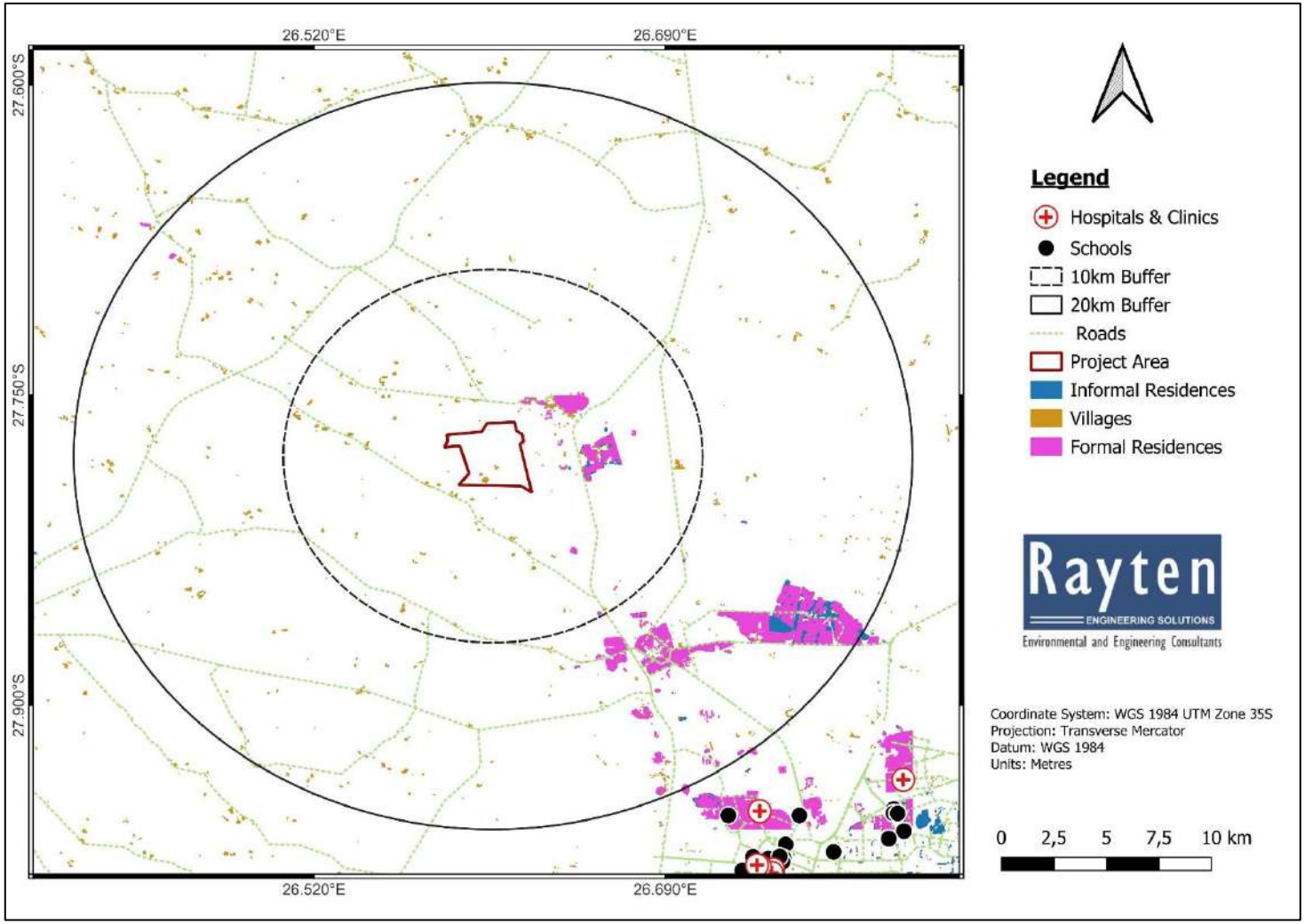


Figure 2-4: Residential areas surrounding the project site.

3. LEGISLATION

3.1. National Environmental Management: Air Quality Act No 39 of 2004 (NEM: AQA)

The NEM: AQA, has shifted the approach of air quality management from source-based control to receptor-based control. The main objectives of the Act are to;

- protect the environment by providing reasonable measures for—
  i. the protection and enhancement of the quality of air in the Republic;
  ii. the prevention of air pollution and ecological degradation; and
  iii. securing ecologically sustainable development while promoting justifiable economic and social development; and
- generally, to give effect to section 24(b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and wellbeing of people.

The Act makes provisions for the setting and formulation of National Ambient Air Quality Standards for “substances or mixtures of substances which present a threat to health, well-being or the environment”. More stringent standards can be established at the provincial and local levels.

The control and management of emissions in the NEM: AQA relates to the listing of activities that are sources of emissions. Listed activities are defined as activities which “result in atmospheric emissions and are regarded as having a significant detrimental effect on the environment, including human health.” Listed activities have been identified by the Minister of the Department of Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment (DFFE)) and atmospheric emission standards have been established for each of these activities.

In addition, the Minister may declare any substance contributing to air pollution as a priority pollutant. Any industries or industrial sectors that emit these priority pollutants will be required to implement a Pollution Prevention Plan. Municipalities are required to “designate an air quality officer to be responsible for co-ordinating matters pertaining to air quality management in the Municipality.” The appointed Air Quality Officer is responsible for the issuing of AELs.

3.2. Listed Activities and Minimum Emission Standards

The NEM: AQA requires all persons undertaking listed activities in terms of Section 21 (S21) of the Act to obtain an AEL. The listed activities and associated minimum emission standards (MES) were issued by the DEA (now known as DFFE) on 31 March 2010 (Government Gazette No. 33064 of 31 March 2010) but were repealed and replaced by the 2013 Regulations (Government Gazette No. 37054 of 22 November 2013). Following promulgation of the 2013 Regulations, several amendments were made in:

- 2015 (Government Gazette No. 38863 of 12 June 2015);
- 2018 (Government Gazette No.41650 of 25 May 2018; Government Gazette No.42013 of 31 October 2018);
- 2019 (Government Gazette No.42472 of 22 May 2019);
- 2020 (Government Gazette No. 43174 of 27 March 2020), and

- 2025 – Draft Amendments (Government Gazette No. 53241 of 29 August 2025).

Based on the proposed operations for the JV project area, the mine does not trigger any of the S21 listed activities in terms of the NEM: AQA, therefore, an AEL is not required.

South Africa launched an online National reporting system, referred to as the National Atmospheric Emissions Inventory System (NAEIS). The NEM: AQA requires all emission source groups identified in terms of the National Atmospheric Emission Reporting Regulations (Government Gazette No. 38633 of 02 April 2015), to register and report emissions on the NAEIS. Mines are classified as Group C emitters and are thus required to report annually and comply with the National Atmospheric Emission Reporting Regulations. Jelani Resources must register on the NAEIS and report on fugitive dust emissions from the proposed JV project area annually, by 31 March each year, upon commencement of operations. However, the NAEIS is currently inactive, therefore NAEIS submissions for the 2024 – 2026 reporting periods are required to be done manually by 30 June each year, as per Government Gazette No. 50284 of 08 March 2024 in Government Notice 4493.

3.3. Ambient Air Quality Standards

National Ambient Air Quality Standards (NAAQS), including permitted frequencies of exceedance and compliance timeframes, were issued by the Minister of Water and Environmental Affairs on 24 December 2009 (Table 3-1). National standards for $PM_{2.5}$ were established by the Minister of Water and Environmental Affairs on 29 June 2012.

Table 3-1: National Ambient Air Quality Standards for Criteria Pollutants.

POLLUTANT	AVERAGING PERIOD	CONCENTRATION (µg/m^3)	FREQUENCY OF EXCEEDANCE (3)
Sulphur dioxide (SO_2)	10 minutes	500 (191)	526
	1 hour	350 (134)	88
	24 hours	125 (48)	4
	1 year	50 (19)	0
Nitrogen dioxide (NO_2)	1 hour	200 (106)	88
	1 year	40 (21)	0
Particulate Matter (PM_{10})	24 hours	75	4
	1 year	40	0
Particulate Matter ($PM_{2.5}$)	24 hours	40(1) 25(2)	4
	1 year	20(1) 15(2)	0
Ozone (O_3)	8 hours (running)	120 (61)	11
Benzene (C_6H_6)	1 year	5 (1.6)	0
Lead (Pb)	1 year	0.5	0
Carbon monoxide (CO)	1 hour	30 000 (26 000)	88

POLLUTANT	AVERAGING PERIOD	CONCENTRATION (µg/m^3)	FREQUENCY OF EXCEEDANCE (3)
	8 hours (calculated on 1 hourly averages)	10 000 (8 700)	11

Notes:

*Values indicated in blue are expressed in part per billion (ppb)

(1) Compliance required by 1 January 2016 – 31 December 2029.

(2) Compliance required by 1 January 2030.

(3) Frequency of exceedance refers to the number of times an exceedance is allowed within a calendar year.

3.4. Dust Deposition Standards

The DEA (now known as the DFFE) issued National Dust Control Regulations (NDCR) promulgated in Government Notice 827 of 2013, which came into effect on 1 November 2013 (Table 3-2) and subsequently the updated NDCR in Government Gazette No. 54440 of 31 March 2026. The purpose of the regulations is to prescribe general measures for the control of dust in all areas nationally and to prescribe steps that must be taken to prevent nuisance dust. The regulations prohibit activities which give rise to dust in such quantities and concentrations that the dustfall at the boundary or beyond the boundary of the premises where it originates exceeds:

a) 600 mg/m^2/day averaged over 30 days in residential areas measured using reference method South African National Standard (SANS) 1137, or any equivalent method.
b) 1 200 mg/m^2/day averaged over 30 days in non-residential areas measured using reference method SANS 1137, or any equivalent method.

Table 3-2: South African National Dust Control Regulations (2026).

RESTRICTION AREAS	DUST-FALL RATE (D) (1)	REQUENCY OF EXCEEDANCE
Residential Areas	D < 600 mg/m^2/day	Two within a year, no two sequential months (2)
Non-residential areas	600 < D < 1200 mg/m^2/day	Two within a year, no two sequential months (2)

Notes:

(1) Averaged over 1 month (30±2-day average) (mg/m^2/day)

(2) Per dustfall monitoring site.

A person identified as a stakeholder in terms of the NDCR (2026), must submit a dust management plan (DMP) to the air quality officer or licensing authority for approval, within 60 days of commencement of the 2026 NDCR (i.e., by 31 May 2026). Identified stakeholders include:

a) any holder of a right or permit related to prospecting, exploration, mining or production as contemplated in the Mineral and Petroleum Resources Development Act (Act 28 of 2002);
b) any person conducting reclamation (defined as obtaining materials of value from a historical mine dump);
c) any person conducting a listed activity and who is required in terms of an AEL, to develop a DMP;
d) any person conducting a controlled emitter that has the potential to generate dust; and
e) any person conducting an activity that an air quality officer reasonably suspects is causing or has the potential to cause nuisance by dust.

The DMP must include:

a) the person responsible for the implementation of the DMP;
b) a description of the surrounding land use (within a 5km radius);
c) a description of the premises and all possible sources of dust and activities with the potential to generate dust within the premises;
d) detailed and time-bound best practicable control measures that must be taken to prevent, minimise, and manage dust, including fugitive dust;
e) measures to manage dust complaints and complaints register;
f) measures that must be taken to prevent nuisance by dust;
g) a dustfall monitoring programme if required by the air quality officer or licensing authority with the following:
    i. procedures for the collection and measurement of dustfall in terms of the standard test method; and
    ii. dust monitoring sampling sites sufficient in number to monitor identified or likely sensitive receptor locations in the vicinity of the premises; and
h) any other relevant information as an air quality or licensing authority may deem necessary.

Monthly DMP-implementation progress reports must be submitted to the air quality officer or licensing authority. The contents of the implementation reports are as prescribed in the 2026 NDCR and include the submission of monthly dustfall monitoring reports.

Persons who have approved DMPs in terms of the 2013 NDCR, must submit reviewed DMPs that align with the 2026 NDCR within 60 days. The reviewed plan must include a transitioning period from using ASTM D1739:1970 to SANS 1137 (which period may not exceed 6 months). Furthermore, the failure to submit DMPs and implementation reports as required in terms of the 2026 NDCR, constitutes an offence, and a fine not exceeding R5 million may be imposed (first conviction).

Dustfall monitoring reports should include relevant information about the dustfall monitoring method used, potential identified sensitive receptor locations, locations of sampling sites, a classification of the study area, meteorological data for the sampling area, proof of South African National Accreditation System (SANAS) accreditation by the laboratory undertaking the gravimetric sample analysis (soluble and insoluble fractions), proof of SANAS accreditation by testing providers on the use of SANS 1137, or any equivalent method, and any other relevant information.

3.5. Greenhouse Gas (GHG) Emissions

On 14 March 2014, the DEA (now known as the DFFE) (Government Gazette No. 37421 of 14 March 2014) declared the following six GHGs as priority air pollutants in South Africa:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)

National GHG Emission Reporting Regulations (Government Gazette No. 40762 of 3 April 2017), as amended (General Notice 994 in Government Notice 43712 of 11 September 2020), were published by the DEA (now known as the DFFE). A person identified as a Category A data provider in terms of Annexure 1 of these regulations, must register their facilities using the online System for Administration of Integrated Greenhouse Gas Emissions (SAIGE) and must submit a GHG emissions inventory, activity data and report in the required format given under Annexure 3 of these regulations on an annual basis. All data must be provided annually, by the 31 March of the following year. However, given the recent implementation of the SAIGE system, report submissions in 2026 may be done manually (i.e., by email to GHGreporting@dffe.gov.za) or through SAIGE. The NEM: AQA and the National GHG Emission Reporting Regulations, establish the legislative framework for the national GHG reporting system in South Africa.

National Pollution Prevention Plan Regulations (Gazette No. 40996) were published on 21 July 2017 by the DEA. A Pollution Prevention Plan will be required should the development do the following:

a) Undertake any of the following activities identified in Annexure A of the National GHG Emission Reporting Regulations (Government Gazette No. 40762 of 3 April 2017, as amended (General Notice 994 in Government Notice 43712 of 11 September 2020)), which involves the direct emission of GHG more than 0.1 Megatonnes (Mt) annually measured as carbon dioxide equivalents ($CO_{2\text{-eq}}$); or
b) Undertake any of the following activities identified in Annexure A of the National Pollution Prevention Plan Regulations (Gazette No. 40996 of 21 July 2017) as a primary activity, which involves the direct emission of GHG more than 0.1 Megatonnes (Mt) annually measured as carbon dioxide equivalents ($CO_{2\text{-eq}}$);

<u>Annexure A activities in terms of the National Pollution Prevention Plan Regulations include:</u>

- Coal mining
- Production and /or refining of crude oil
- Production and/or processing of natural gas
- Production of liquid fuels from coal or gas
- Carbon black production
- Iron & steel production
- Ferro-alloys production
- Aluminium production
- Polymers production
- Pulp and paper production
- Electricity production

- Cement production
- Glass production
- Ammonia production
- Nitric acid production

Mining falls under category 1A2i (i.e., Mining and Quarrying) in terms of Annexure 1 of the National GHG emission reporting regulations (Government Gazette No. 40762 of 3 April 2017), as amended (General Notice 994 in Government Notice 43712 of 11 September 2020). All facilities conducting this activity (i.e., Mining and Quarrying) are required to register and report on their GHG emissions by the 31 March of every year, should they have combustion installations that have a cumulative installed design capacity equal to or greater than 10MW.

3.6. Carbon Tax Act

The Carbon Tax Act No. 15 of 2019 was promulgated on the 23 May 2019 and is implemented using a phased approach, allowing emitters time to transition to cleaner and more efficient technologies resulting in lower GHG emissions. Phase One is effective from 1 June 2019 to 31 December 2022 (extended to 31 December 2025) and focuses on Scope 1 (direct) emissions, while phase 2, running from 31 December 2022 (extended to 2025) to 31 December 2030, will include Scope 2 (indirect) emissions.

Any person, company or entity who undertakes an activity (above a certain threshold) and is responsible for the release of GHG emissions is required to report on their emissions to the DFFE by the 31 March each year and pay tax on those emissions by July each year.

The base tax rate when the Act was published was R120 per tonne of $CO_{2\text{-eq}}$ (carbon dioxide equivalent) emitted by the generation facility or entity for the relevant reporting period, but it is now at R159 per tonne of $CO_{2\text{-eq}}$. The carbon tax rate will increase at a rate determined by the Minister. However, there are tax-free allowances that apply that can make the overall effective tax rate much lower between R6 and R48 per tonne of $CO_{2\text{-eq}}$ emitted. Tax free allowances are capped at 95% and include:

- A basic tax-free allowance of 60% during Phase One (until December 2022).
- An additional tax-free allowance of 10% for process emissions.
- An additional tax-free allowance of 10% for fugitive emissions.
- An additional tax-free allowance of up to a maximum of 10% for trade exposed sectors.
- An additional tax-free performance allowance of 5% based on performance against intensity benchmarks.
- An additional tax-free allowance of 5% for companies who participate in the carbon budget system.
- An additional tax-free carbon offset allowance of 5% or 10%.

3.7. Human Health Effects (Dustfall and Particulates)

Many studies have shown that air pollution can affect our health in different ways. These health effects are usually grouped by exposure duration, the type of health problem/outcome, and the age of the people affected. Air pollution can lead to serious outcomes like early death, hospitalisation, or illness, and researchers often use a measure called DALYs (Disability-Adjusted Life Years) to understand

the overall impact. DALYs consider both the years of life lost, and the years people live with illness/poor health or disability. Human health effects are normally estimated for whole populations, not individuals. Therefore, it is difficult to single-out individuals that died because of air pollution, but it is possible to understand how air pollution affects communities (DHB, 2022/2023).

General impacts of air pollution on human health are discussed in the Sections 3.7.1 to 3.7.2 for dustfall and particulates (i.e., PM_{10} and $PM_{2.5}$).

3.7.1. *Dustfall*

Dust is any particle with an aerodynamic diameter small enough to travel through a 1 mm surface and its weight is large enough to be able to be collected into a sampling container from the ambient air (DEA, 2013). Dust particles can be entrained into the air by a physical process such as wind, movement of vehicles, stack emissions or from fugitive dust. These particles are generally too heavy to remain in suspension in the air for any period and fall out of the air over a relatively short distance depending on a combination of various factors such as particle size, density, temperature (of the air and particle), emission velocity or method, ambient wind speed and humidity. These particles are therefore commonly known as “dustfall”. Particulates in this range are generally classified as a nuisance dust and can cause physical damage to property and physical irritation to plants, animals, and humans.

3.7.2. *Particulates (PM_{10} & $PM_{2.5}$)*

Particles can be classified by their aerodynamic properties into coarse particles, PM_{10} (particulate matter with an aerodynamic diameter equal to or less than 10 µm) and fine particles, $PM_{2.5}$ (particulate matter with an aerodynamic diameter equal to or less than 2.5 µm). The fine particles mostly contain secondary formed aerosols such as sulphates and nitrates, combustion particles and re-condensed organic and metal vapours. The coarse particles mostly contain earth crust materials and fugitive dust from roads and industries (Harrison and van Grieken, 1998) (Fenger, 2002).

In terms of health impacts, particulate air pollution is associated with effects on the respiratory system (WHO, 2000 and 2021). When looking at human health particle size is an important factor to consider because it controls where in the respiratory system a given particle will be deposited. Fine particles are thought to be more damaging to human health than coarse particles as larger particles do not penetrate deep into the lungs compared to smaller particles. Larger particles are deposited into the extra thoracic part of the respiratory tract while smaller particles are deposited into smaller airways that lead to the respiratory bronchioles (WHO, 2000 and 2021).

Recent studies suggest that short-term exposure to particulate matter leads to adverse health effects, even at low concentrations of exposure (below 100 µg/m^3). Morbidity effects associated with short-term exposure to particulates include increases in lower respiratory symptoms, medication use and small reductions in lung function. Long-term exposure to low concentrations (~10 µg/m^3) of particulates is associated with mortality and other chronic effects such as increased rates of bronchitis and reduced lung function (WHO, 2000 and 2021). Those most at risk include the elderly, individuals with pre-existing heart or lung disease, asthmatics and children.

4. BASELINE ASSESSMENT

4.1. Meteorological Overview

Meteorological processes will determine the dispersion and dilution potential of pollutants emitted into the atmosphere. The vertical dispersion of pollution is governed by the stability of the atmosphere as well as the depth of the surface mixing layer. Horizontal dispersion of pollution is defined by dominant wind fields. Therefore, meteorological parameters including temperature, precipitation, wind speed and wind direction are of significance as they will influence the degree to which pollution will accumulate or disperse in the atmosphere.

As per the Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014), representativeness of the meteorological data is influenced by the following four factors:

- Proximity of the meteorological site to the area being modelled;
- Complexity of the terrain;
- Exposure of the meteorological measurement site; and
- Period of data collection.

MM5 modelled meteorological data was used for the project area. MM5 meteorological data was obtained from Lakes Environmental for the period January 2023 – December 2025. MM5 is a PSU/NCAR meso-scale model used to predict meso-scale and regional-scale atmospheric circulation. The model provides integrated model meteorological data, which can be used in a wide range of applications. This model is often used to create weather forecasts and climate projections. Details of the meteorological data obtained are summarised in Table 4-1 below.

The South African dispersion modelling regulations requires a minimum of 3-years of meteorological data for input into the dispersion model. The meteorological overview given below is with reference to the data used for input into the model. The meteorological data is representative of recent prevailing weather conditions that are experienced at the project site.

Table 4-1: Meteorological Data Details.

Meteorological Data Details	
Met Data Information	**Description**
Met data type	MM5 AERMET-Ready (Surface & Upper Air Data)
Datum	WGS 84
Closest Town	Komati - South Africa
Co-ordinates of centre of met grid:	
Latitude	27.795450°S
Longitude	26.619653°E
Time zone	UTC +2 hours
Period of record	January 2023 - December 2025
Met Station Parameters	**Description**
Anemometer height	14 m
Station base elevation	1301 m

Meteorological Data Details	
Met Data Information	**Description**
Upper air adjustment	-2 hours
Grid Cell Information	
Cell centre	27.795450°S, 26.619653°E
Cell dimension	12km * 12km
Surface Met Data	**Description**
File format	SAMSON file
Output interval	Hourly
Upper Air Data	**Description**
Format	TD-6201- Fixed Length
Reported in	GMT
Output interval	Hourly
Models used to process met data	
Model used to process data for wind roses	n/a
Model used to process data for AERMOD	AERMET

4.1.1. *Local Wind Field*

Figure 4-2 below provides the period wind rose plot for the project site for the period January 2023 to December 2025. The predominant wind directions for the period are observed from the north-eastern quadrant, with an average wind speed of 3.26 m/s. Wind conditions during the three-year period generally ranged from light air to fresh breezes, with the majority of winds occurring within the 0.5 – 2.1 m/s, 2.1 – 3.6 m/s and 3.6 – 5.7 m/s wind speed classes. Higher wind speed occurrences (>8.8 m/s) were relatively infrequent and recorded occasionally (~0.2% of the time). Calm conditions, defined as wind speeds equal to 0.0 m/s, were observed with a frequency of 7.5%, while light air to fresh breezes, ranging from 0.5 m/s to 8.80 m/s were observed for 91.4% of the time (Figure 4-1).

The morning (AM) and evening (PM) period wind rose plots for the period January 2023 to December 2025 are given in Figure 4-3 and show slight diurnal variation in the wind field data. During the morning (AM) and evening periods, winds predominantly originate from the north-eastern quadrant. However, during the evening (PM) period, an additional south-westerly wind component emerges but it is less frequent than the north-easterly winds (Figure 4-3). Wind intensities during both periods remain generally similar, with most winds falling within the light to moderate breeze categories. The average wind speeds recorded during the morning and evening periods were 3.53 m/s and 2.92 m/s, respectively.

Seasonal winds at the project site are shown in Figure 4-4 below. During all seasons, prevailing winds are from the north-eastern quadrant. Frequencies of calm conditions were 5.66% (summer), 10.85% (autumn), 8.18% (winter) and 5.05% (spring).

Based on the prevailing wind fields for the period January 2023 to December 2025, emissions from the proposed activities will likely be transported towards the south-westerly wind quadrant. Wind speeds observed during all time periods were generally classified as light air to fresh breezes, which may help in effective dispersion of pollutants from the proposed operations. However, higher wind

speeds can facilitate fugitive dust emissions from open exposed areas such as stockpile areas and waste rock dumps.

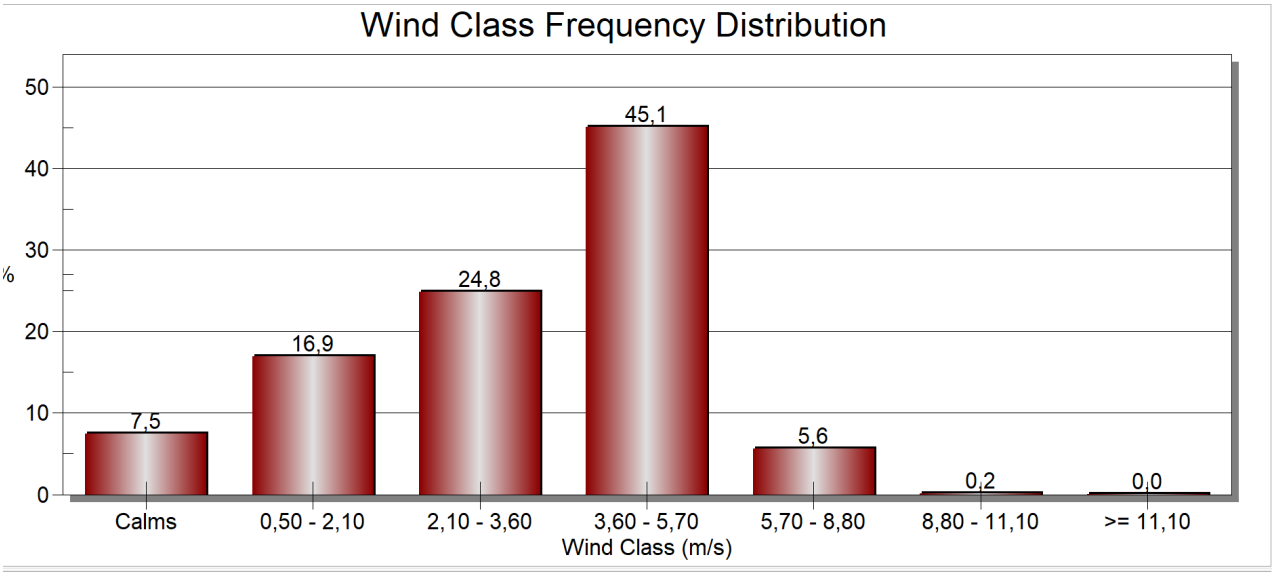


Figure 4-1: Wind class frequency distribution from the period January 2023 - December 2025.

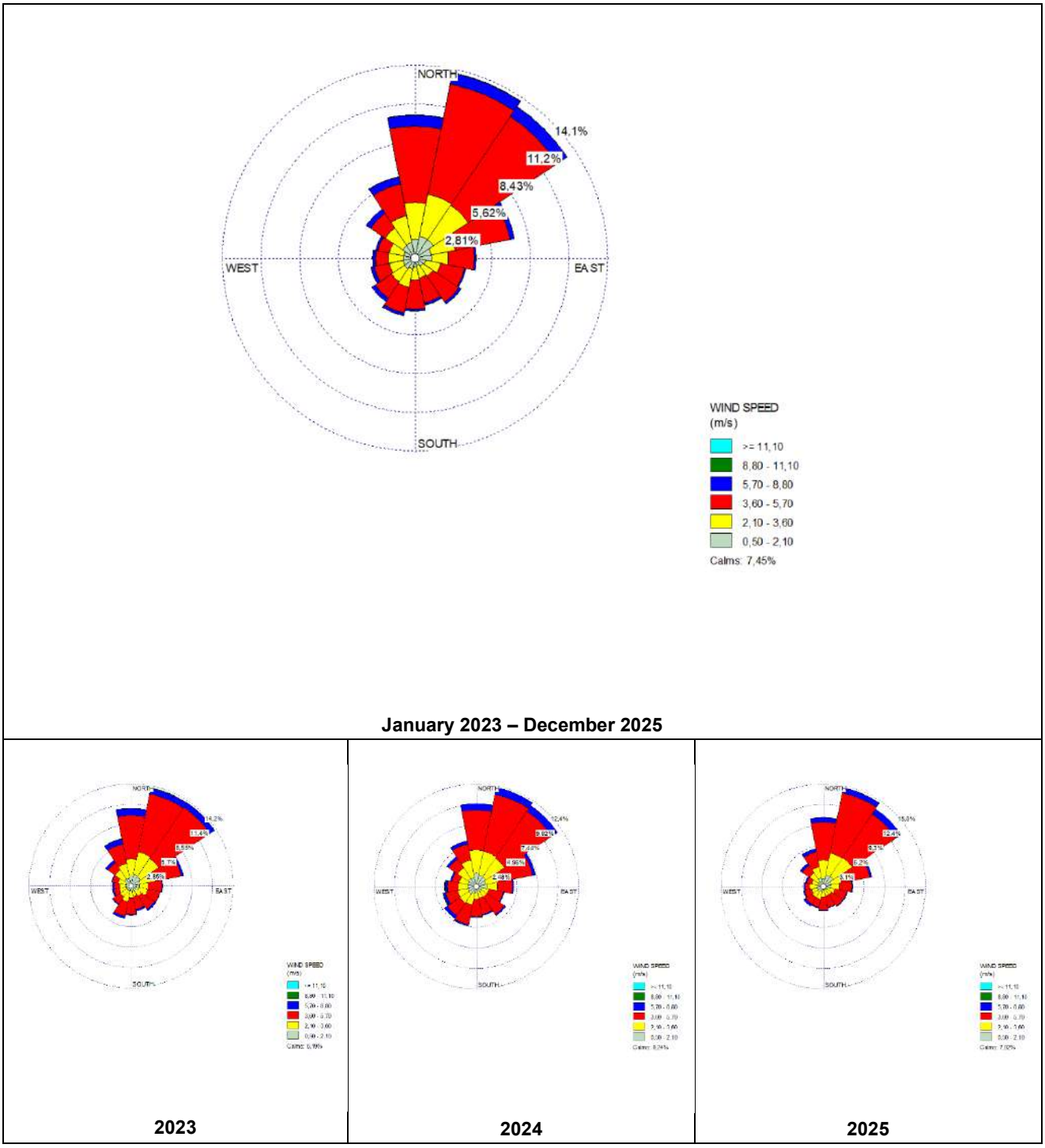
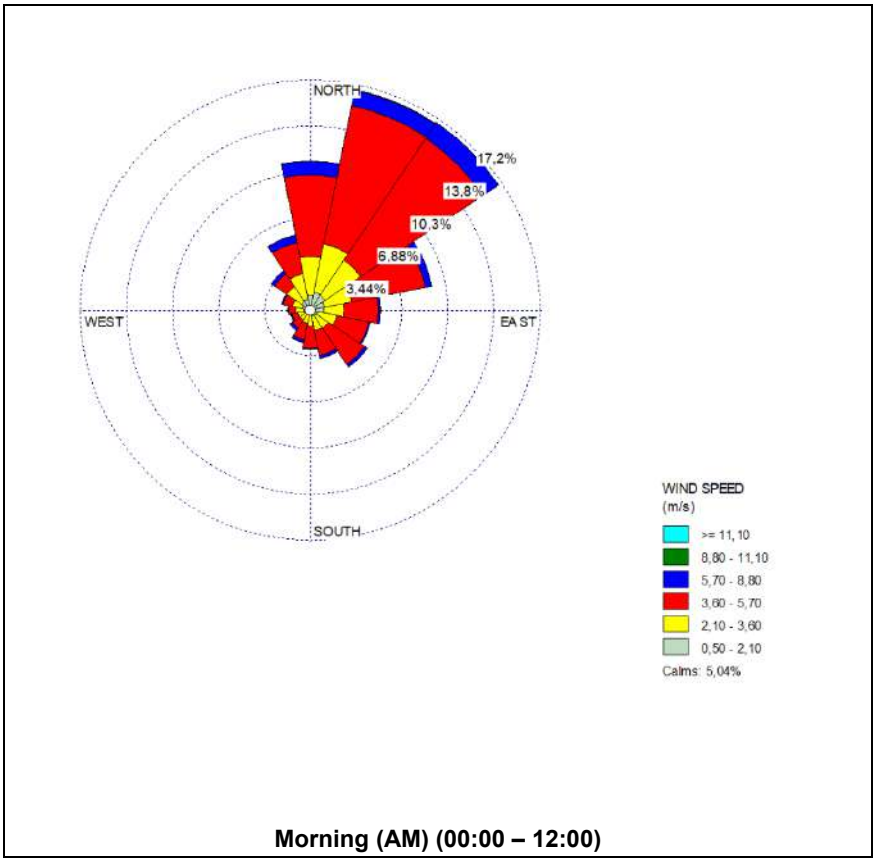
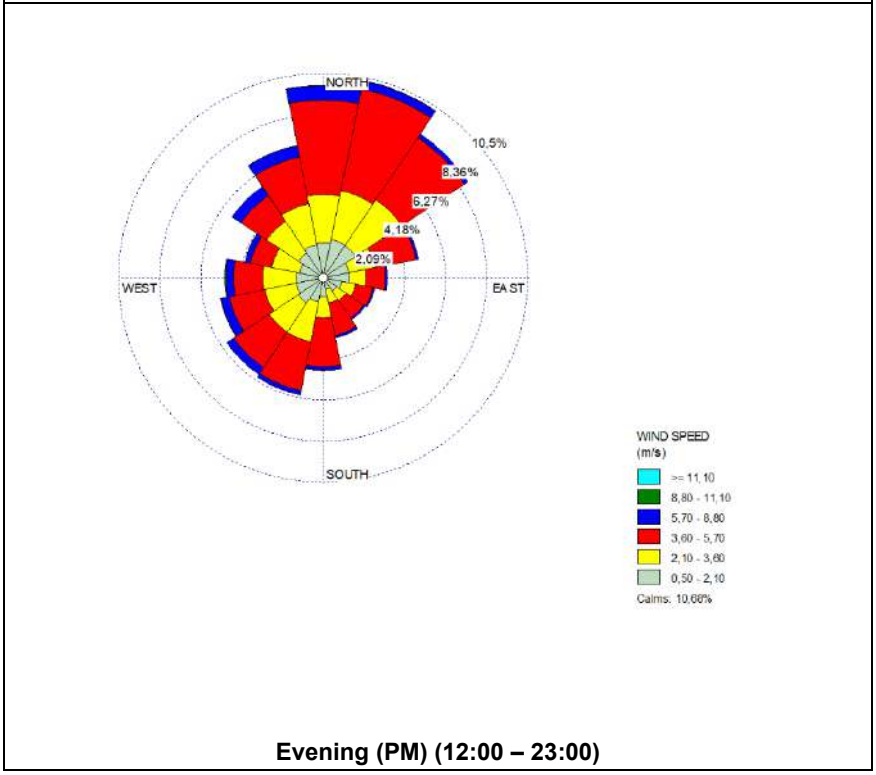


Figure 4-2: Period Wind Rose Plots for the project site from the period January 2023 - December 2025.



Morning (AM) (00:00 – 12:00)



Evening (PM) (12:00 – 23:00)

Figure 4-3: Morning (AM) (00:00 - 12:00) and Evening (PM) (12:00-23:00) Period Wind Rose Plots for the project site from the period January 2023 - December 2025.

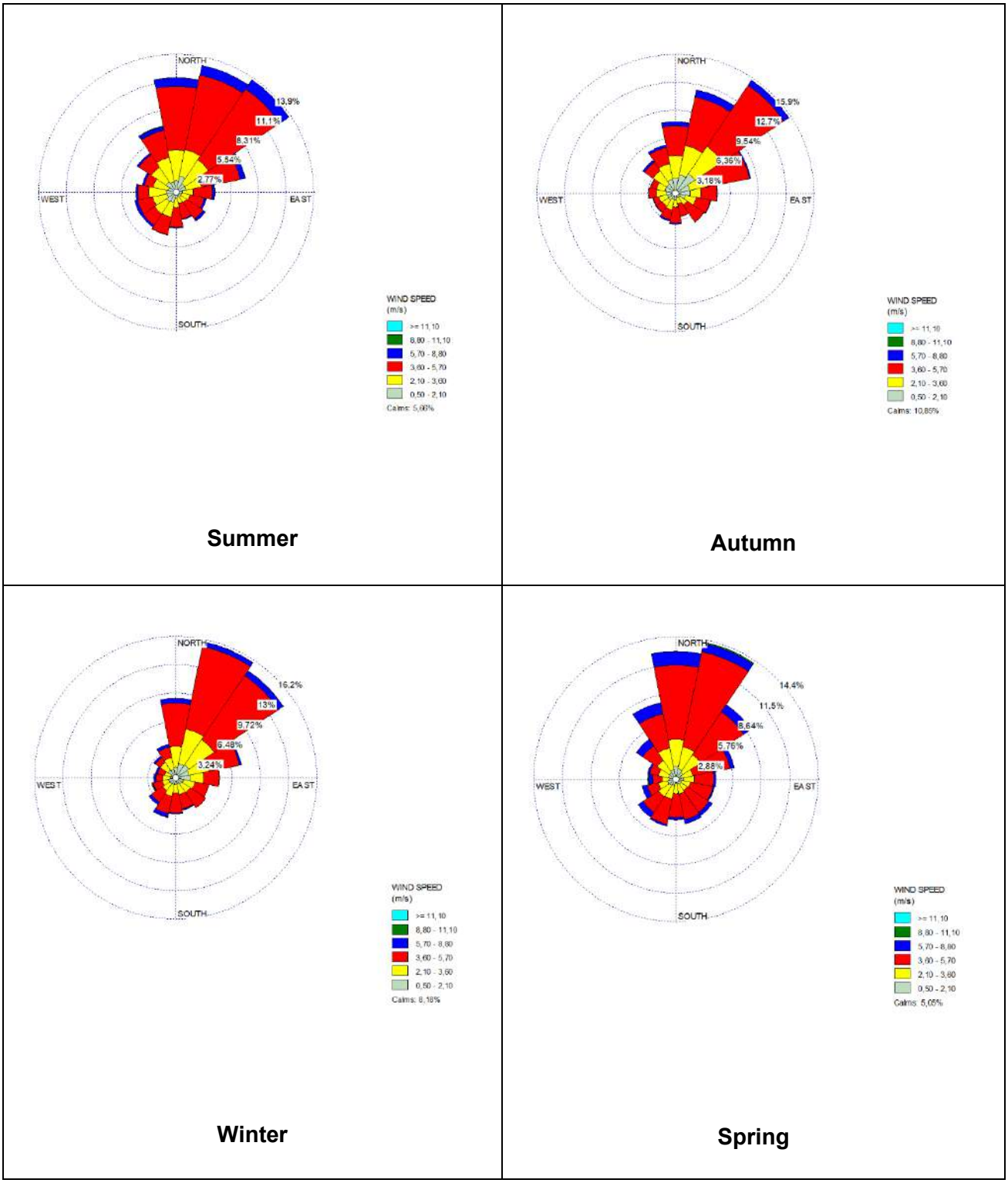


Figure 4-4: Seasonal Variation of Winds for the project site from the period January 2023 - December 2025.

4.1.2. *Temperature and Relative Humidity*

Temperature affects the formation, action, and interactions of pollutants in various ways. Temperature provides an indication of the rate of development and dissipation of the mixing layer, which is largely controlled by surface inversions. Surface temperature inversions play a significant role in air quality, especially during the winter months when these inversions are the strongest. Higher ambient temperatures will facilitate the dispersion of air pollutants which can result in lower ambient concentrations.

Chemical reaction rates also tend to increase with temperature and the warmer the air, the more water it can hold and therefore the higher the humidity. When relative humidity exceeds 70%, light scattering by suspended particles begins to increase, as a function of increased water uptake by the particles. This results in decreased visibility due to the resultant haze. Many pollutants may also dissolve in water to form acids.

The Free State province generally experiences a varied climate with warm summers and mild winters. Monthly average temperatures at the project site for the period January 2023 to December 2025 are presented in Figure 4-5. Average monthly temperatures range from 9.4 – 24.9ºC (Table 4-2). Highest temperatures are observed during the late-spring, summer and early-autumn months (November – March), while minimum temperatures are observed during the late-autumn to late-winter months (May – August). Relative humidity is higher during the cooler months (May – September) and lower but consistent for the remainder of the year (Figure 4-5).

Table 4-2: Hourly Minimum, Maximum and Monthly Average Temperatures for January 2023 - December 2025.

MINIMUM. MAXIMUM AND MONTHLY AVERAGE TEMPERATURES (ºC)												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Min	11.8	12.5	10.2	5.4	2.9	-0.8	-2.0	0.2	2.8	2.6	6.9	13.1
Max	33.5	34.5	32.6	27.5	25.0	21.6	21.8	27.1	28.1	30.8	34.6	35.1
Avg	24.9	24.4	22.5	18.1	14.3	9.4	9.7	13.5	17.1	19.8	22.8	24.2

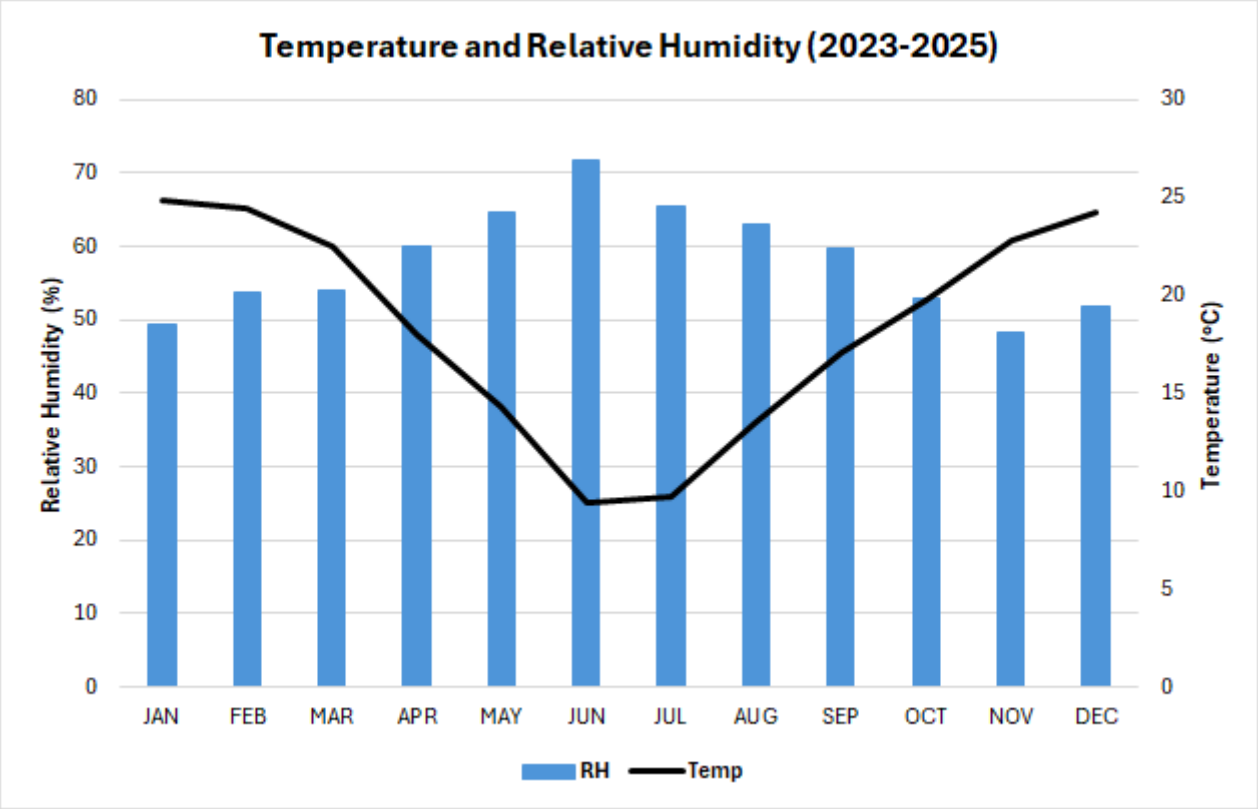


Figure 4-5: Monthly Average Temperature profile for the project site from January 2023 - December 2025.

4.1.3. *Precipitation*

Precipitation has an overall dilution effect and cleanses the air by washing out particles suspended in the atmosphere. Monthly total rainfall at the project site for the period January 2023 to December 2025 is presented in Figure 4-6. The area receives most of its rainfall during the months of September – April, with notably lower rainfall occurring during the late-autumn to winter months (May – August) (Table 4-3). Removal of particulates via wet depositional processes would be evident during the warmer and wet seasons (spring to mid-autumn), thus lower ambient concentrations of dust could be expected during these seasons. Over the remainder of the year higher ambient concentrations of particulates could be expected.

Table 4-3: Total Monthly Rainfall for January 2023 - December 2025.

TOTAL MONTHLY RAINFALL (mm)													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
2023	84.3	156.0	67.6	16.0	69.1	11.2	26.2	7.6	31.0	87.9	123.7	270.5	951.0
2024	96.8	35.3	7.9	127.0	0.8	41.7	0.8	0.0	82.6	56.6	62.7	192.5	704.6
2025	79.0	184.7	74.2	112.8	0.0	17.0	6.9	15.7	71.4	127	157.2	134.9	980.9

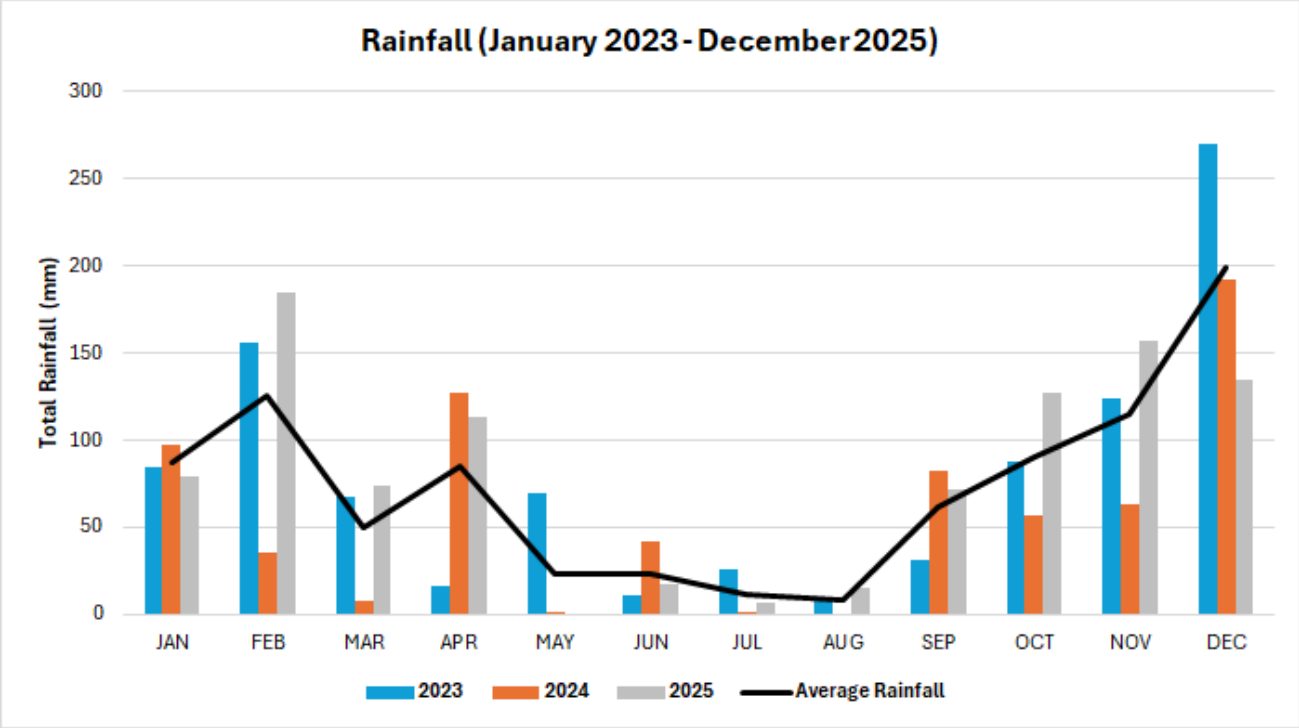


Figure 4-6: Total Monthly and Average Rainfall (mm) for the project site for the period January 2023 - December 2025.

4.2. Baseline Air Quality Concentrations

The existing air quality situation is usually evaluated using available monitoring data from permanent ambient air quality monitoring stations and dustfall networks near the project site. The nearest air quality monitoring station to the project site is located at the Bayswater Clinic (-29.085052°S; 26.242689°E) in Bloemfontein, however, this station is located more than 10km away from the proposed mine (i.e., ~150km south-west of the mine) and would not provide an accurate representation of background concentrations for criteria air pollutants (PM_{10}, PM_2.5, CO, SO_2, NO_2) at the project site. There is no other ambient air quality monitoring station operated near the project site (within a ~10km radius) that data could be used to represent background air quality, thus, baseline air quality concentrations for the criteria air pollutants could not be determined for the project site.

Dustfall monitoring is undertaken near the project site, by Harmony Gold, using single-unit dust bucket stations. Thus, background dustfall data for the project area was obtained from Harmony's monitoring network for the July 2024 – June 2025 monitoring periods. The dustfall monitoring network consists of seven (7) dustfall monitoring sites. Six (6) of the sites are classified as non-residential, while the seventh site is classified as residential.

4.2.1. *Baseline Dustfall Rates*

Out of 70 dustfall rates recorded at the Harmony sites for the July 2024 – June 2025 monitoring periods, only one (1) exceedance of the residential area standard of 600 mg/m^2/day was recorded at site HAR1, i.e., at Nyakallong (Table 4-4, Table 4-5 and Figure 4-7). However, causes of the exceedance were unknown at the time of compilation of this report. The exceedance was recorded in March 2025. In terms of the National Dust Control Regulations, 2026, a total of two non-consecutive exceedances of the residential and non-residential area limits are permitted within a calendar year. Thus, based on Harmony's dustfall monitoring data for the July 2024 – June 2025 monitoring periods, background dustfall rates at the project site are compliant with the Dust Control Regulations.

Table 4-4: Monthly dust fallout rates at the Harmony monitoring sites for July 2024 – June 2025.

Site ID	Site Description	Site Classification	Applicable Standard (mg/m2/day)	Jul-24	Aug-24	Sept-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Average
HAR1	Nyakallong	Residential	600		54	186	209	189	200	201	200	1570		394	102	
HAR36	Allanridge Silos	Non-residential	1200	87	48	204	302	81	181	124	269	97	60	76	47	
HAR41	West from Target TSF	Non-residential	1200			247	261	196	80	145	213	605	255	67	58	
HAR42	South from Target TSF	Non-residential	1200			237	200	85	220	67	10	68	41	14	79	202,86
HAR43	South from Freddies 9 TSF	Non-residential	1200			215	720	103	146	121	162	121	71	55	47	
HAR44	North from Freddies 9 TSF	Non-residential	1200			586	1130	205	134	83	150	50	36	86	166	
HAR45	East from Freddies 9 TSF	Non-residential	1200					237	326	280	215	39	169	306	212	

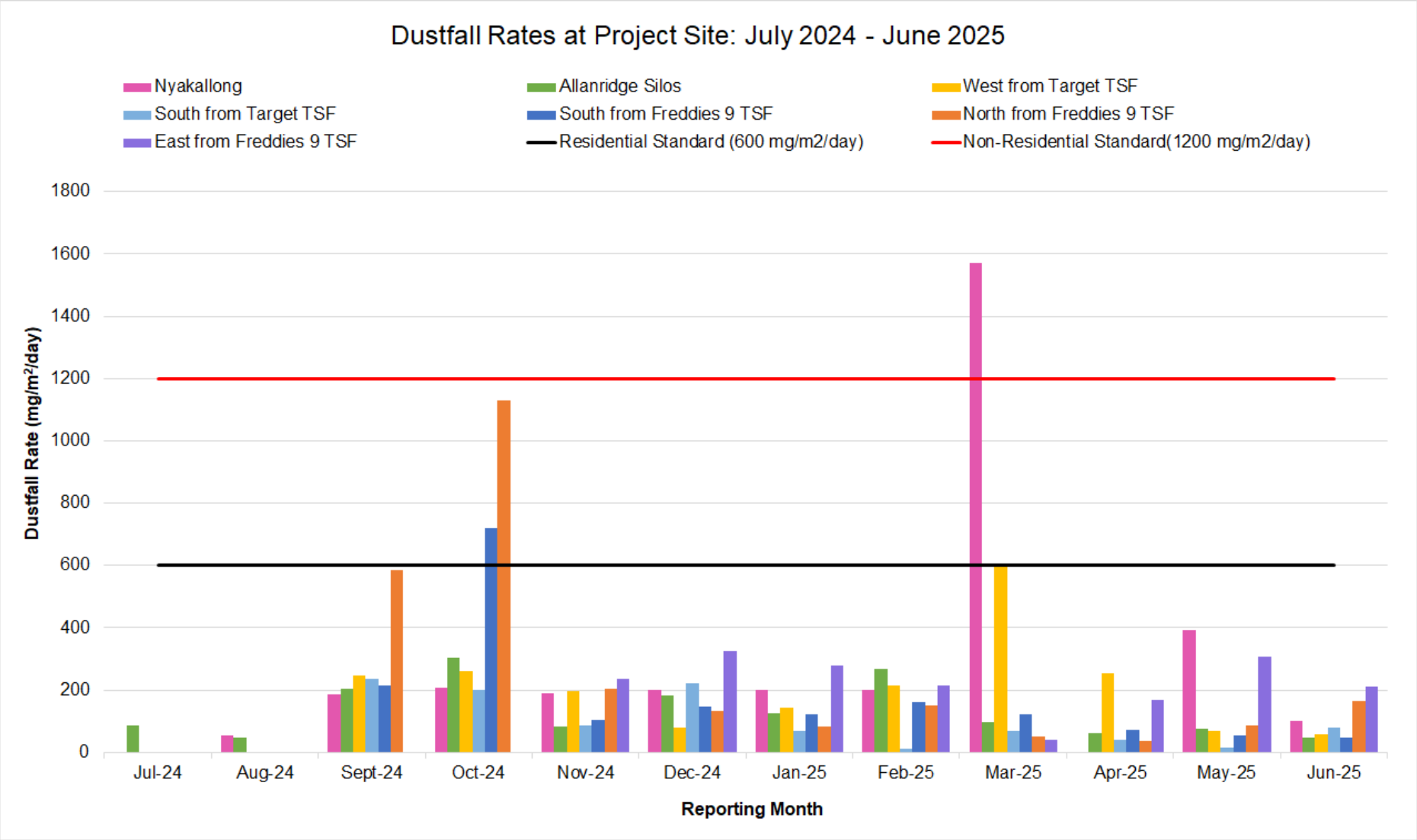


Figure 4-7: Dustfall rates associated with the Harmony monitoring network for the period July 2024 – June 2025.

Table 4-5: Frequency of exceedances of dust control standards at the Harmony dust bucket sites for the period July 2024 – June 2025.

Harmony				Frequency of Exceedance of Applicable National Standard	Applicable National Standard
Site ID	**Description**	**Unit Type**	**Classification**	**2024/2025**	
Single Units - compared to non-residential standard					**mg/m²/day**
HAR36	Allanridge Silos	Single	Non-residential	0	1200
HAR41	West from Target TSF	Single	Non-residential	0	1200
HAR42	South from Target TSF	Single	Non-residential	0	1200
HAR43	South from Freddies 9 TSF	Single	Non-residential	0	1200
HAR44	North from Freddies 9 TSF	Single	Non-residential	0	1200
HAR45	East from Freddies 9 TSF	Single	Non-residential	0	1200
Single Units - compared to residential standard					**mg/m²/day**
HAR1	Nyakallong	Single	Residential	1	600

4.3. Surrounding Sources of Air Pollution

Existing key sources of air pollution surrounding the project site were identified during a desktop exercise and include (Figure 4-8):

- Commercial agricultural activity (surrounding areas);
- Mining activities (surrounding areas);
- Wind erosion from exposed/bare surfaces (surrounding areas); and
- Vehicle dust entrainment on unpaved roads (surrounding areas).

Industrial areas, villages and informal settlement areas are found interspersed within the main land use types and they act as additional sources of air pollution in the area. Villages and informal settlements are typically associated with domestic solid-fuel burning emissions (Matandirotya, *et. al.,* 2022), while industrial areas generally emit process emissions. As shown in Figure 4-8, agricultural activities dominate the identified pollution sources in the area. However, all nearby sources are expected to negatively influence air quality within the airshed.

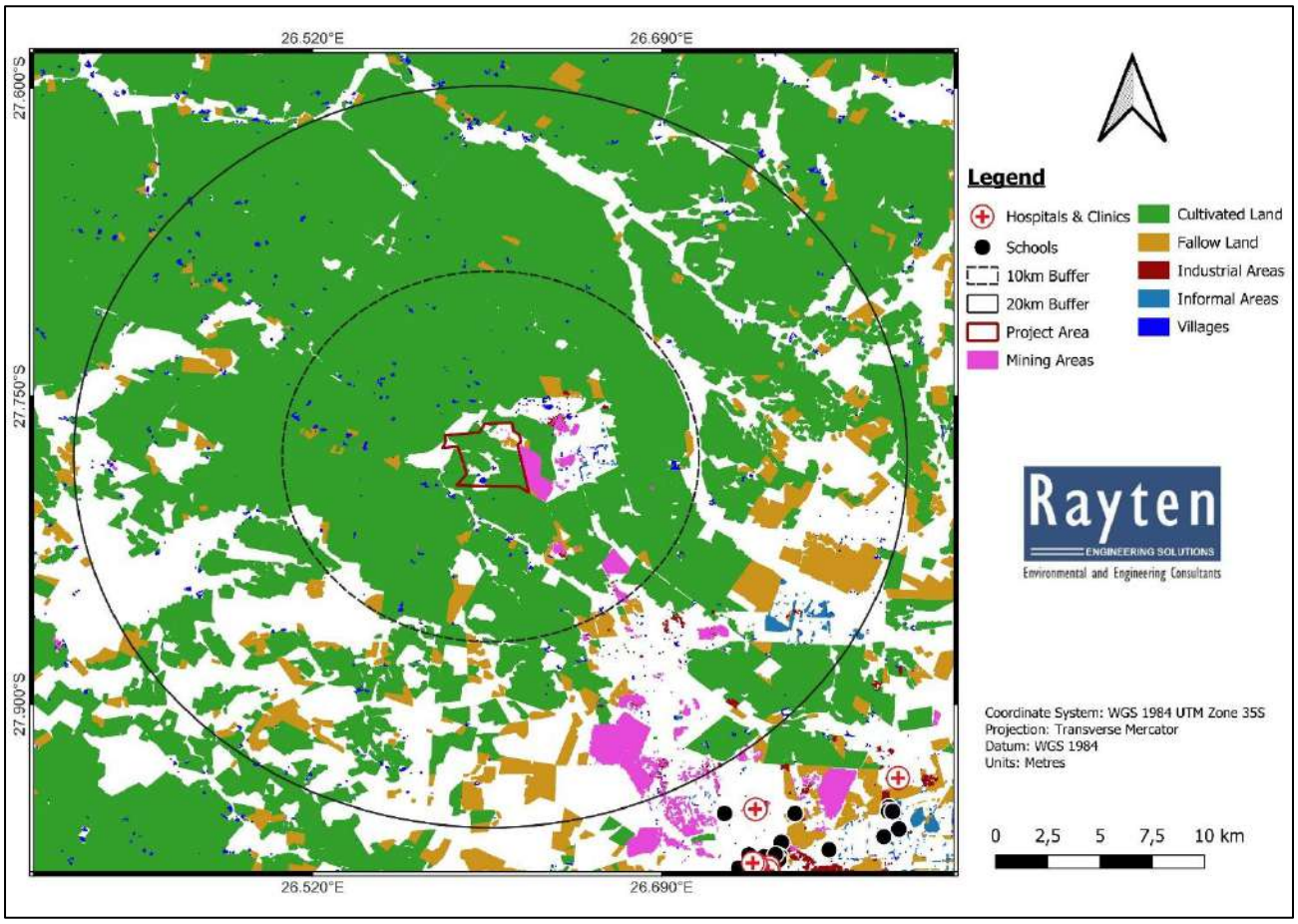


Figure 4-8: Identified surrounding emission sources within 20km of the project site.

4.3.1. *Commercial Agriculture*

There are several commercial agricultural areas surrounding the project site. Emissions from agricultural activities are difficult to control due to the seasonality of emissions and the large surface area producing emissions. Expected emissions resulting from agricultural activities include particulates associated with wind erosion and burning of crop residue, chemicals associated with crop spraying, and odiferous emissions resulting from manure and fertilizer. Dust associated with agricultural practices may contain seeds, pollen, and plant tissue, as well as agrochemicals, such as pesticides. The application of pesticides during temperature inversions increases the drift of the spray and the area of impact.

Dust entrainment from farming vehicles travelling on gravel roads may also cause increased particulates in an area. Dust from traffic on gravel roads increases with higher vehicle speeds, more vehicles and lower moisture conditions. The seasonal burning of the veld from July to September for field clearing in preparation for planting may also be a source of smoke. The nature of the activity has a potential impact on air quality in the area.

4.3.2. *Mining Activities*

Mining operations are known to produce significant amounts of fugitive dust. Fugitive dust emissions result from activities such as blasting and drilling, material handling, vehicle entrainment by haul vehicles, as well as windblown dust from stockpiles (Murzin & Gorlenko, 2021).

Some mining areas, including open bulk material storage areas and waste dumps that are susceptible to wind erosion, are identified within a 20km radius of the project site, particularly in the south-eastern quadrant.

4.3.3. *Wind Erosion from Exposed/Bare surfaces*

There are some open exposed areas such as bare soil, eroded natural land, etc, around the project site, which represent a source of dust in the area. Dust emissions due to the erosion of exposed areas occur when the threshold wind speed is exceeded. The threshold wind speed is dependent on the erosion potential of the exposed surface, which is expressed in terms of the availability of erodible material per unit area (mass/area). Any factor which binds the erodible material or otherwise reduces the availability of erodible material on the surface, thus, decreases the erosion potential of the surface. Studies have shown that when the threshold wind speeds are exceeded, particulate emission rates tend to decay rapidly due to the reduced availability of erodible material.

4.3.4. *Vehicle Dust Entrainment on Unpaved Roads*

Vehicle-entrained dust emissions from the surrounding unpaved roads in the area potentially represent a source of fugitive dust. When a vehicle or truck travels on an unpaved road, the force of the wheels on the road surface causes the pulverisation of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

5. AIR QUALITY IMPACT ASSESSMENT

Dustfall, PM_{10} and $PM_{2.5}$ are key pollutants of concern associated with the proposed mining activities, and are emitted from the following activities:

- Refurbishment and/or construction at Target No. 2 and No.3 Shafts;
- Materials handling operations (truck loading/offloading operations during Phase 1);
- Wind erosion from exposed areas: waste rock dumps;
- Vehicle dust entrainment on unpaved roads; and
- Conveyor transfer points (rock hoisting and run-of mine ore transport).

The above-mentioned sources were identified for the project based on the information provided by the client. A detailed questionnaire was given to the client prior to modelling to obtain specific details needed for input into the model and for the calculation of emission rates. The conservative scenario was assumed, where information was not known for input into the model. Please refer to Section 5.4 for more details about the assumptions made in this study.

To investigate the potential impact of the proposed project on local ambient air quality, the following air pollutants were chosen in the quantification of emissions for the construction and operational phases of the project:

- Dustfall; and
- Particulate matter (PM_{10} and $PM_{2.5}$).

This project focused on dust emissions as this is a key pollutant associated with the proposed project.

In this study, two scenarios were modelled:

a) The **construction phase scenario**, where emissions associated with construction and refurbishment activity due to the development and/or upgrade of infrastructure at Target No 2 Shaft were modelled.
   - Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.
b) The **operational phase scenario**, where emissions associated with surface activities at the proposed mine were modelled. This scenario represents the potential impacts if the proposed mine were emitting under normal operating conditions and comprises two different operational configurations, representing Phase 1 and Phase 2, respectively.

Processing operations at the Target 1 Plant fall outside the scope of this assessment, as they are undertaken as part of Harmony's operations and are not included in the proposed JV project.

In the quantification of emissions, use was made of published predictive emission factor equations given in the United States Environmental Protection Agency (USEPA) AP-42 documents and the Australian National Pollutant Inventory (NPI) Emission Estimate Technique (EET) Manual for Gold Ore Processing, version 2.0. The South African Regulations regarding Air Dispersion Modelling recommends the use of published emission factors for national consistency, such as the USEPA AP-42 and NPI emissions factors.

An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors are always expressed as a function of the weight, volume, distance, or duration of the activity emitting the pollutant. The general equation used for the estimation of emissions is:

$$E = A \times EF \times \left(1 - \frac{ER}{100}\right)$$

Where:
E = emission rate
A = activity rate
EF = emission factor
ER = overall emission reduction efficiency (%)

The emission factors and equations used in the assessment for the proposed project are described in Section 5.1. The fugitive emission source locations and descriptions are given in Appendix C. The source dimensions and emission durations, as well as margins of uncertainty/accuracy associated with the emission factors used are given in Sections 5.1.1 to 5.1.4.

NPI emission factor symbols and ratings can be summarised as follows (NPI, 2015):

- A – Excellent;
- B – Above average;
- C – Average;
- D – Below Average;
- E – Poor; and
- U – Unrated.

An A or B rating indicates a higher degree of certainty, whereas a D or E rating indicates a lower degree of certainty. A rating of U indicates that the emission factor uncertainty has not been rated (e.g., for emission factors generated by modelling rather than actual test results) (NPI, 2015).

5.1. Surface Mining Operations – Emission Rates (Area and Line Sources).

5.1.1. *Construction*

The USEPA provides an emissions equation for general construction operations. Dust is the main pollutant of concern emitted during heavy construction activities. The impact of dust emissions associated with construction is generally limited to the period of construction where the impact is significantly reduced once construction activities have stopped. Dust emissions from construction activities are associated with land clearing, ground excavation, material handling (loading/offloading), vehicle dust entrainment from trucks, stockpiling, and the construction of infrastructure. Dust emissions from construction activities will vary depending on the level of activity and prevailing meteorological conditions (USEPA, 1995).

Emissions from the construction activities were calculated using the following equation:

$$E = 2.69 \text{ Mg/hectare/month of activity}$$

Where:
E = Emission rate (Mg/Hectare/month activity)
Emission factor rating symbol is unknown

The emission factor and equation used to estimate emissions from construction activities were obtained from the USEPA AP-42 document, Section 13.2.3 *Heavy Construction Operations* (USEPA, 1995). The value is most applicable to construction operations with medium activity level, moderate silt contents and semi-arid climate.

The following general assumptions were made in order to model the construction activity (based on information provided by the client):

- Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.
- Construction was assumed to occur during the day for 10 hours a day for 7 days a week, to represent the worst-case scenario.
- A phased construction approach was assumed, given that the construction activities are expected to extend over a 45-month period.
- 40% control efficiency was applied to construction activity, due to the assumed use of water sprays to mitigate dust during construction.
- Maximum height of release for the construction area was assumed to be 0.5m since construction occurs at ground level.
- A conservative approach was undertaken where emissions associated with all construction activities were assumed to be covered under *Heavy Construction Activity.* In other words, emissions were not calculated separately for each individual activity.

The emission rates for total suspended particulates (TSP), PM_{10} and $PM_{2.5}$ and the input parameters for the construction areas are given in Table 5-1.

Table 5-1: Input parameters for construction area.

SOURCE [2,3,4]	EMISSION RATE (g/s)			MAX HEIGHT (m) [1]	MAX LENGTH (m) [1]	MAX WIDTH (m) [1]
	TSP	PM_{10}	$PM_{2.5}$			
Construction Phase – No. 2 Shaft						
Offices & buildings area (new)	1.06	0.53	0.053	0.5	based on site layout	
Shaft area (new)	0.75	0.38	0.038	0.5	based on site layout	

Notes:
1. Dimensions and locality of source assumed based on preliminary layout provided by client.
2. 40% control efficiency was applied to construction activity, due to the assumed use of water sprays to mitigate dust during construction.
3. Emission duration assumed to be 10 hours for 7 days a week, and over three months, to represent the worst-case scenario.
4. Construction activity was assumed to occur in phases at the proposed No. 2 Shaft development areas. Therefore, the shaft and offices/buildings areas were assumed to fall under the same phase of construction.

5.1.2. *Wind Erosion from Exposed Surfaces (i.e., Waste Rock Dumps.)*

Wind erosion from exposed surfaces such as the waste rock dumps (WRDs) at the No. 2 and No. 3 Shafts are a significant source of dust emissions. Physical properties namely the shape, size, height, the surface area coverage, moisture content and the surface compaction of the stockpiles together with prevailing meteorological conditions will influence the rate at which dust is emitted. Significant amounts of dust will be eroded from the exposed areas and stockpiles under wind speeds greater than 5.4 m/s (i.e., threshold friction velocity of 0.26 m/s). Fugitive dust generation resulting from wind erosion under high winds (i.e., > 5.4 m/s) is directly proportional to the wind speed.

In the estimation of fugitive dust emissions from the stockpiles and exposed areas at the proposed mine, emissions were calculated by use of the emission factors for wind erosion given in the NPI, EET manual for gold ore processing (NPI, 2006). The emission factors for TSP, PM_{10} and $PM_{2.5}$ used are given below.

Wind erosion (NPI, Gold ore processing, Table 4):

$$E_{TSP} = 0.4 \text{ kg/Ha/hr}$$

$$\mathrm{E_{PM10}} = 0.2 \text{ kg/Ha/hr}$$

$$E_{PM2.5} = 5\% \; of \; TSP$$

Where:
E = Emission rate (Kg/Hectare/hour)
Emission factor rating symbol = U

The emission rates for TSP, PM_{10} and $PM_{2.5}$ and the input parameters for the exposed areas and stockpiles are given in Table 5-2.

Table 5-2: Input parameters for stockpiles and exposed areas.

SOURCE [2, 3, 4]	EMISSION RATE (g/s)			MAX HEIGHT (m)[1,]	MAX LENGTH (m)[1]	MAX WIDTH (m)[1]
	TSP	PM_{10}	$PM_{2.5}$			
WRD at No. 2 Shaft	1.31	0.65	0.065	15	Based on footprint of source	
WRD at No. 3 Shaft	1.05	0.52	0.052	40		

Notes:
1. Max heights, source dimensions, exact footprints and locality for sources were estimated from google earth.
2. Emission duration assumed to be 24 hours for 7 days a week for wind erosion.
3. A 30% control efficiency was applied to the WRDs. Hard material and rock present in the dump has less dust emitting potential compared to finer materials.

5.1.3. *Material Handling Operations (Conveyors and Conveyor Transfer Points)*

Hoisting of material (waste rock and ore) will be done using the No. 3 Shaft during Phase 1, while the No. 2 Shaft is being constructed. In Phase 2, hoisting will be done using the No. 2 Shaft. During Phase 1, conveyors will be used to transfer reef ore to the reef stockpile, from where it will be conveyed via the reef transfer conveyor to the truck loading bin. From the truck loading bin, haul trucks will transport the ore to the processing plant at Harmony Target's No. 1 Shaft for further processing. In Phase 2, a set of conveyors will be used to transfer material (waste rock and ore) from the headgear bin to the waste rock bin and the No. 1 Shaft plant area, respectively.

Emissions of TSP, PM_{10} and $PM_{2.5}$ due to conveyor transfer operations are quantified using the NPI emission factors provided in the EET manual for gold ore processing for:

Handling, Transferring & Conveying (NPI, Gold ore processing, Table 4):

$$E_{TSP} = 0.005\ kg/ton$$

$$E_{PM10} = 0.002 kg/ton$$

$$E_{PM2.5} = Assumed\ to\ be\ 5\%\ of\ TSP$$

Where:
E = Emission rate (kg/tonne)
Emission factor rating symbol = C
Assumed high moisture content for material (>4%), based on client information.

Emission rates for TSP, PM_{10} and $PM_{2.5}$ from material conveying and transfer points at the proposed mine are given in Table 5-3 below.

Table 5-3: Input parameters for material conveying and transfer points.

SOURCE	Material Type	THROUGHPUT TONNES/HOUR [2]	EMISSION RATE (g/s) [3]		
			TSP	PM_{10}	$PM_{2.5}$
Phase 1 (No. 3 Shaft)					
x1 conveyor transfer point (load reef ore stockpile) [1,3,4]	ore	44.44 [2]	0.062	0.025	0.0031
x1 transfer point (load reef ore transfer conveyor) [1,3,4]	ore	44.44 [2]	0.062	0.025	0.0031
x1 conveyor transfer point (load truck loading bin) [1,3,4]	ore	44.44 [2]	0.062	0.025	0.0031
x1 transfer point (load haul trucks) [1,3,4]	ore	44.44 [2]	0.062	0.025	0.0031
x1 conveyor transfer point (load surface rock handling area / trucks) [1,3,4]	waste rock	12.30 [2]	0.017	0.007	0.009

Phase 2 (No. 2 Shaft)					
x1 conveyor transfer point (load headgear bin) (1,3,4)	ore/waste rock	144.18 (2)	0.2	0.08	0.010
x1 conveyor transfer point (load conveyor SC01/SC02) (1,3,4)	ore/waste rock	144.18 (2)	0.2	0.08	0.010
conveyor SC01/SC02	ore/waste rock	144.18 (2)	0.2	0.08	0.010
x1 conveyor transfer point (load conveyor SC03) (1,3,4)	ore/waste rock	144.18 (2)	0.2	0.08	0.010
conveyor SC03 (1,3,4)	ore/waste rock	144.18 (2)	0.2	0.08	0.010
x1 conveyor transfer point (load conveyor SC04) (1,3,4)	ore/waste rock	144.18 (2)	0.2	0.08	0.010
conveyor SC04 (1,3,4)	ore/waste rock	144.18 (2)	0.2	0.08	0.010
x1 conveyor transfer point (load conveyor SC05) (1,3,4)	waste rock	28.21 (2)	0.04	0.016	0.002
conveyor SC05 (1,3,4)	waste rock	28.21 (2)	0.04	0.016	0.002
x1 conveyor transfer point (load waste rock bin) (1,3,4)	waste rock	28.21 (2)	0.04	0.016	0.002
x1 conveyor transfer point (load conveyor SC06A) (1,3,4)	ore	115.97 (2)	0.16	0.064	0.0081
conveyor SC06A (1,3,4)	ore	115.97 (2)	0.16	0.064	0.0081
x1 conveyor transfer point (load conveyor SC07A) (1,3,4)	ore	115.97 (2)	0.16	0.064	0.0081
conveyor SC07A (1,3,4)	ore	115.97 (2)	0.16	0.064	0.0081

Notes:

1. Dimensions and height above ground of transfer points were estimated based on information provided by the client. Where information was not provided, assumptions were made based on conveyor specifications at similar mines.
2. Material throughputs were assumed based on information provided by the client. Hourly material throughput was calculated based on the hours of operation.
3. Emission duration assumed to be for 10 hours for 7 days a week during Phase 1 and 16 hours a day for 7 days a week during Phase 2, based on information provided by client.
4. No control efficiency applied to conveyor transfer of material since the conveyors are open conveyors (as confirmed by the client).

5.1.4. *Vehicle Dust Entrainment on Unpaved Road*

During Phase 1, mined ore will be transported by truck to the Target 1 processing plant via a haul road comprising both paved and unpaved sections. The haul road was identified from the technical report prepared for the JV Project by Bara Consulting in April 2026 and is approximately 7.67km in length. As the available information and Google Earth imagery did not allow the paved and unpaved sections of the haul road to be reliably distinguished, the haul road was conservatively modelled as unpaved for the purposes of the air quality assessment. This approach represents a conservative, worst-case assumption with respect to fugitive dust emissions from vehicle travel along the haul road.

Vehicle-entrained dust emissions from the movement of hauling trucks on the haul road potentially represent a significant source of fugitive dust at the site. The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. In addition to the volume of traffic,

emissions also depend on source parameters which characterise the condition of a road and the associated vehicle traffic. These parameters include vehicle speeds, mean vehicle weight, average number of wheels per vehicle and road surface moisture (EPA, 1995). Although vehicle entrainment on unpaved roads is found to result in high fugitive dust emissions, these impacts are often limited close to the source.

Fugitive dust emissions from hauling trucks, are quantified using the following equations provided in the Missouri Department of Natural Resources, Haul Road Fugitive Emissions Worksheet Instructions (Missouri Department of Natural Resources, 2009):

$$E = K\,(\frac{s}{12})^{a}\,x\,(\frac{W1+W2}{6})^{b}$$

$$Annual\,VMT = \frac{2\,x\,(length\,of\,haul\,road)\,x\,(annual\,amount\,hauled)}{(average\,weight\,of\,material\,per\,load)}$$

Where:

E = emission factor (lb/VMT) (lb/VMT x 281.9 = g/VKT)
VMT = Vehicle miles travelled
VKT = Vehicle kilometres travelled
s = surface material silt content (%)
K = empirical constant (K_{TSP}, K_{PM10} & $K_{PM2.5}$)
a = empirical constant (a_{TSP}, a_{PM10} & $a_{PM2.5}$)
b = empirical constant (b_{TSP}, b_{PM10}, $b_{PM2.5}$)
W1 = Weight of unloaded truck
W2 = Weight of loaded truck

A surface material silt content of 8.3% was assumed for the haul road, based on the typical silt content value provided by the USEPA for stone quarrying and processing (haul road to/from pit) and can be found in Table 13.2.2-1 of the USEPA AP-42 document. The weights of the trucks were estimated based on a ~30T CAT AD30 articulated dump truck (ADT), which is similar in capacity to the trucks that will be used at the mine. The empirical constants K, a and b were chosen for industrial roads based on the values provided in the USEPA, AP-42 document, Section 13.2 unpaved haul roads (Table 5-4).

A summary of input parameters for the hauling trucks at the mine is given in Table 5-5. Emission rates for TSP, PM_{10} and $PM_{2.5}$ due to vehicle dust entrainment from hauling trucks are given in Table 5-6 below.

The mine will use water (water bowser/water sprays) to control dust emissions from hauling activities. It was assumed that at least 40% emission reduction efficiency will be achieved. This assumption was only made for modelling purposes; dust suppression on the haul route at the mine will depend on the weather conditions and operational activities at the time.

Table 5-4: Empirical constants used in the calculation for dust emissions from hauling trucks (USEPA, 1995: Section 13.2, Table 13.2.2).

Constant	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
	PM-2.5	PM-10	PM-30*	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	-	-	-	0.5	0.5	0.3
Quality Rating	B	B	B	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 5-5: Source parameters for hauling trucks.

SOURCE [1]	TRUCK PARAMETERS				
	UNLOADED WEIGHT (Tonnes)	LOADED WEIGHT (Tonnes)	LENGTH (m)	WHEEL WIDTH (m)	HEIGHT (m)
Proposed Mine					
Truck hauling activity on unpaved haul road (ore)	30	60	10.15	2.69	2.55
Notes: 1. Parameters were based on the specifications provided for an ~30T CAT AD30 ADT.					

Table 5-6: Input parameters for vehicle dust entrainment due to truck hauling activities on unpaved road surfaces.

SOURCE [1, 2, 3]	VKT	EMISSION RATE (g/s)		
		TSP	PM_{10}	$PM_{2.5}$
Proposed Mine				
Road 1 – from No. 3 Shaft to Target 1 processing plant	81813	11.24	3.2	0.32
Notes: 1. Truck hauling hours assumed to occur 10 hours a day for 7 days a week based on information provided by the client. 2. A 40% control efficiency applied due to water spraying for dust suppression. The percentage control efficiency was based on the Australian NPI document (NPI, 2012). 3. VKT = vehicle kilometres travelled and was based on the average annual ore production rate provided by the client (annual values provided in April 2026 technical report for the JV project).				

5.2. Model Overview

5.2.1. *AERMOD View*

AERMOD, a state-of-the-art Planetary Boundary Layer (PBL) air dispersion model, was developed by the American Meteorological Society and USEPA Regulatory Model Improvement Committee

(AERMIC). AERMOD utilizes a similar input and output structure to ISCST3 and shares many of the same features, as well as offering additional features. AERMOD fully incorporates the PRIME building downwash algorithms, advanced depositional parameters, local terrain effects, and advanced meteorological turbulence calculations.

The AERMOD atmospheric dispersion modelling system is an integrated system that includes three modules:

- A steady-state dispersion model designed for short-range (up to 50 km) dispersion of air pollutant emissions from stationary industrial sources.
- A meteorological data pre-processor (AERMET) for surface meteorological data, upper air soundings, and optionally, data from on-site instrument towers. It then calculates atmospheric parameters needed by the dispersion model, such as atmospheric turbulence characteristics, mixing heights, friction velocity, Monin-Obukov length and surface heat flux.
- A terrain pre-processor (AERMAP) which provides a physical relationship between terrain features and the behaviour of air pollution plumes. It generates location and height data for each receptor location. It also provides information that allows the dispersion model to simulate the effects of air flowing over hills or splitting to flow around hills.

AERMOD includes Plume Rise Model Enhancements (PRIME) building downwash algorithms which provide a more realistic handling of building downwash effects. PRIME algorithms were designed to address two fundamental features associated with building downwash; enhanced plume dispersion coefficients due to the turbulent wake and to reduce plume rise caused by a combination of the descending streamlines in the lee of the building and the increased entrainment in the wake. AERMOD is suitable for a wide range of near field applications in both simple and complex terrain. The evaluation results for AERMOD, particularly for complex terrain applications, indicate that the model represents significant improvements compared to previously recommended models.

AERMOD has been used in various dispersion modelling studies in the United States and around the world (Perry *et al*., 2004).

5.2.2. *Model Requirements*

The approach to this dispersion modelling study is based on the Code *of Practice for Air Dispersion Modelling in Air Quality Management in South Africa* (DEA, 2014). As per the *Code of Practice*, this assessment is a Level 2 assessment. Level 2 assessments should be used for air quality impact assessments in standard/generic licence or amendment processes where:

- The distribution of pollutant concentrations and depositions are required in time and space;
- Pollutant dispersion can be reasonably treated by a straight-line, steady-state, Gaussian plume model with first order chemical transformation. Although more complicated processes may be occurring, a more complicated model that explicitly treats these processes may not be necessary depending on the purposes of the modelling and the zone of interest;
- Emissions are from sources where the greatest impacts are in the order of a few kilometres (less than 50 km) downwind.

A summary of the key variables used for input into the AERMOD model is given in Table 5-7 below. Data input into the model includes MM5 modelled meteorological data (surface and upper air) for 01 January 2023 – 31 December 2025. Terrain data at a resolution of 90m (SRTM90) was used for input into the model, as generated by the terrain pre-processor, AERMAP. A modelling domain of 15km x 15km was used. A multi-tier grid with a grid receptor spacing of 250m (5 km from the facility), 500m (10 km from facility) and 1000 m (15km from facility) (3 tiers) was used.

Table 5-7: Key Variables used in the modelling study.

Parameter	Model Input
Model	**Input**
Assessment level	Level 2
Dispersion model	AERMOD Version 12.0.0
Supporting models	AERMET Version 12.0.0 AERMAP Version 12.0.0
Emissions	**Input**
Pollutants to be modelled	Dustfall, PM_{10} and $PM_{2.5}$
Scenarios	Construction and Operational
Chemical transformations	N/A
Exponential decay	Rural
Settings	**Input**
Terrain setting	Elevated
Terrain data	SRTM90
Terrain data resolution (m)	90
Land use characteristics	Grassland & Cultivated Land
Grid receptors	**Input**
Site boundary (m)	50
Modelling domain (km)	15 x 15
Fine grid resolution (m)	250 (5km from the facility)
Medium grid resolution (m)	500 (10km from facility)
Large grid resolution (m)	1000 (beyond 15km from facility)

5.3. Dispersion Modelling Results

Dispersion simulations were undertaken for the following scenarios to determine:

a) The **construction phase scenario**, where emissions associated with construction and refurbishment activity due to the development and/or upgrade of infrastructure at Target No 2 Shaft, were modelled.
b) The **operational phase scenario**, where emissions associated with surface activities at the proposed mine were modelled. This scenario represents the potential impacts if the proposed mine were emitting under normal operating conditions and comprises two different operational configurations, representing Phase 1 and Phase 2, respectively.

The closure phase was not assessed in this AQIAr. However, the impacts associated with closure should be similar to those observed for the construction phase. Thus, the incremental concentrations

projected, and isopleth plots created for the construction phase in this AQIAr are considered as applicable to the closure phase.

The Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014), recommends the use of the 99th percentile concentrations for short-term assessment with the NAAQS since the highest predicted ground-level concentrations can be considered outliers due to complex variability of meteorological processes. This might cause exceptionally high concentrations that the facility may never actually exceed in its lifetime.

Isopleth plots of predicted dustfall rates and PM_{10} and $PM_{2.5}$ concentrations are given in Figure 5-1 to Figure 5-5 for the construction phase and Figure 5-6 to Figure 5-15 for the operational phase. For short term averaging periods, the predicted 99th percentile concentrations are provided.

The AERMOD dispersion model plots shown below represent the maximum predicted incremental concentrations and deposition rates (for dustfall) calculated over the 3-year meteorological period.

Comparison of the predicted PM_{10} and $PM_{2.5}$ ambient concentrations is made with the South African NAAQS to determine compliance. Comparison of the dustfall rates is made with the NDCR, 2026. In determining compliance, (as determined beyond the site boundary) predicted incremental concentrations are compared against the applicable standards. Inside the site boundary, air pollutant concentrations are typically required to comply with occupational health and safety standards. In this case, the shaft boundaries of the proposed mine are evaluated because all operational surface activities will centre on the No. 2 and No. 3 Shafts.

5.3.1. *Construction Phase*

Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.

The dispersion model output plots for dustfall rates, including PM_{10} and $PM_{2.5}$ concentrations due to construction activities associated with the No. 2 Shaft are given in Figure 5-1 to Figure 5-5. Predicted dustfall deposition rates, as well as PM_{10} and $PM_{2.5}$ concentrations, are indicated to be highest in the immediate vicinity of the construction area and decrease rapidly with increasing distance from the source. Localised on-site exceedances of the non-residential dustfall standard of 1 200 mg/m^2/day (and, consequently, the more stringent residential standard of 600 mg/m^2/day) (Figure 5-1), the daily and annual PM_{10} NAAQS (Figure 5-2 and Figure 5-3), and the daily $PM_{2.5}$ NAAQS (Figure 5-4) are observed within the shaft boundary. Of these pollutants, only the short-term PM_{10} exceedances are predicted to extend locally just beyond the southern shaft boundary (Figure 5-2). However, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM standards. Incremental annual $PM_{2.5}$ concentrations remain below the respective standard throughout the modelling domain (Figure 5-5).

The dispersion footprint extends predominantly towards the west and south-west, with the higher concentration contours largely confined to the shaft area. Sensitive receptor areas located around the No. 2 Shaft generally fall outside the higher-concentration contours. The results therefore indicate that dustfall, PM_{10} and $PM_{2.5}$ impacts associated with the refurbishment activities at the No. 2 Shaft are predominantly localised around the construction areas, with substantially lower impacts expected at surrounding residential receptors.

Maximum predicted incremental dustfall rates and PM concentrations at the nearby sensitive receptors located within a 20km radius of the proposed mine are given in Table 5-8 for the construction phase. In addition, the maximum predicted incremental PM_{10} and $PM_{2.5}$ concentrations and dustfall rates at the No. 2 Shaft boundary are given in Table 5-11 for this scenario.

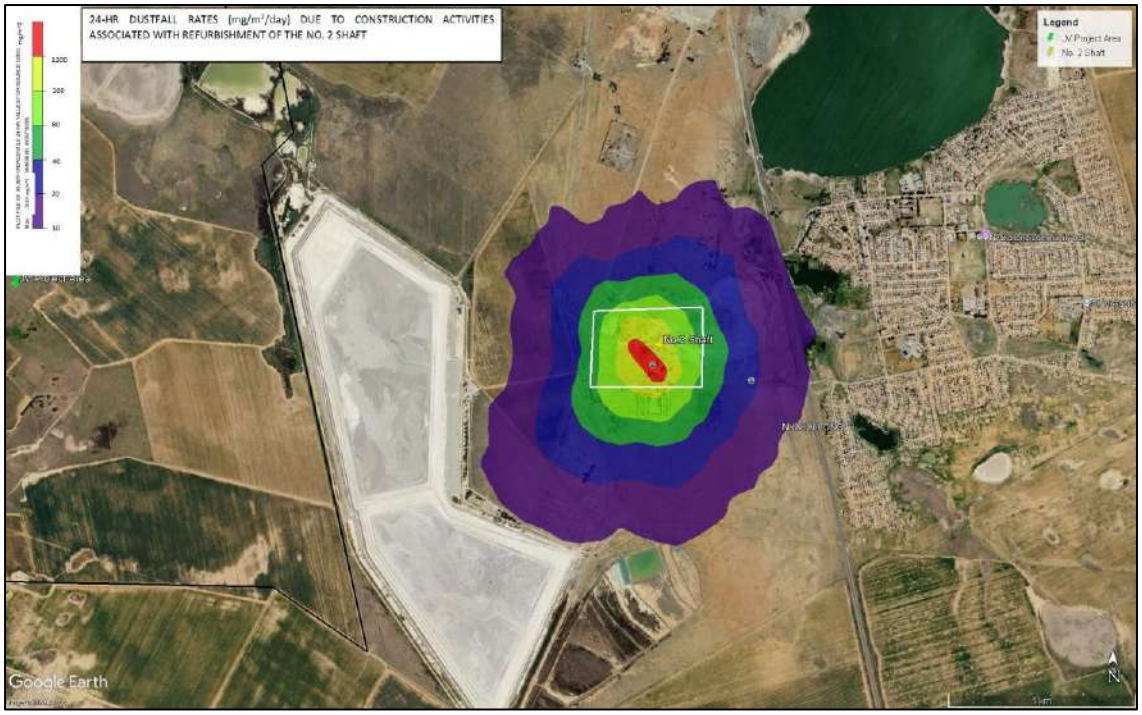


Figure 5-1: Predicted Dustfall Rates for the Proposed Mine - Construction Phase.



Figure 5-2: Predicted Daily Average PM_{10} Concentrations for the Proposed Mine - Construction Phase.

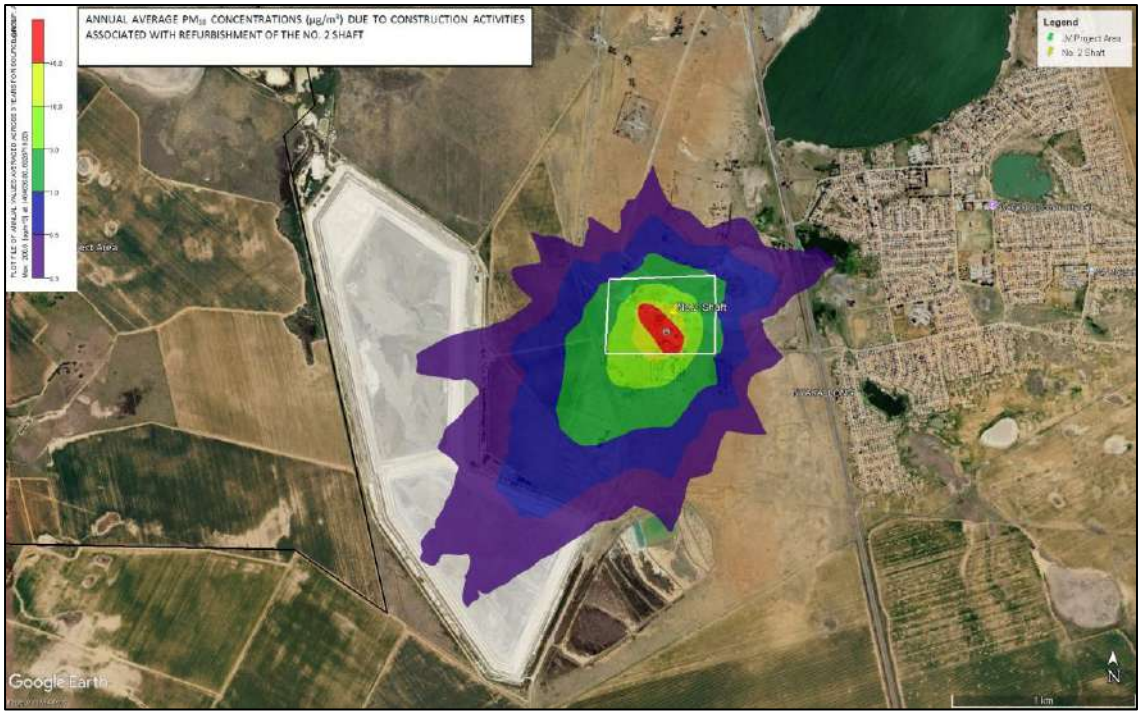


Figure 5-3: Predicted Annual Average PM_{10} Concentrations for the Proposed Mine - Construction Phase.

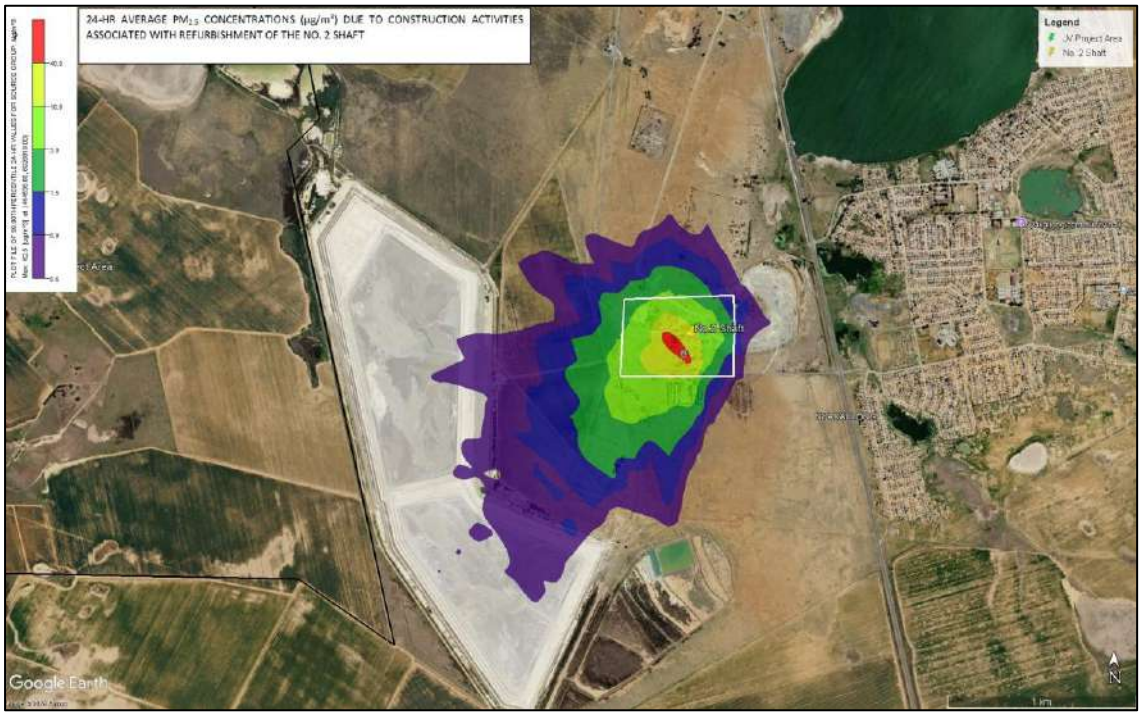


Figure 5-4: Predicted Daily Average $PM_{2.5}$ Concentrations for the Proposed Mine - Construction Phase.

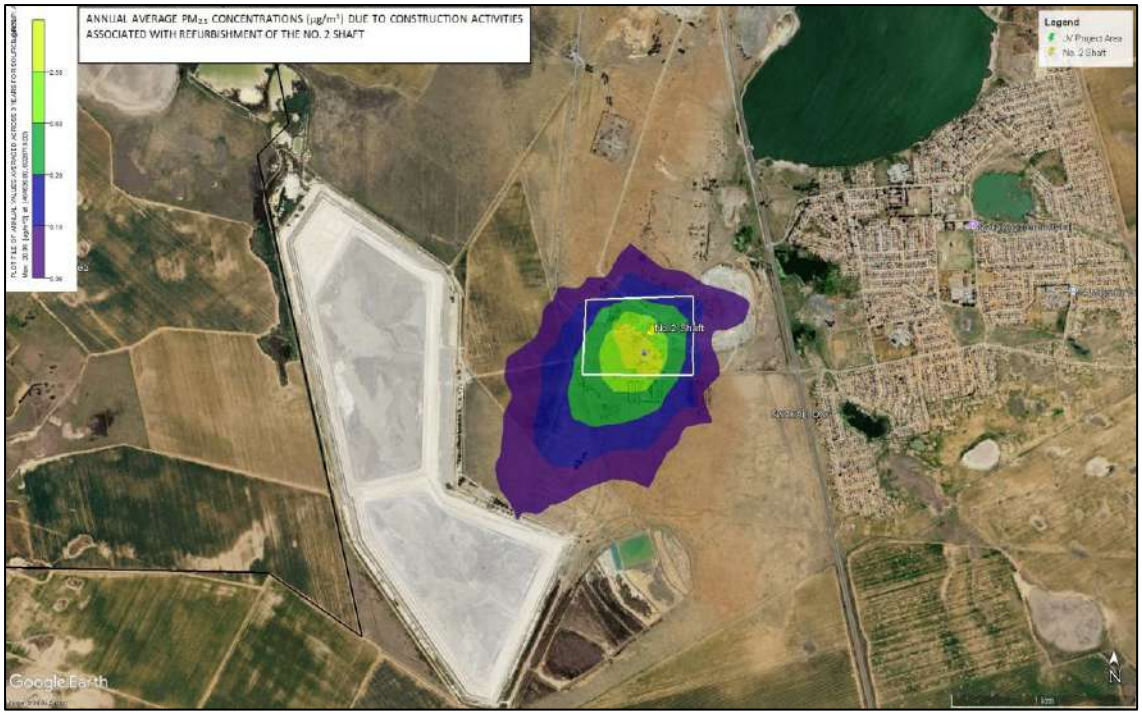


Figure 5-5: Predicted Annual Average $PM_{2.5}$ Concentrations for the Proposed Mine - Construction Phase.

5.3.2. *Operational Phase*

5.3.2.1. Phase 1

Phase 1 surface operations will be centred on the No. 3 Shaft. Based on the dispersion model output plots for the operational phase 1 associated with the proposed mining project, predicted incremental dustfall deposition rates, as well as PM_{10} and $PM_{2.5}$ concentrations, are generally low, except for two isolated exceedances of the daily and annual PM_{10} NAAQS observed along the north-western shaft boundary

The dispersion model output plots for dustfall rates, including PM_{10} and $PM_{2.5}$ concentrations due to Phase 1 operations are given in Figure 5-6 for dustfall, Figure 5-7 to Figure 5-8 for PM_{10}, and Figure 5-9 to Figure 5-10 for $PM_{2.5}$. Higher incremental concentrations are predicted in the vicinity of the shaft and along the haul route, with concentrations decreasing with increasing distance from the emission sources. The Phase 1 results show a relatively elongated dispersion footprint extending between the No. 3 Shaft and Target 1 Plant, reflecting the use of the approximately 7.67km haul route for transporting ore. The relatively elongated footprint also reflects the distributed nature of emissions from the approximately 7.67km haul route.

Low incremental concentrations are predicted to disperse from the shaft area to the surrounding sensitive receptor areas, with no exceedances of the respective standards occurring outside the shaft boundary.

Maximum predicted incremental dustfall rates and PM concentrations at the nearby sensitive receptors located within a 20km radius of the proposed mine are given in Table 5-9 for operational phase 1 of the proposed project. The maximum predicted incremental PM_{10} and $PM_{2.5}$ concentrations, as well as dustfall rates at the No. 3 Shaft boundary are given in Table 5-11 for this modelling scenario.

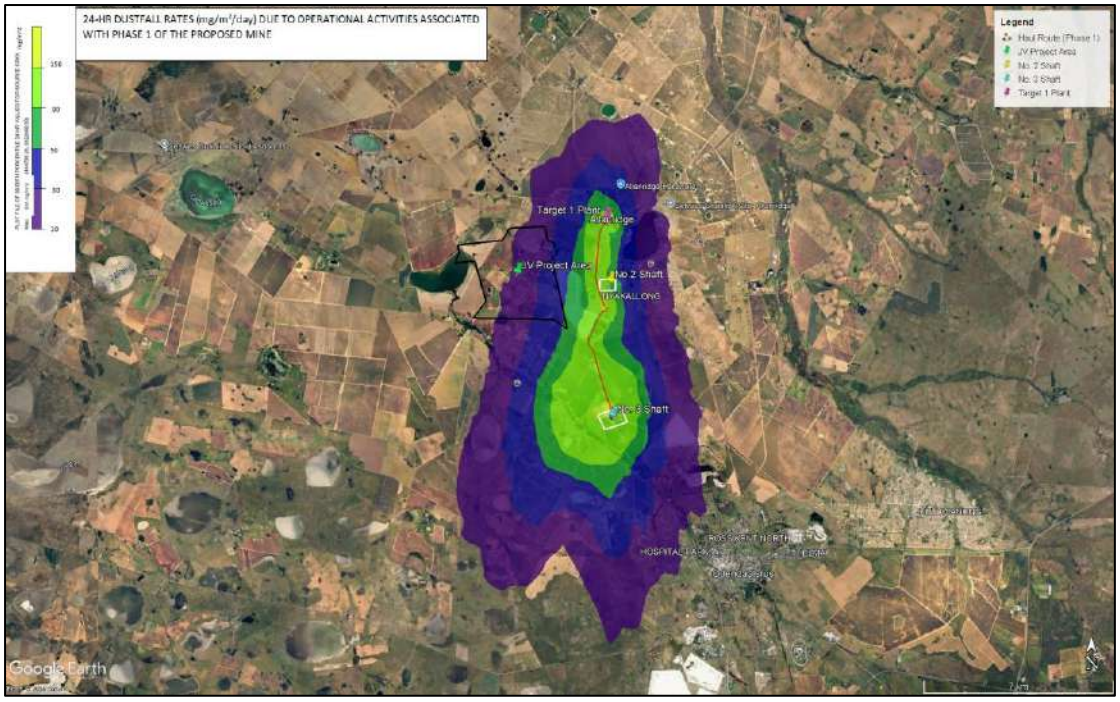


Figure 5-6: Predicted Dustfall Rates for the Proposed Mine – Operational Phase 1.

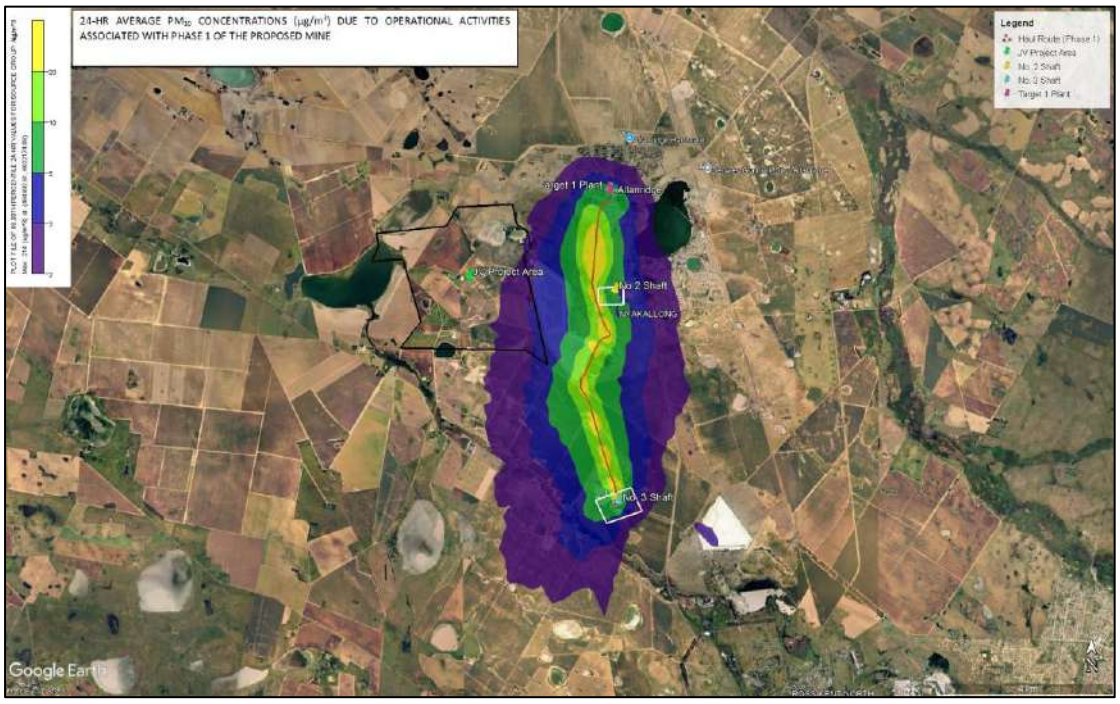


Figure 5-7: Predicted Daily Average PM_{10} Concentrations for the Proposed Mine – Operational Phase 1.

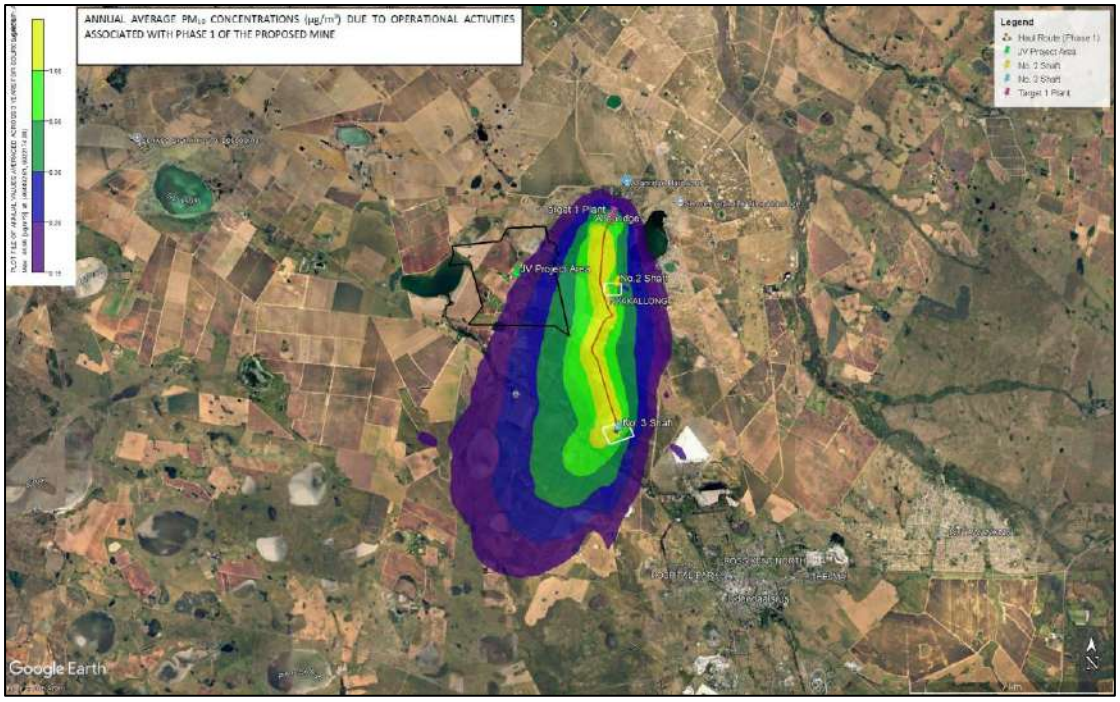


Figure 5-8: Predicted Annual Average PM_{10} Concentrations for the Proposed Mine – Operational Phase 1.

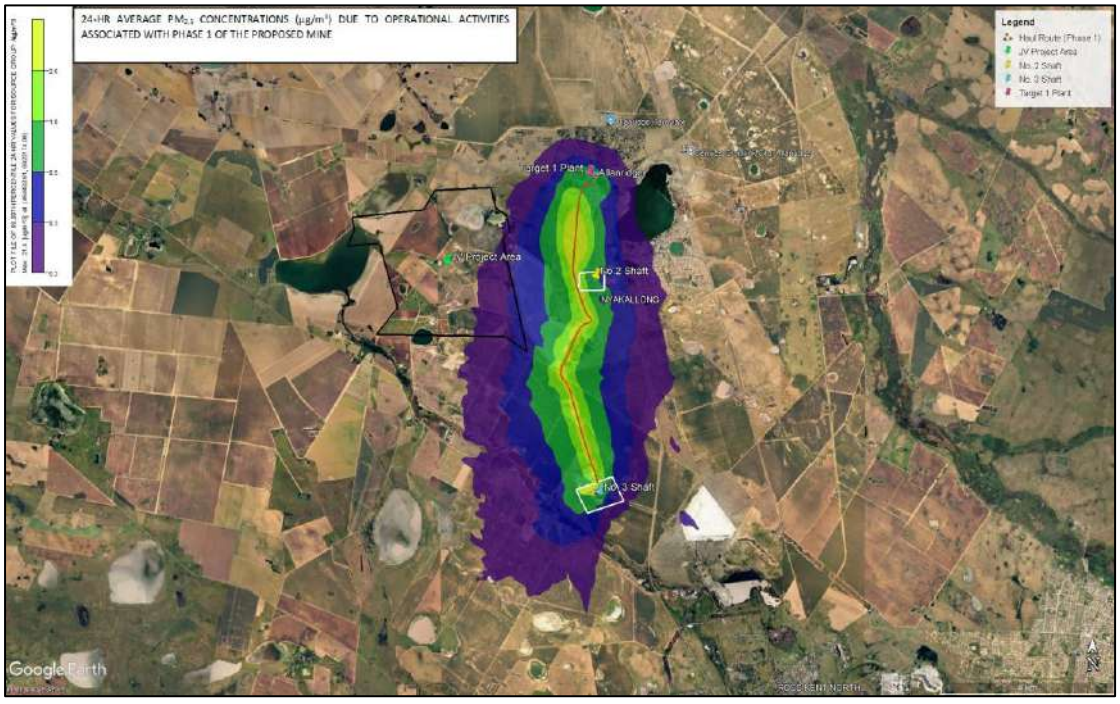


Figure 5-9: Predicted Daily Average $PM_{2.5}$ Concentrations for the Proposed Mine – Operational Phase 1.

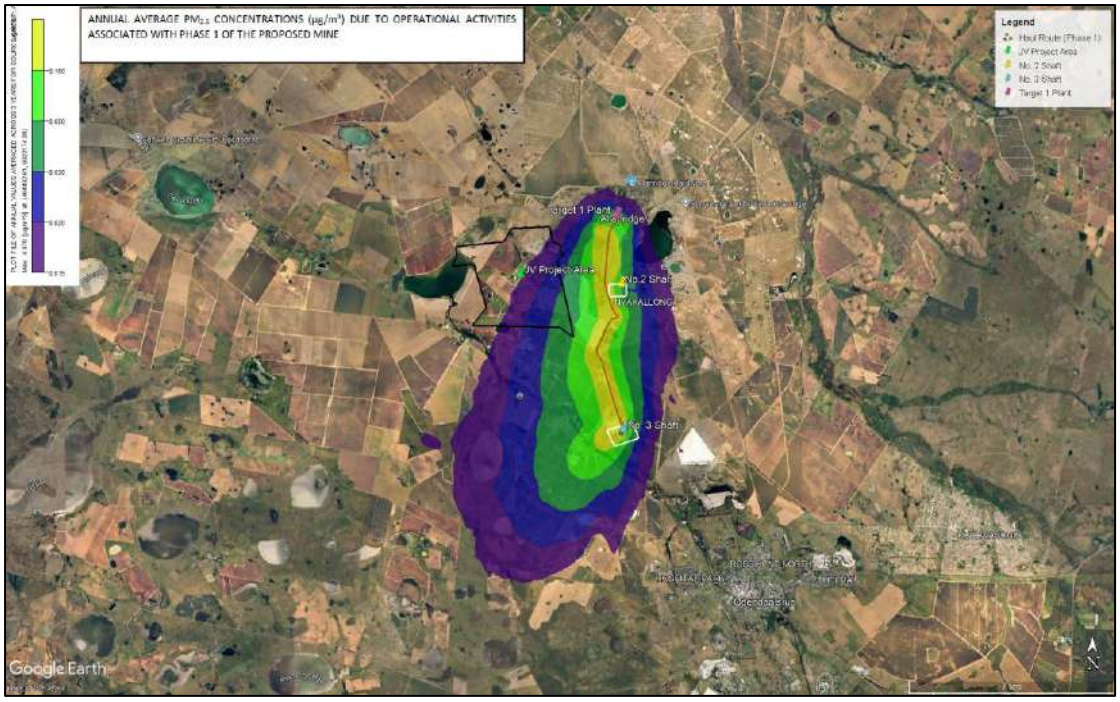


Figure 5-10: Predicted Annual Average $PM_{2.5}$ Concentrations for the Proposed Mine – Operational Phase 1.

5.3.2.2. Phase 2

Phase 2 surface operations will be centred on the No. 2 Shaft. Based on the dispersion model output plots for the operational phase 2, predicted incremental dustfall deposition rates, as well as PM_{10} and $PM_{2.5}$ concentrations, are generally low at all the off-site locations surrounding the shaft.

The dispersion model output plots for dustfall rates, including PM_{10} and $PM_{2.5}$ concentrations due to Phase 2 operations are given in Figure 5-11 for dustfall, Figure 5-12 and Figure 5-13 for PM_{10}, and Figure 5-14 and Figure 5-15 for $PM_{2.5}$. The Phase 2 dispersion model results show a more concentrated area of elevated dustfall, PM_{10} and $PM_{2.5}$ incremental concentrations around the No. 2 Shaft, with the impact footprint extending towards Target 1 Plant along the conveyor alignment. This reflects the concentration of emissions associated with material handling and the open conveyor system around the No. 2 Shaft and along the approximately 2.45km conveyor route. Localised on-site exceedances of the respective dustfall and PM_{10} limits are predicted within the shaft boundary, with the short-term and long-term PM_{10} exceedances extending to a small section of the eastern shaft boundary. The proximity of the No. 2 Shaft to the Nyakallong residential area also results in receptors being located relatively close to the principal Phase 2 emission sources. However, despite predicted exceedances within the shaft boundary, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM_{10} standards. Predicted incremental daily and annual $PM_{2.5}$ concentrations remain below the respective standards throughout the modelling domain.

Maximum predicted incremental dustfall rates and PM concentrations at the nearby sensitive receptors located within a 20km radius of the proposed mine are given in Table 5-10 for operational phase 2 of the proposed project. In addition, the maximum predicted incremental PM_{10} and $PM_{2.5}$ concentrations, as well as dustfall rates at the No. 2 Shaft boundary are given in Table 5-11 for this modelling scenario.

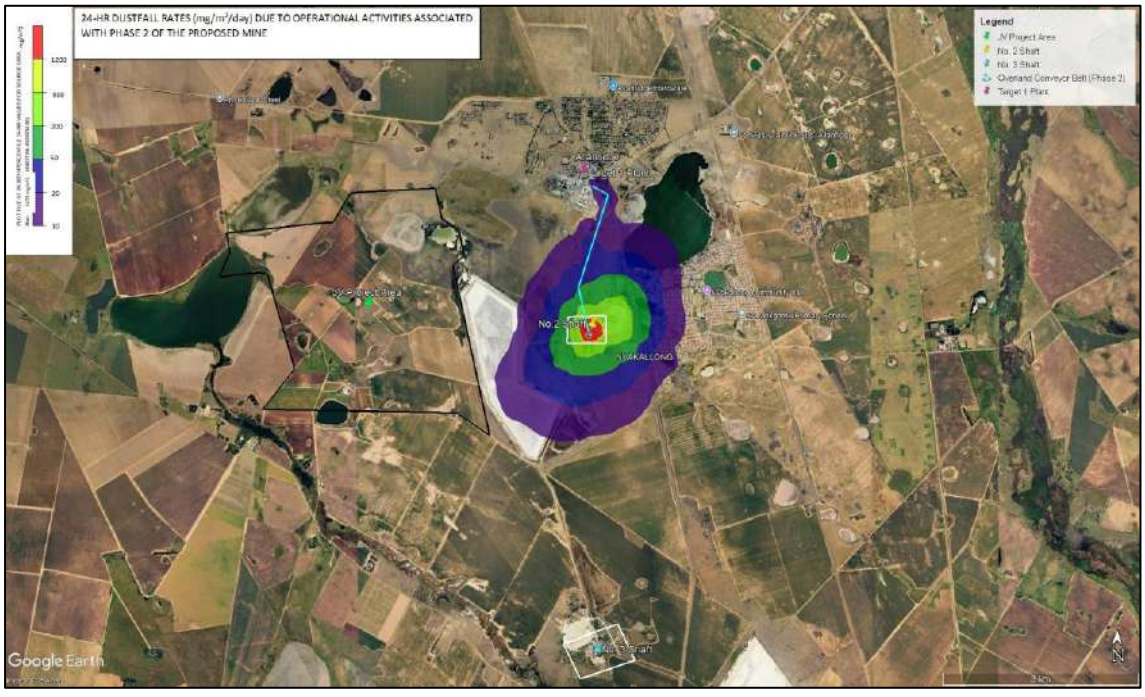


Figure 5-11: Predicted Dustfall Rates for the Proposed Mine – Operational Phase 2.

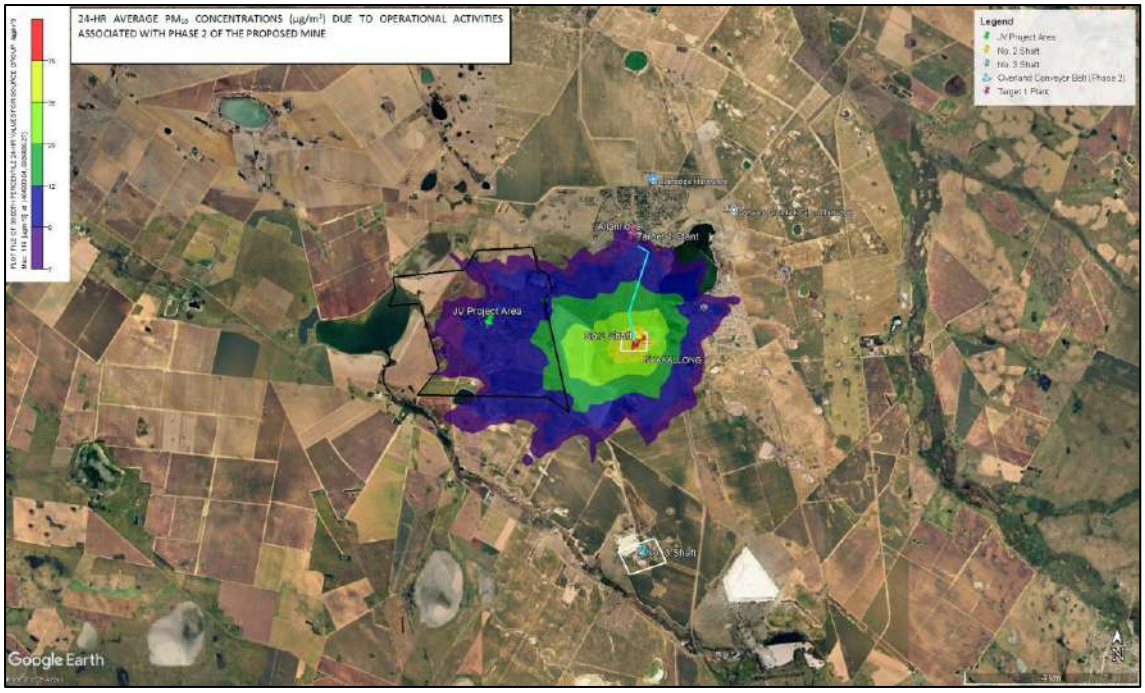


Figure 5-12: Predicted Daily Average PM_{10} Concentrations for Proposed Mine – Operational Phase 2.

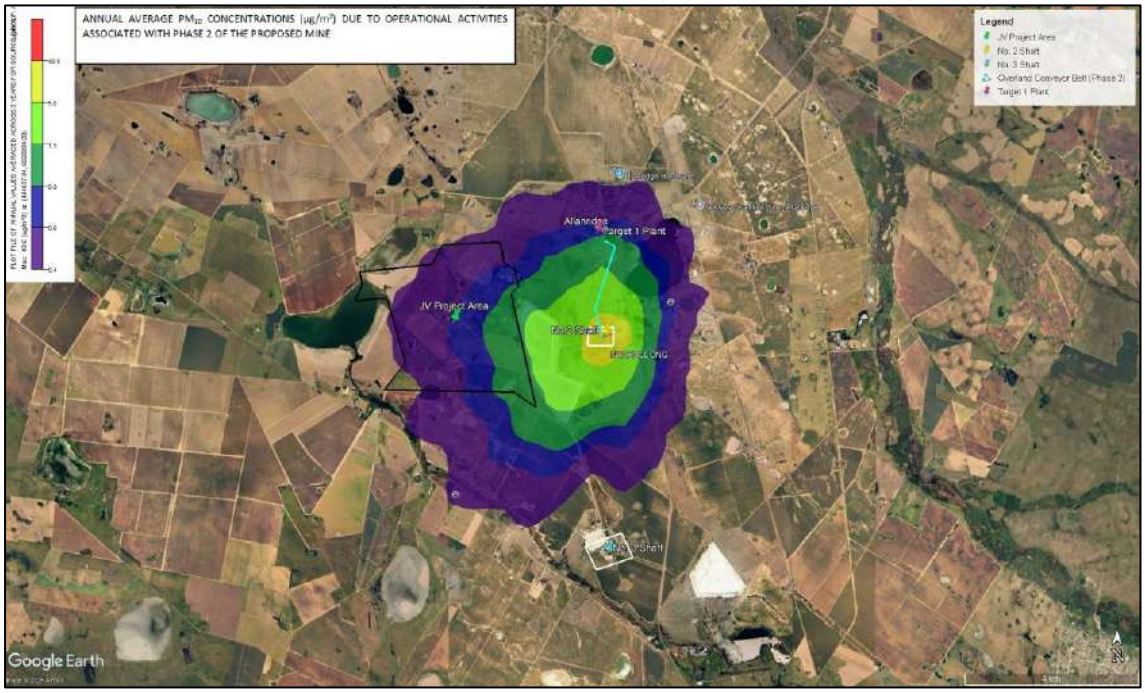


Figure 5-13: Predicted Annual Average PM_{10} Concentrations for the Proposed Mine – Operational Phase 2.

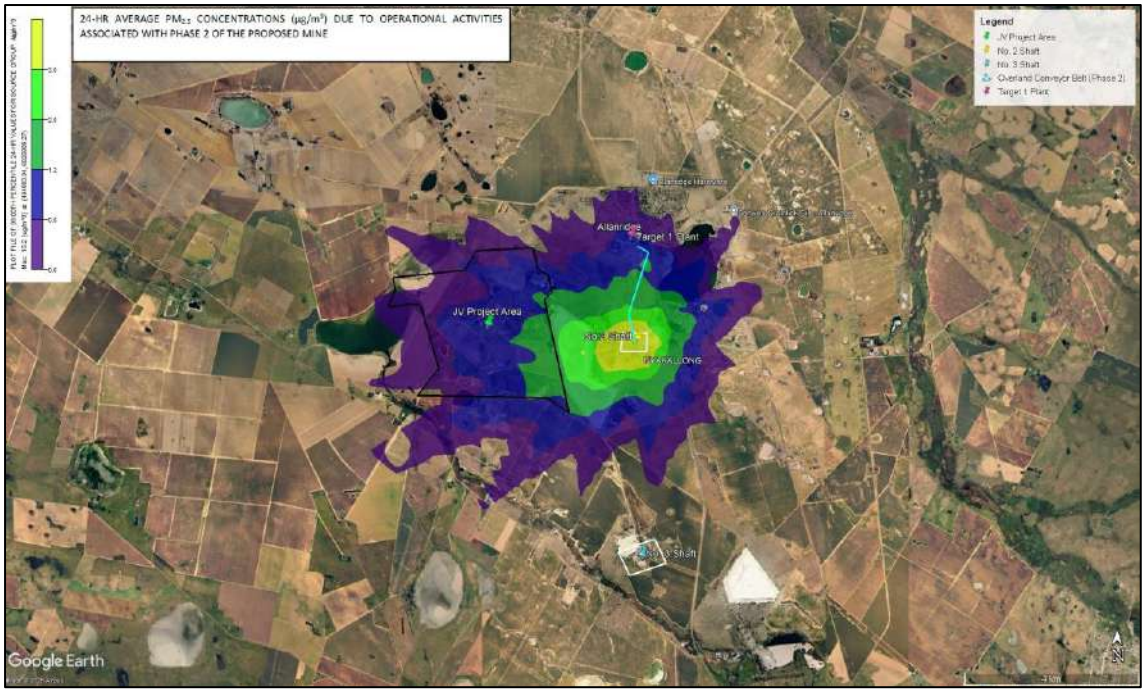


Figure 5-14: Predicted Daily Average $PM_{2.5}$ Concentrations for the Proposed Mine – Operational Phase 2.

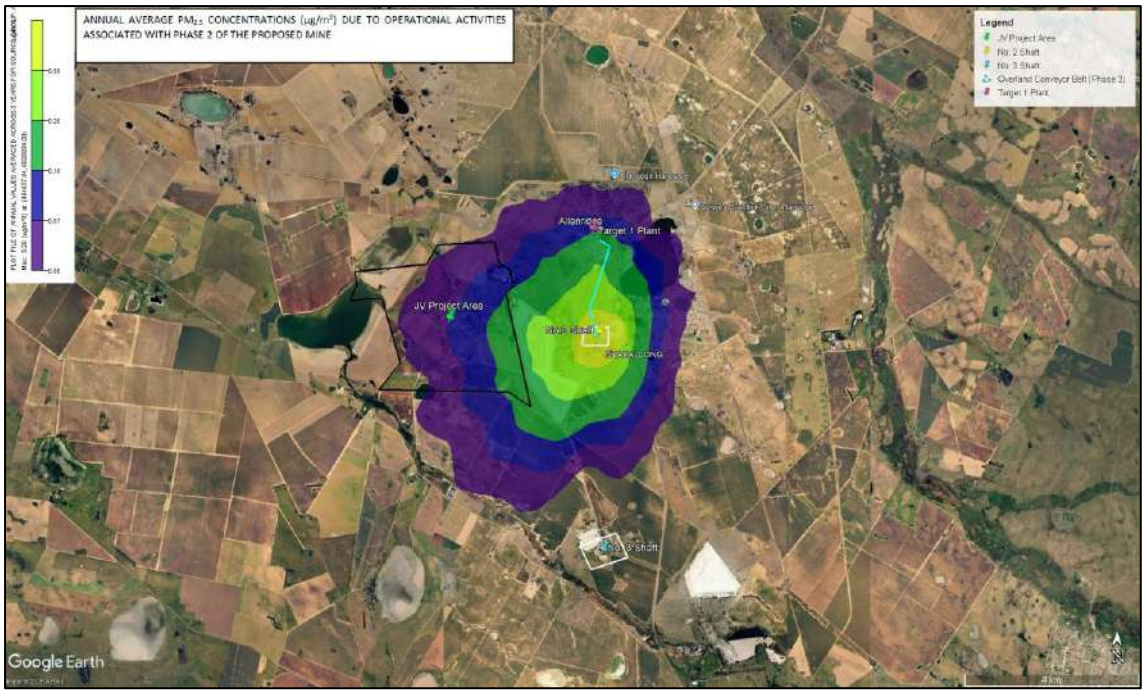


Figure 5-15: Predicted Annual Average $PM_{2.5}$ Concentrations for the Proposed Mine – Operational Phase 2.

5.3.3. *Maximum Predicted Incremental Concentrations*

Maximum predicted incremental concentrations at nearby sensitive receptors (represented as discrete receptors) located within a 20km radius from the proposed mine are given in Table 5-8 to Table 5-10 for the modelled scenarios. Maximum predicted incremental concentrations at the shaft boundaries are given in Table 5-11.

The discrete/sensitive receptor points are mostly located at the centre of residential areas (mostly dwellings), or near schools and hospitals, to determine the maximum concentrations that could be expected near these sensitive receptors. A spatial representation of the identified discrete receptors is shown below in Figure 5-16. The receptors were identified during a desktop study (please refer to Section 2.4).

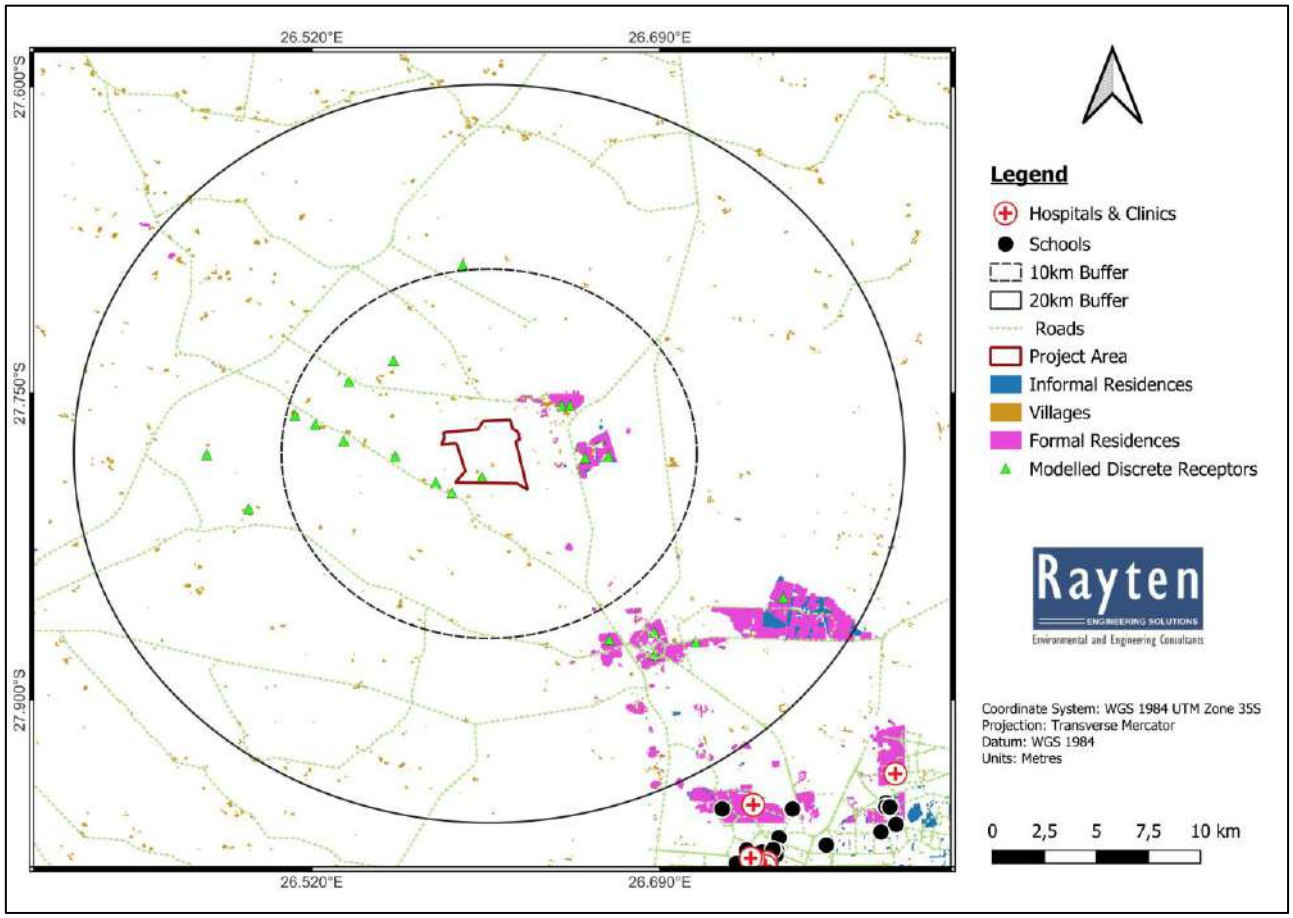


Figure 5-16: Spatial representation of discrete receptors included in dispersion model (<20km from project site).

Table 5-8: Maximum predicted incremental PM_{10}, $PM_{2.5}$ concentrations and Dustfall rates at nearby sensitive receptors, located within 20km radius of the proposed mine – Construction Phase.

INCREMENTAL CONCENTRATIONS (µg/m³)								
Discrete Receptor	Dustfall (mg/m²/day)	PM_{10} (24H)	PM_{10} (Annual)	$PM_{2.5}$ (24H)	$PM_{2.5}$ (Annual)	Co-ordinates (35S)		Elevation (m)
	Residential: 600mg/m²/day Non-residential: 1200 mg/m²/day	75	40	40	20	X (m)	Y (m)	
DR1	0.56	0.35	0.026	0.035	0.003	458673.77	6925594.00	1302.55
DR2	0.58	0.29	0.018	0.029	0.002	459459.67	6925044.27	1301.77
DR3	0.96	0.18	0.012	0.018	0.001	464715.67	6929791.24	1322.69
DR4	0.91	0.72	0.037	0.072	0.004	460901.22	6925886.62	1304.31
DR5	1.02	0.20	0.040	0.020	0.004	465123.36	6929768.96	1323.46
DR6	5.02	0.49	0.058	0.049	0.006	465872.54	6926947.42	1313.18
DR7	1.64	0.18	0.020	0.018	0.002	466979.67	6927049.19	1319.64
DR8	0.18	0.09	0.004	0.009	0.000	454468.17	6931054.10	1300.80
DR9	0.23	0.09	0.007	0.009	0.001	456619.84	6932180.89	1300.15
DR10	0.25	0.14	0.007	0.014	0.001	456718.95	6927019.53	1297.36
DR11	0.17	0.06	0.003	0.006	0.000	454231.69	6927822.98	1287.91
DR12	0.18	0.05	0.004	0.005	0.000	452867.81	6928708.75	1292.38
DR13	0.14	0.05	0.002	0.005	0.000	451876.86	6929216.96	1288.68
DR14	0.14	0.03	0.001	0.003	0.000	459935.97	6937383.59	1296.59
DR15	0.37	0.06	0.005	0.006	0.001	467064.92	6917110.02	1331.77
DR16	0.37	0.04	0.004	0.004	0.000	469209.40	6917522.06	1335.60
DR17	0.16	0.03	0.002	0.003	0.000	475425.17	6919402.33	1342.07
DR18	0.20	0.05	0.004	0.005	0.000	471214.69	6916993.48	1341.79
DR19	0.30	0.05	0.004	0.005	0.000	469231.97	6916292.28	1336.71
DR20	0.11	0.09	0.005	0.009	0.001	449668.84	6924151.20	1285.25
DR21	0.05	0.03	0.002	0.003	0.000	447635.60	6927065.24	1280.91

Table 5-9: Maximum predicted incremental PM_{10}, $PM_{2.5}$ concentrations and Dustfall rates at nearby sensitive receptors, located within 20km radius of the proposed mine – Operational Phase 1.

INCREMENTAL CONCENTRATIONS (µg/m³)								
Discrete Receptor	Dustfall (mg/m²/day)	PM_{10} (24H)	PM_{10} (Annual)	$PM_{2.5}$ (24H)	$PM_{2.5}$ (Annual)	Co-ordinates (35S)		Elevation (m)
	Residential: 600mg/m²/day Non-residential: 1200 mg/m²/day	75	40	40	20	X (m)	Y (m)	
DR1	1.31	0.87	0.09	0.09	0.009	458673.77	6925594.00	1302.55
DR2	1.55	1.06	0.12	0.11	0.012	459459.67	6925044.27	1301.77
DR3	6.49	2.40	0.18	0.24	0.018	464715.67	6929791.24	1322.69
DR4	2.18	1.47	0.16	0.15	0.016	460901.22	6925886.62	1304.31
DR5	4.12	2.14	0.17	0.21	0.017	465123.36	6929768.96	1323.46
DR6	2.88	2.17	0.18	0.22	0.019	465872.54	6926947.42	1313.18
DR7	1.93	1.38	0.12	0.14	0.012	466979.67	6927049.19	1319.64
DR8	0.67	0.38	0.04	0.04	0.004	454468.17	6931054.10	1300.80
DR9	0.92	0.43	0.04	0.04	0.004	456619.84	6932180.89	1300.15
DR10	0.87	0.61	0.06	0.06	0.006	456718.95	6927019.53	1297.36
DR11	0.55	0.43	0.04	0.04	0.004	454231.69	6927822.98	1287.91
DR12	0.49	0.39	0.04	0.04	0.004	452867.81	6928708.75	1292.38
DR13	0.41	0.33	0.03	0.03	0.003	451876.86	6929216.96	1288.68
DR14	0.69	0.33	0.02	0.03	0.003	459935.97	6937383.59	1296.59
DR15	2.14	0.63	0.06	0.06	0.006	467064.92	6917110.02	1331.77
DR16	1.54	0.68	0.05	0.07	0.005	469209.40	6917522.06	1335.60
DR17	0.63	0.37	0.02	0.04	0.002	475425.17	6919402.33	1342.07
DR18	1.00	0.53	0.03	0.05	0.003	471214.69	6916993.48	1341.79
DR19	1.39	0.72	0.04	0.07	0.004	469231.97	6916292.28	1336.71

INCREMENTAL CONCENTRATIONS (µg/m³)								
Discrete Receptor	Dustfall (mg/m²/day)	PM_{10} (24H)	PM_{10} (Annual)	$PM_{2.5}$ (24H)	$PM_{2.5}$ (Annual)	Co-ordinates (35S)		Elevation (m)
	Residential: 600mg/m²/day Non-residential: 1200 mg/m²/day	75	40	40	20	X (m)	Y (m)	
DR20	0.33	0.41	0.04	0.04	0.004	449668.84	6924151.20	1285.25
DR21	0.27	0.37	0.03	0.04	0.003	447635.60	6927065.24	1280.91

Table 5-10: Maximum predicted incremental PM_{10}, $PM_{2.5}$ concentrations and Dustfall rates at nearby sensitive receptors, located within 20km radius of the proposed mine – Operational Phase 2.

INCREMENTAL CONCENTRATIONS (µg/m³)								
Discrete Receptor	Dustfall (mg/m²/day)	PM_{10} (24H)	PM_{10} (Annual)	$PM_{2.5}$ (24H)	$PM_{2.5}$ (Annual)	Co-ordinates (35S)		Elevation (m)
	Residential: 600mg/m²/day Non-residential: 1200 mg/m²/day	75	40	40	20	X (m)	Y (m)	
DR1	0.70	4.89	0.26	0.51	0.03	458673.77	6925594.00	1302.55
DR2	0.99	5.36	0.32	0.57	0.04	459459.67	6925044.27	1301.77
DR3	2.72	5.58	0.51	0.61	0.06	464715.67	6929791.24	1322.69
DR4	1.60	6.06	0.47	0.66	0.05	460901.22	6925886.62	1304.31
DR5	3.19	5.36	0.54	0.58	0.06	465123.36	6929768.96	1323.46
DR6	16.77	10.87	0.85	1.21	0.10	465872.54	6926947.42	1313.18
DR7	3.16	5.15	0.35	0.53	0.04	466979.67	6927049.19	1319.64
DR8	0.21	2.76	0.13	0.30	0.01	454468.17	6931054.10	1300.80

INCREMENTAL CONCENTRATIONS (µg/m^3)								
Discrete Receptor	Dustfall (mg/m^2/day)	PM_{10} (24H)	PM_{10} (Annual)	$PM_{2.5}$ (24H)	$PM_{2.5}$ (Annual)	Co-ordinates (35S)		Elevation (m)
	Residential: 600mg/m^2/day Non-residential: 1200 mg/m^2/day	75	40	40	20	X (m)	Y (m)	
DR9	0.39	2.60	0.12	0.28	0.01	456619.84	6932180.89	1300.15
DR10	0.34	3.73	0.21	0.39	0.02	456718.95	6927019.53	1297.36
DR11	0.24	2.85	0.15	0.32	0.02	454231.69	6927822.98	1287.91
DR12	0.22	2.79	0.12	0.29	0.01	452867.81	6928708.75	1292.38
DR13	0.21	2.17	0.11	0.23	0.01	451876.86	6929216.96	1288.68
DR14	0.25	0.95	0.06	0.10	0.01	459935.97	6937383.59	1296.59
DR15	0.44	1.19	0.08	0.13	0.01	467064.92	6917110.02	1331.77
DR16	0.40	1.10	0.06	0.12	0.01	469209.40	6917522.06	1335.60
DR17	0.21	0.41	0.03	0.05	0.00	475425.17	6919402.33	1342.07
DR18	0.29	0.63	0.04	0.07	0.00	471214.69	6916993.48	1341.79
DR19	0.34	0.79	0.05	0.09	0.01	469231.97	6916292.28	1336.71
DR20	0.13	1.54	0.08	0.17	0.01	449668.84	6924151.20	1285.25
DR21	0.09	1.72	0.07	0.18	0.01	447635.60	6927065.24	1280.91

Table 5-11: Summary of Predicted Maximum Modelled Incremental PM_{10} and $PM_{2.5}$ Concentrations and Dustfall Rates at the shaft boundaries of the Proposed Mine.

Pollutant	Averaging Period	Maximum Predicted (C_P) [6]	SA Air Quality Standard (µg/m^3)
Construction Phase			
Dustfall	Daily	280	600 [1, 3] 1 200 [2, 3]
PM_{10}	Daily	106.81	75 [4]
	Annual	12.45	40 [5]
$PM_{2.5}$	Daily	10.85	40 [4]
	Annual	1.27	20 [5]
Operational Phase 1			
Dustfall	Daily	230	600 1 200
PM_{10}	Daily	213.85	75
	Annual	44.65	40
$PM_{2.5}$	Daily	21.39	40
	Annual	4.47	20
Operational Phase 2			
Dustfall	Daily	610	600 1 200
PM_{10}	Daily	146.18	75
	Annual	42.07	40
$PM_{2.5}$	Daily	15.16	40
	Annual	4.33	20

Notes:

1. Dustfall given in mg/m^2/day
2. Residential area dustfall standard.
3. Non-residential area dustfall standard.
4. Daily PM_{10} and $PM_{2.5}$ NAAQS.
5. Annual PM_{10} and $PM_{2.5}$ NAAQS.
6. Maximum concentrations at the shaft boundaries of the proposed mine.

5.3.4. *Cumulative Impacts*

Emissions from sources need to be assessed in terms of the cumulative impacts in an area. The *Code of Practice for Air Dispersion Modelling in Air Quality Management in South Africa (DEA, 2014),* outlines the following for sources influenced by background concentrations in urban areas and priority areas:

- For annual averages, the sum of the highest predicted concentration (C_P) and background concentration (C_B) must be less than the NAAQS, no exceedances allowed;
- For short-term averages (24 hours or less), the sum of the 99th percentile concentrations and background concentration (C_B) must be less than the NAAQS. Whenever one year is modelled, the highest concentrations shall be considered.

There was background ambient data available for dustfall for the project site, from Harmony's dustfall monitoring network (please refer to Section 4.2). Cumulative concentrations were estimated by adding maximum predicted (modelled) concentrations to the average background (measured) concentrations. The mean background value was considered representative of existing ambient conditions at the project site. Cumulative dustfall rates at the shaft boundaries are provided in Table 5-12 and are shown to remain below the non-residential limit for all three (3) scenarios.

Maximum predicted incremental concentrations at nearby sensitive receptors, within 20km of the proposed mine are given in Table 5-8 to Table 5-10 for the modelled scenarios. Predicted concentrations are generally low and decrease when moving further away from the emission sources. Thus, cumulative impacts for these pollutants will be higher near the areas of planned construction and surface mining activities. At the Nyakallong residential area (DR6), however, elevated cumulative dustfall impacts may occur due to the relatively high maximum background dustfall recorded at this location. The residential area dustfall limit of 600 mg/m²/day was exceeded on one occasion during the July 2024 – June 2025 monitoring period, with a dustfall rate of 1 570 mg/m²/day recorded in March 2025. Therefore, even relatively low incremental dustfall from the proposed activities could result in elevated cumulative dustfall at DR6.

Table 5-12: Summary of the cumulative impacts using the maximum modelled dustfall rates at the shaft boundaries and the average background dustfall rate at the Harmony monitoring sites.

Pollutant	Averaging Period	Average Background Dustfall Rate (C_B) [1]	Maximum Modelled Dustfall Rate (C_P) [2]	Cumulative Dustfall- 24HR ($C_B + C_P$)	Air Quality Standard ($mg/m^2/day$)
Construction Phase					
Dustfall (TSP)	Daily	202.86	280	482.86	1200
Operational Phase 1					
Dustfall (TSP)	Daily	202.86	230	432.86	1200
Operational Phase 2					
Dustfall (TSP)	Daily	202.86	610	812.86	1200

Notes:
1. Considered the average background dustfall rate recorded at the Harmony monitoring sites. Refer to Section 4.2 for more details on the background air quality data.
2. Considered the maximum predicted incremental dustfall rates at the shaft boundaries.

5.3.5. *Impact Analysis*

The level of impact of operational activities associated with the proposed activities, is assessed based on consequence/inherent risk and likelihood, using the methodology in Table 5-14 and Table 5-15 and summarised in Table 5-16 to Table 5-17, which provide the residual risk/overall impact significance ratings during construction and operational phases 1 and 2. The methodology used to assess impacts is adopted from SE Solutions' proposed impact rating methodology (O'Beirne, 2024), which is explained in more detail in Appendix E.

Overall, low negative impact significance ratings (i.e., low residual risk) for air quality are predicted at the sensitive receptor locations for the proposed activities (Table 5-16), while moderate impact significance ratings are predicted at the shaft boundaries (Table 5-17).

Cumulative impacts of the proposed activities were also assessed, using the Risk Matrix provided in Table 5-13. The predicted cumulative impacts at the shaft boundaries are summarised in Table 5-18 and are predicted to range from low to moderate.

Predicted pollutant concentrations decrease with increasing distance from the emission sources. Consequently, the highest cumulative impacts are expected in areas located near the operational areas, with lower impacts anticipated at increasing distances from these sources. At the sensitive receptor areas, cumulative impacts are generally expected to be low to negligible. At the Nyakallong residential area (DR6), however, elevated cumulative dustfall impacts may occur due to the relatively high maximum background dustfall recorded at this location. The residential area dustfall limit of 600 mg/m²/day was exceeded on one occasion during the July 2024 – June 2025 monitoring period, with a dustfall rate of 1 570 mg/m²/day recorded in March 2025. Therefore, even relatively low incremental dustfall from the proposed activities could result in elevated cumulative dustfall at DR6.

Table 5-13: Risk Matrix for Determining Cumulative Impacts.

This defines the impact of the proposed development/activity on the environmental parameter being assessed when added to other existing or potential impacts		
Baseline Condition	**Project Incremental Contribution**	**Cumulative Rating**
Baseline below NAAQS	Percentage contribution of predicted concentrations to cumulative concentrations is minimal (<1%)	Negligible cumulative impact
Baseline below NAAQS	Percentage contribution of predicted concentrations to cumulative concentrations is low (1% - 29%)	Low cumulative impact
Baseline below NAAQS	Percentage contribution of predicted concentrations to cumulative concentrations is moderate (30% - 69%)	Low-moderate cumulative impact
Baseline exceeds NAAQS	Percentage contribution of predicted concentrations to cumulative concentrations is minimal (<1%)	Low-moderate cumulative impact
Baseline exceeds NAAQS	Percentage contribution of predicted concentrations to cumulative concentrations is low (1% - 29%)	Moderate cumulative impact
Baseline exceeds NAAQS	Percentage contribution of predicted concentrations to cumulative concentrations is moderate (30% - 69%) or high (70% - 100%)	Moderate-High/High cumulative impact

Table 5-14: The hierarchy of potential consequences of changes in the receiving environment (impacts). These consequences are expressed as inherent risks or benefits (what could happen) because of the impacts.

	Environmental Cost	Rating
Inherent Risk	Human health – morbidity / mortality, loss of threatened species population(s), loss of strategic water source potential or sequestered carbon stocks.	High
	Material reductions in threatened or endemic species populations or habitat, loss of livelihoods, individual economic loss.	Moderate-high
	Material reductions or degradation of environmental quality – air. Loss of habitat, loss of heritage, amenity.	Moderate
	Nuisance	Moderate-low
	Negative change - with no other consequences.	Low

Table 5-15: Likelihood categories and definitions in ascribing impact significance.

Likelihood	Definitions
Highly unlikely	The possibility of the consequence occurring is negligible
Unlikely but possible	The possibility of the consequence occurring is low but cannot be discounted entirely
Likely	The consequence may not occur, but a balance of probability suggests it will.
Highly likely	The consequence may still not occur, but it is most likely that it will.
Definite	The consequence will definitely occur.

Table 5-16: Residual risk matrix combining likelihood and consequence at the sensitive receptors (for dust fallout, PM_{10} and $PM_{2.5}$) – Construction and Operational Phases 1 and 2.

Discrete Receptor ID			Residual Risk				
DR1 - DR21	Consequence	High	Moderate	High	High	Fatally Flawed	
		Moderate-high	Low	Moderate	High	High	High
		Moderate	Low	Moderate	Moderate	Moderate	Moderate
		Moderate-low	Low	Low	Low	Low	Moderate
		Low	Low	Low	Low	Low	Low
			Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
			Likelihood				

Table 5-17: Residual risk matrix combining likelihood and consequence at the shaft boundaries (for dustfall, PM_{10} and $PM_{2.5}$) – Construction and Operational Phases 1 and 2.

			Residual Risk				
At Shaft Boundaries	Consequence	High	Moderate	High	High	Fatally Flawed	
		Moderate-high	Low	Moderate	High	High	High
		Moderate	Low	Moderate	Moderate	Moderate	Moderate
		Moderate-low	Low	Low	Low	Low	Moderate
		Low	Low	Low	Low	Low	Low
			Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
			Likelihood				

Table 5-18: Summary of cumulative impacts associated with the proposed mine (estimated based on the maximum modelled dustfall rates at the shaft boundaries with the average background dustfall rate at the Harmony monitoring sites).

Pollutant	Averaging Period	Average Background Dustfall Rate (C_B) [1]	Maximum Modelled Dustfall Rate (C_P) [2]	Cumulative Dustfall- 24HR ($C_B + C_P$)	% contribution of C_P to Cumulative concentration	Cumulative Impact Rating	Air Quality Standard ($mg/m^2/day$
Construction Phase							
Dustfall (TSP)	Daily	202.86	280	482.86	57.99	Low-Moderate	1200
Operational Phase 1							
Dustfall (TSP)	Daily	202.86	230	432.86	53.14	Low-Moderate	1200
Operational Phase 2							
Dustfall (TSP)	Daily	202.86	610	812.86	75.04	Moderate	1200

Notes:

1. Considered the average background concentration recorded at the monitoring stations. Refer to Section 4.2 for more details on the background air quality data.
2. Considered the maximum predicted incremental concentrations at the shaft boundaries.

5.3.6. *Specialist's Reasoned Opinion Regarding the Acceptability of the Project*

Based on the impact ratings projected in Section 5.3.5 post-mitigation, Rayten believes that the proposed mining operations could be authorised provided that the air quality management measures outlined in Section 6 are implemented, where possible, as an effort to minimise the impact of the proposed mine on the environment (i.e., air quality).

Given that all impacts for the modelled scenarios are predicted to fall within the low to moderate range post-mitigation, and can be effectively managed through standard mitigation measures, the proposed mine is indicated to have an overall moderate risk in terms of air quality degradation during construction and operation (Table 5-19, adopted from O'Beirne's 2024 report).

Table 5-19: Decision-making implications of the identified significance ratings (construction and operational phases 1 & 2).

Rating	Implication for decision-making
Fatally Flawed	The project cannot be authorised.
High	The project can be authorised but with strict conditions and high level of compliance and enforcement.
Moderate	The project can be authorised but with conditions and routine inspections.
Low	The project can be authorised with a low risk of environmental degradation.

The "no-go alternative", which is the option of not fulfilling the proposed project, would result in no additional impacts to the receiving environment.

5.4. Assumptions Limitations and Exclusions

The key assumptions, limitations and exclusions of the study are given below:

Assumptions

- Data/information provided by the client and used as input into the model were assumed to be accurate and complete at the time of modelling.
- Dustfall buckets from Harmony Gold's monitoring network are located at the Allanridge silos, the Nyakallong residential area and the exiting Target and Freddies 9 TSFs. It is assumed that the background dust fallout rates reported are representative of the ambient conditions at the JV project site as well as at the No. 2 and No. 3 Shafts.
- Dustfall emissions from nearby background emission sources surrounding the project site are already included in Harmony's dustfall monitoring data. Therefore, no modelling of background emissions was undertaken.
- Cumulative impacts were estimated based on a sum of the maximum predicted/modelled concentrations at the shaft boundaries and the average monitored dustfall rate in the July 2024 – June 2025 period from the Harmony dust buckets. The methodology used to assess cumulative impacts (i.e., sum of background and modelled concentrations) is in accordance with the dispersion modelling regulations (DEA, 2014).

- Construction activities were assumed to be focused primarily on the No. 2 Shaft area, as development at the No. 3 Shaft is limited to the clearing of scrap, rubble, and vegetation, with no significant construction works anticipated. However, the No. 3 Shaft infrastructure and equipment will require rigorous inspection to ascertain the condition, utility and value of the items, prior to development of an appropriate budget and refurbishment plan.
- Construction was assumed to occur during the day for 10 hours a day for 7 days a week, to represent the worst-case scenario.
- A phased construction approach was assumed, given that the construction activities are expected to extend over a 45-month period.
- 40% control efficiency was applied to construction activity, due to the assumed use of water sprays to mitigate dust during construction.
- Maximum height of release for the construction area was assumed to be 0.5m since construction occurs at ground level.
- A conservative approach was undertaken where emissions associated with all construction activities were assumed to be covered under *Heavy Construction Activity.* In other words, emissions were not calculated separately for each individual activity.
- Wind erosion from the exposed areas (WRDs) was assumed to occur for 24 hours a day for seven days a week.
- Maximum heights of the WRDs were estimated from Google Earth.
- All hauling and material handling activities (truck loading/offloading) during operational phase 1 were assumed to occur for 10 hours a day for 7 days a week, based on information provided by the client.
- All conveyor transfer and material handling activities during operational phase 2 were assumed to occur for 16 hours a day for 7 days a week, based on information provided by the client.
- The conveyor transfer and haul routes planned to be used for the transfer of ore from the No. 2 and 3 Shafts, respectively, were identified from the technical report prepared for the JV Project by Bara Consulting in April 2026.
- The haul road was conservatively modelled as unpaved for the purposes of the air quality assessment. This approach represents a conservative, worst-case assumption with respect to fugitive dust emissions from vehicle travel along the haul road.
- Mitigation measures that were included in this study for the operational phase are as follows:
    - water spraying on the unpaved haul route (assumed to achieve at least 40% control efficiency.
    - 30% control efficiency associated with the WRDs due to rocky nature of waste rock material.
- Material throughputs for the No. 2 and No. 3 Shafts were estimated based on the mining schedule provided by the client in the technical report. For dispersion modelling purposes, average hourly material throughputs were calculated for each operational phase by distributing the scheduled annual-average material throughput over the expected hours of operation.
- The dimensions of the haul trucks were based on the specifications provided for a CAT AD30 ADT, which is similar in capacity to the trucks that will be used at the mine during operational phase 1.

- Dimensions, exact locality and footprints of the remainder of the sources were assumed based on information provided by client. Where information was not provided or was unknown, assumptions were made.

Limitations

- Emission sources included in the model are limited to the surface mining activities associated with the proposed mine.
- Detailed information for each emission source is required for input into the model, such as the dimensions, material throughputs, material characteristics and the exact locality of the sources. In some instances, not all these details are known. To account for the emissions, assumptions and estimates were made where necessary.
- The study is limited by the amount of detailed information that could be provided at the time of modelling.

Exclusions

- Activities that are not associated with the proposed project and occur outside the scope of the proposed operations were not included in the assessment. These may include any potential background emission sources. The assessment focused on the impact of emissions attributable to emission source activities associated with the proposed mine, specifically.

6. MITIGATION MEASURES

6.1. Recommended Mitigation Measures for Construction Phase

Pollutants emitted during the construction phase of the proposed mine will mainly comprise of dustfall and particulate matter emissions but will be short-term (up to 45 months) and intermittent. These emissions can be easily managed and mitigated with the implementation of dust control measures summarised in Table 6-1, where possible.

In addition to the mitigation measures recommended in Table 6-1, the following measures should be considered for implementation, where feasible:

- using water trucks for dust suppression, particularly during the dry and windy periods,
- implementation of vehicle speed restrictions, i.e., set strict speed limits and ensure speed reduction for all onsite construction vehicles, and
- ensure full compliance with any further mitigation measures specified in the EMPr.

Table 6-1: Dust control measures for construction (Department of Environment and Conservation, 2011).

DUST CONTROL MEASURE	DESCRIPTION
Limit Cleared Areas	Before the commencement of any site works and during the operation, as much vegetation as possible should be retained, including patches and strips to minimise dust. Dust emissions can be controlled using the following procedures: • Before any site works commence, plan and locate the vegetation cover that needs to be retained; • Protect this vegetation by fencing or blocking off from the rest of the site operations; • In other areas, maintain the original vegetation cover for as long as possible; • Avoid clearing the entire site at once, instead clear areas as required in stages of the operation. Retaining the original trees, shrubs and grasses is one of the most efficient and effective ways of minimising dust emissions. Even low or sparse vegetation can be very effective at dissipating wind velocity at the ground surface, where dust lift off occurs.
Vegetative Stabilisation	Vegetation is a very effective form of reducing dust emissions. The following procedures should be considered in minimising dust emissions: • Retain as much existing vegetation as possible; • If an area needs to be cleared, transplant established plants that must be disturbed to areas that need vegetation; • If existing vegetation must be removed and cannot be immediately transplanted elsewhere, remove and maintain them for replanting at project completion. If trees and plants must be removed and it is not possible for them to be replanted, consider chipping and using the material as mulch – the advantage is that reseeding of original vegetation can occur. Where possible, restore vegetation that is native to the area to maximise plant success and improve environmental conditions.
Timing of Development	Activities with high dust-causing potential, such as topsoil stripping, should not be carried out in sensitive areas during adverse wind conditions. When necessary, topsoil should be stripped in discrete sections, allowing buffer strips (windbreaks) between clearings.
Wind Barriers	Having appropriate wind barriers can be an effective measure for the control of dust over short distances. Wind barriers provide protection against the movement and impact of dust on nearby land uses. Wind barriers can be placed on site before commencement of works and when it is apparent that one is required during the phase of the operation. Consider the following options when placing barriers to prevent dust emissions: • Wind barriers are most effective when placed perpendicular to the direction of the prevailing wind, but will have little or no effect when the wind direction is parallel to the fence; • When choosing wind barriers, it has been observed that solid barriers provide significant reductions in wind velocity for relatively short leeward distances, whereas porous barriers provide smaller reductions in velocity for more extended distances; • Wind barriers should be at least 2 meters high; • The screening material should have a porosity of 50% or less.
Earth Moving Management	Earth-moving works have the potential to generate large amounts of dust. Planning earth-moving works particularly at the start of an operation can reduce dust emissions by limiting the time the site is exposed. Options for dust control can include the following: • Plan earth-moving works so that they are completed just prior to the time they are needed; • Observe weather conditions and do not commence or continue earth moving works if conditions are unsuitable e.g., under conditions of strong winds; • Reduce off-site hauling via balanced cut and fill operations; • Pre-water areas to be disturbed.

6.2. Recommended Mitigation Measures for Operational Phase

General recommended control measures and their efficiency for reduced dust emissions are given in Table 6-2, for the operational phase. Furthermore, a summary of recommendations and monitoring requirements for the proposed operations is given in Table 6-3. It is further recommended that a DMP be compiled prior to commencement of operations and strictly implemented during the operational phase, to comply with the 2026 NDCR. Monthly dustfall monitoring is also recommended to meet various objectives, including compliance monitoring and tracking progress made by control measures.

Table 6-2: Common dust control measures for mining activity and associated control efficiencies (%) (taken from NPI, 2012).

SOURCE	RECOMMENDED CONTROL MEASURES	CONTROL EFFICIENCY (%)
Offloading trucks	Water sprays	70
Loading stockpiles	Variable height stacker	25
	Water sprays	50
	Telescopic chute with sprays	75
	Total enclosure	99
Unloading from stockpiles	Water Sprays	50
	Wind breaks	30
Loading to trains/rail wagons	Enclosure	70
	Enclosure and use of fabric filters	99
Miscellaneous transfer and conveying	Water sprays with chemicals	90
	Enclosure	70
	Enclosure and use of fabric filters	99
Hauling	Level 1 watering (2 litres/m^2/hr)	50
	Level 2 watering (>2 litres/m^2/hr)	75
	Sealed or salt encrusted roads	100
Wind erosion from stockpiles	Water sprays	50
	Wind breaks	30
	Total enclosure	99
	Rock armour and/or topsoil applied	30
Wind erosion	Primary rehabilitation	30
	Secondary rehabilitation	60
	Vegetation	40
	Re-vegetation	90
	Fully rehabilitated	100

Table 6-3: Summary of recommendations and monitoring requirements.

POLLUTANT	ACTIVITIES	MITIGATION MEASURE	MONITORING PROGRAM			
			MONITORING	TIMEFRAME (✓ = yes) (X = no)		
				Pre - operation	During - operation	Post – operation
Fugitive Dust – TSP, PM_{10} & $PM_{2.5}$	Material handling operations; conveyor belts and conveyor transfer points; exposed areas (WRDs); and truck loading/offloading operations.	The following dust mitigation measures can be considered at the operational areas to reduce dust emissions associated with proposed surface mining activities: ▪ Reduce height of material transfer at the conveyor transfer points. ▪ Partial or full enclosure of conveyors and conveyor transfer points. ▪ Maintain the drop height to a minimum during truck loading/offloading operations. ▪ Water sprays for material handling operations (e.g., wet material before loading trucks or conveying). ▪ Water spraying or wind breaks at exposed material storage areas such as the WRDs. ▪ Use vegetation, topsoil and/or rock armour on large stockpiles and WRDs that are prone to wind erosion. ▪ Regular maintenance of operational equipment, including dust suppression equipment such as water sprays, to ensure the equipment is operating properly. ▪ Immediate clean-up of any material (i.e., ore and waste rock spillages. ▪ Conduct regular site inspections to ensure the dust mitigation measures are being implemented. Regular visual site inspections are recommended to assess whether further mitigation is required for any of the dust emission sources.	Dustfall monitoring and reporting as per the 2026 NDCR is recommended.	✓ For dustfall	✓ – For dustfall	X (not required if mining areas are fully rehabilitated)

		A DMP will need to be developed for onsite activities, to comply with the requirements of the 2026 NDCR. • Dust control measures need to be assessed in detail and incorporated into the plan. • The plan should include a dustfall monitoring programme and appropriate mitigation measures as described in Table 6-2 and Table 6-3 for all key dust emission sources. • The plan can be compiled internally by the mine and used for internal management purposes.				
Fugitive Dust – TSP, PM_{10} & $PM_{2.5}$ **& Gases**	Vehicle dust entrainment, truck exhaust emissions and any other mining vehicle/equipment exhaust emissions	▪ Have clearly defined hauling routes/vehicle access areas. These areas should be treated for dust suppression. ▪ All main hauling roads should be treated for dust suppression. A combination of a fixed irrigation system and use of water trucks is recommended. A fixed irrigation system can reduce operational costs associated with dust mitigation of haul roads. ▪ Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust, if applicable. ▪ Conduct regular maintenance and checks for haul road surfaces. ▪ Immediate clean-up of any spillages. ▪ Trucks transporting ore should be appropriately covered or otherwise secured (where possible) to minimise wind-blown dust and material spillage during transportation, particularly when travelling on public roads. ▪ Control the number of trucks on the road, weight of trucks and the travelling speed. Implement strict vehicle speed limits (e.g., 20-40 km/h). ▪ Switch off engines whilst not in use; ▪ Establish a maintenance schedule to ensure proper maintenance of the trucks & mobile equipment;	Dustfall monitoring and reporting as per the 2026 NDCR is recommended.	✓ For dustfall	✓ – For dustfall	X (not required if mining areas are fully rehabilitated)

		▪ Conduct regular maintenance and quality checks (engines/tyres) for all heavy mobile equipment/trucks.				

6.2.1. *Recommendations for Dustfall Monitoring*

It is recommended that the existing dustfall monitoring network be expanded, to include dustfall buckets in and around the No. 2 and No. 3 Shaft operational areas. In terms of the updated NDCR (2026), monthly dustfall monitoring should be undertaken using the SANS 1137, or any equivalent method. This method prescribes that, for each region to be surveyed, a minimum of four (4) sampling sites shall be provided.

Therefore. the following recommendations are made:

- It is recommended that any dust buckets installed should have windshields attached, in accordance with the specifications provided;
- Where possible and practical, dust buckets should not be installed within 20m of structures higher than 1m;
- The stand for the container should hold the top of the container at a height of 2m above ground.
- In terms of the monitoring network, emphasis should be placed on locations to the south-west of the shaft areas, representing the predominant downwind direction, locations near sensitive receptor areas, as well as locations within the predicted areas of elevated pollutant concentrations to the north of the shaft areas and along the proposed haul route and conveyor alignment towards Target 1 Plant.
- In Phase 1, the impact footprint is strongly elongated in the north-south direction, with the highest dustfall rates centred around the No. 3 Shaft and extending northwards through the No. 2 Shaft towards Target 1 Plant. This suggests that the north/south directions are particularly important. Therefore, it is recommended that (Figure 6-1):
    - one bucket be placed north of the No. 2 Shaft, particularly given the haul route and nearby receptors within the Allanridge residential area (DB1 Phase 1).
    - one bucket be placed south/south-west of the No. 3 Shaft to account for this downwind direction (DB4).
    - one bucket be placed east/north-east of the No. 3 Shaft to account for this wind direction (DB5).
- During construction and Phase 2 operations, the highest impacts are concentrated around the No. 2 Shaft, with a relatively compact footprint extending primarily around the shaft. There is an additional clearly defined northward impact corridor along the overland conveyor towards Target 1 Plant in Phase 2. Therefore, it is recommended that:
    - one bucket be placed north of the No. 2 Shaft, particularly along the conveyor/Target 1 Plant direction (DB1 Phase 2).
    - one bucket be placed east/north-east of the No. 2 Shaft, given the nearby residential/sensitive receptors within the Nyakallong residential area (DB3).
    - one bucket be placed south/south-west of the No. 2 Shaft, to account for this downwind direction (DB2).
- The location of the northern dustfall monitoring station may be adjusted according to the operational phase of the project.
- A combined monitoring network is recommended rather than separate networks for Phase 1 and Phase 2.
- Where practical, the JV project's dustfall monitoring network could be coordinated with or complement the existing Harmony Gold monitoring network.

A spatial representation of the proposed dustfall monitoring network can be seen in Figure 6-1.



Figure 6-1: Map of proposed dustfall monitoring network at the project site.

6.3. SUMMARY AND CONCLUSIONS

Rayten was appointed by Kongiwe Environmental (Pty) Ltd to compile an AQIAr for the proposed Jelani Resources underground mining project near Allanridge, in the Lejweleputswa District Municipality, Free State Province. The AQIA was conducted in support of a Mining Right application for the proposed mine. The assessment considered the existing air quality environment, prevailing meteorological conditions, potential project-related emission sources, predicted incremental impacts, and cumulative impacts at surrounding areas and sensitive receptors.

The project area is situated within a predominantly rural environment, with surrounding land uses consisting primarily of grassland, cultivated land, mining areas, water bodies and exposed/bare areas, together with formal and informal residential areas. Existing sources of airborne emissions in the broader area include commercial agricultural activities, surrounding mining operations, wind erosion from exposed surfaces, and vehicle dust entrainment on unpaved roads. The proposed project will therefore introduce additional particulate emission sources into an environment where dust-generating activities already occur.

Meteorological conditions are an important consideration in assessing the potential dispersion of project-related emissions. The dispersion assessment was based on MM5 modelled meteorological data for the period January 2023 to December 2025. The prevailing wind fields indicate that emissions from the proposed activities are most likely to be transported towards the south-westerly wind quadrant. Wind speeds are generally within the light-air to fresh-breeze range, which is expected to promote dispersion of pollutants. However, periods of higher wind speeds may increase the potential for fugitive dust emissions from exposed surfaces, particularly areas such as the WRDs and other open areas.

The baseline assessment identified a limitation in the availability of representative ambient air quality monitoring data for criteria pollutants. The nearest permanent ambient air quality monitoring station is located at the Bayswater Clinic in Bloemfontein, more than 10km from the project site and approximately 150km to the south-west. This station was therefore considered unsuitable for representing background concentrations at the project site. No other suitable ambient monitoring station was identified within approximately 10km of the project area and, consequently, representative baseline concentrations of PM_{10}, $PM_{2.5}$, CO, SO_2, and NO_2 could not be established.

In contrast, representative dustfall monitoring data were available from the Harmony Gold monitoring network in the vicinity of the project. The network comprised seven monitoring locations for the July 2024 – June 2025 period, of which six (6) were classified as non-residential and one (1) as residential. Of the 70 dustfall measurements recorded, only one exceedance of the residential dustfall limit of 600 mg/m²/day was recorded, at the Nyakallong monitoring site (HAR1) in March 2025. Although the cause of this exceedance was not known at the time of the assessment, the available monitoring data indicates that background dustfall was generally compliant with the applicable NDCR during the assessment period.

The principal pollutants of concern associated with the proposed mining project are dustfall, PM_{10} and $PM_{2.5}$. The main sources considered in the assessment include refurbishment and construction activities at the Target No. 2 and No. 3 Shafts, material handling and truck loading/offloading during Phase 1, wind erosion from exposed areas such as WRDs, vehicle dust entrainment from unpaved roads, and emissions associated with conveyor transfer points and the transport of run-of-mine ore to

the Target 1 Plant. Processing activities at the Target 1 Plant were excluded from the assessment as these activities form part of Harmony's existing operations and are not included in the proposed JV project.

During the construction phase, predicted dustfall deposition and PM_{10} and $PM_{2.5}$ concentrations are highest in the immediate vicinity of the construction area and decrease rapidly with increasing distance from the sources. Localised exceedances of the applicable dustfall, PM_{10} and daily $PM_{2.5}$ standards are predicted within the shaft boundary, with short-term PM_{10} exceedances extending locally beyond the southern shaft boundary. Importantly, however, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM standards, and annual $PM_{2.5}$ concentrations remain below the applicable standard throughout the modelling domain.

During Operational Phase 1, surface activities will be centred on the No. 3 Shaft, with ore transported to the Target 1 Plant via an approximately 7.67km haul route. Predicted incremental dustfall, PM_{10} and $PM_{2.5}$ concentrations are generally low, with isolated exceedances of the daily and annual PM_{10} standards predicted along the north-western shaft boundary. The dispersion footprint is elongated between the No. 3 Shaft and Target 1 Plant, reflecting the distributed nature of emissions from the haul route. Concentrations decrease with increasing distance from the emission sources, and no exceedances of the applicable standards are predicted at sensitive receptor locations.

During Operational Phase 2, surface activities will be centred on the No. 2 Shaft, with ore transported to the Target 1 Plant via an approximately 2.45km overland conveyor system. The predicted impact footprint is more concentrated around the No. 2 Shaft and extends towards Target 1 Plant along the conveyor alignment. This reflects the concentration of emissions associated with material handling and the open conveyor system. Localised exceedances of the applicable dustfall and PM_{10} limits are predicted within the shaft boundary, with PM_{10} exceedances extending to a small section of the eastern shaft boundary. Nevertheless, no modelled sensitive receptor is predicted to experience an exceedance of the applicable dustfall or PM_{10} standards, while predicted incremental $PM_{2.5}$ concentrations remain below the applicable standards throughout the modelling domain.

The cumulative assessment indicates that cumulative impacts at the shaft boundaries are expected to range from low to moderate, with concentrations decreasing as distance from the operational areas increases. At surrounding sensitive receptor areas, cumulative impacts are generally expected to be low to negligible. The Nyakallong residential area is, however, considered a particular area of sensitivity due to the relatively high maximum background dustfall recorded at this location. A dustfall rate of 1 570 mg/m^2/day was recorded at Nyakallong in March 2025, exceeding the residential limit of 600 mg/m^2/day. As a result, even relatively low incremental dustfall contributions from the proposed project could contribute to elevated cumulative dustfall levels at this receptor.

Overall, the modelling indicates that the highest air quality impacts are expected within or immediately adjacent to the proposed operational and construction areas, while impacts decrease rapidly with increasing distance from the emission sources. Although localised exceedances of dustfall and PM_{10} standards are predicted within the shaft boundaries, these impacts are largely confined to the operational areas and are not predicted to result in exceedances at the modelled sensitive receptors. The overall predicted impact significance at sensitive receptor locations is therefore low, while moderate impacts may occur within the shaft boundaries.

Based on the findings of the baseline and impact assessments, the proposed Jelani Resources underground mining project is considered acceptable from an air quality perspective, subject to the implementation and maintenance of the recommended mitigation and management measures throughout the construction and operational phases. Emphasis should be placed on controlling fugitive dust from exposed surfaces, material handling, vehicle movements and conveyor-related activities, as well as monitoring the effectiveness of these measures. Monthly dustfall monitoring is recommended to support compliance monitoring, identify changes in background dustfall, and track the effectiveness of dust control measures, particularly at sensitive areas such as Nyakallong. Where practical, the JV project's dustfall monitoring network could be coordinated with or complement the existing Harmony Gold monitoring network.

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8. DECLARATIONS

DECLARATION OF ACCURACY OF INFORMATION - APPLICANT

Name of Enterprise: Jelani resources (Pty) Ltd – Proposed Underground Mining Operations – Air Quality Impact Assessment Report.

Project Consultant:	Kongiwe Environmental (Pty) Ltd		
Contact person:	Ripfumelo Macevele		
Postal address:	PostNet Suite no 163, Private Bag X21, Bryanston, South Africa		
Postal code:	2021	Cell:	
Telephone:	010 140 6508	Fax:	
E-mail:	rmacevele@kongiwe.com		

Declaration of accuracy of information provided:

Atmospheric Impact Report in terms of Section 30 of the Act:

I Ripfumelo Macevele declare that – General declaration

The information provided in this atmospheric impact report is, to the best of my knowledge, in all respects factually true and correct.

I am aware that the supply of false or misleading information to an air quality officer is a criminal offence in terms of section 51(1)(g) of this Act.

Signed at _Bryanston_____on this_22nd_____ day of September 2026_____



_

_____

SIGNATURE

_Environmental Consultant_____

CAPACITY OF SIGNATORY

DECLARATION OF INDEPENDENCE - PRACTITIONER

Specialist:	Rayten Engineering Solutions (Pty) Ltd		
Contact person:	Gertrude Mafusire		
Postal address:	PO Box 1369, Bromhof, 2154		
Postal code:	2154	Cell:	
Telephone:	011 792 0880	Fax:	086 592 0298
E-mail:	info@rayten.co.za		
Professional affiliation(s) (if any)	SACNASP (400171/15)		

Name of Practitioner: Rayten Engineering Solutions (Pty) Ltd

Name of Registration Body: South African Council for Natural Scientific Professions

Professional Registration No: 400171/15 (Gertrude Mafusire - Report Author)

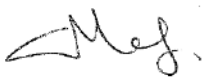
Declaration of accuracy of information provided:

Atmospheric Impact Report in terms of Section 30 of the Act:

I Gertrude Mafusire, declare that – General declaration

I am independent of the applicant;
I have the necessary expertise to conduct the assessments required for the report; and
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I will disclose to the applicant and the air quality officer all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the air quality officer.
The information provided in this atmospheric impact report is, to the best of my knowledge, in all respects factually true and correct. I am aware that the supply of false or misleading information to an air quality officer is a criminal offence in terms of section 51(1)(g) of this Act.

Signed at **Roodepoort** on the **23rd day** of **September 2026**



SIGNATURE

Senior Associate

CAPACITY OF SIGNATORY

APPENDIX A

AIR DISPERSION MODELLING CHECKLIST

Table A 1: Information Required in Air Dispersion Modelling Report.

Information Required in Plan of Study Report				
Description	**Included (Y/N)**	**Section**	**Page no.**	**Comments**
1. Facility and Modellers Information				
Project Identification Information				
Applicant details	Y	1.1	1-2	
Facility Identification	Y	1.1	1-2	
Physical address of facility	Y	1.1	1-2	Co-ordinates provided
AEL number	N			N/A
EIA reference	N	1.1	1-2	In the process of applying for a Mining Right
Modelling contractors	Y	1.1	1-2	
Project Background				
Objectives of Baseline Assessment	Y	1.3	6	Terms of Reference provided
Process description	Y	1.2	2-4	
Project Location				
Site layout plan	Y	1.2	5	
Regional map	Y	2	10-13	
Adjacent area map	Y	2	10-13	
Surrounding land use map	Y	2	10-13	
Elevation data (DEM)	Y	2	10-13	
2. Emission Characterisation				
Proposed emissions & source parameters				
All identifiable emissions listed	Y	5 & 5.1	36-43	
Parameters for each operating scenario	Y	5 & 5.1	36-43	
Proposed emissions calculations	Y	5 & 5.1	36-43	
3. Meteorological Data				
Surface Data				
Source of data	Y	4.1	21-22	
Seasonal wind roses	Y	4.1.1	26	
3-year representative data	Y	4.1.1	24	
Program used to process data	Y	4.1	21-22	
Description of station	Y	4.1	21-22	
Period of record	Y	4.1	21-22	
Spatial representativeness	Y	4.1	21-22	

Data complies with Code of Practice	Y	4.1	21-22	
Upper Air Data				
Source of data	Y	4.1	21-22	
4. Ambient Impact Analysis and Ambient Levels				
Standard Levels				
National Ambient Air Quality Standards	Y	3.3	15-16	
Background Concentrations				
Background values specified	Y	4.2	29-33	
5. Modelling Procedures				
Proposed Model				
Assessment level proposed	Y	5.2.2	44-45	Table 5-7
Dispersion model to be used	Y	5.2.2	44-45	Table 5-7
Supporting models to be used	Y	5.2.2	44-45	Table 5-7
Version of models to be used	Y	5.2.2	44-45	Table 5-7
Proposed Emissions to be Modelled				
Pollutants specified	Y	5.2.2	44-45	Table 5-7
Scenarios to be modelled	Y	5.2.2	44-45	Table 5-7
Conversion factor utilized	N			Not used
Proposed Settings				
Settings to be utilized	Y	5.2.2	44-45	Table 5-7
Terrain settings	Y	5.2.2	44-45	Table 5-7
Land characteristics	Y	5.2.2	44-45	Table 5-7
Grid Receptors				
Property line resolution	Y	5.2.2	44-45	Table 5-7
Fine grid resolution	Y	5.2.2	44-45	Table 5-7
Medium grid resolution	Y	5.2.2	44-45	Table 5-7
Large grid resolution	Y	5.2.2	44-45	Table 5-7
6. Ambient Impact Results Documentation				
Tables of Modelling Results				
Pollutant	Y	5.3.3	58-63	
Averaging time	Y	5.3.3	58-63	
Operating scenario	Y	5.3.3	58-63	
Maximum modelled concentration	Y	5.3.3	58-63	
Receptor location	Y	5.3.3	58-63	
Receptor elevation	Y	5.3.3	58-63	
Date of maximum impact	N			
Name of output e-files	Y	Appendix B	91	
Source Impact Area Figures				
UTM co-ordinates	Y	5.3.1 & 5.3.2	47-57	
Modelled facility	Y	5.3.1 & 5.3.2	47-57	

Topography features	Y	2.3	7&12	
Isopleths	Y	5.3.1 & 5.3.2	47-57	
Value of maximum impact	Y	5.3.1 & 5.3.2	47-57	
Value of maximum cumulative impact	Y	5.3.4	64-65	
7. Ambient Impact Supporting Documentation				
Electronic Files				
Electronic files can be provided upon request				
Input & output files for models	Y	Appendix B	91	name of files specified
Input & output files for pre-processors	Y	Appendix B	91	name of files specified
Input & output files for post-processors	Y	Appendix B	91	name of files specified
Digital terrain files	N			
Plot files	Y	Appendix B	91	name of files specified
Final report	Y			

APPENDIX B

OUTPUT E-FILES

Table B1: List of output e-files used.

Name	Date modified	Type	Size
Jelani_Met	8/27/2026 4:51 PM	File folder	
Jelani_PM10_Construction	9/1/2026 11:10 AM	File folder	
Jelani_PM10_Op Phase 1	9/1/2026 8:55 AM	File folder	
Jelani_PM10_Op Phase 2	9/1/2026 3:30 PM	File folder	
Jelani_PM25_Construction	9/1/2026 2:32 PM	File folder	
Jelani_PM25_Op Phase 1	9/1/2026 9:16 AM	File folder	
Jelani_PM25_Op Phase 2	9/1/2026 3:46 PM	File folder	
Jelani_TSP_Construction	9/1/2026 11:51 AM	File folder	
Jelani_TSP_Op Phase 1	9/1/2026 8:24 AM	File folder	
Jelani_TSP_Op Phase 2	9/3/2026 9:54 AM	File folder	

Note: an electronic copy of the modelling files can be provided upon request.

APPENDIX C

SUMMARY OF SOURCE PARAMETERS

CONSTRUCTION PHASE

			Dimensions			Modelled Location		
Source Number	**Source ID**	**Source Description**	**Length X (m)**	**Length Y (m)**	**Release Height (m)**	**X (m)**	**Y (m)**	**Elevation (m)**
1	PAREA1	Offices & Buildings (New)	*	*	0,5	464529,64	6926883,73	1326,06
2	PAREA2	No 2.Shaft Area (new)	*	*	0,5	464587,54	6926779,14	1327,88

OPERATIONAL PHASE 1

			Dimensions			Modelled Location		
Source Number	**Source ID**	**Source Description**	**Length X (m)**	**Length Y (m)**	**Release Height (m)**	**X (m)**	**Y (m)**	**Elevation (m)**
1	PAREA1	WRD (No.3 Shaft)	multiple	multiple	20	464677,00	6922251,50	1319,59
2	VOL1	Load reef stockpile (ore)	1,2	1,2	6	464666,96	6922098,16	1320,06
3	VOL2	Load reef tranfer conveyor (ore)	1,2	1,2	0,5	464683,62	6922094,23	1319,19
4	VOL3	Load truck-loading bin (reef)	1,2	1,2	6	464732,23	6922142,55	1318,09
5	VOL4	Load haul trucks (ore)	1,2	1,2	2,55	464748,55	6922158,62	1318,16
6	VOL5	Load Surface Rock Handling Area 6 (waste rock)	1,2	1,2	6	464675,21	6922094,26	1319,56
7	VOL6	Load trucks for transport to No.1 Shaft (waste rock)	1,2	1,2	2,55	464752,18	6922150,02	1318,1
8	SLINE1	Haul Road (from No. 3 Shaft to No. 2 Shaft)	*	*	*	multiple	multiple	multiple

OPERATIONAL PHASE 2

			Dimensions			Modelled Location		
Source Number	**Source ID**	**Source Description**	**Length X (m)**	**Length Y (m)**	**Release Height (m)**	**X (m)**	**Y (m)**	**Elevation (m)**
1	PAREA1	WRD (No. 2 Shaft	multiple	multiple	7,5	464756,18	6926902,23	1325,64
2	VOL1	Load headgear bin (ore/waste rock)	1,2	1,2	60	464642,47	6926780,34	1328,52
3	VOL2	Load conveyor SC01/SC02 (ore/waste rock)	1,2	1,2	6	464642,17	6926784,03	1328,47
4	VOL3	Load conveyor SC03 (ore/waste rock)	1,2	1,2	6	464638,27	6926790,80	1328,39
5	VOL4	Load conveyor SC04 (ore/waste rock)	1,2	1,2	6	464606,10	6926791,47	1328,29
6	VOL5	Load conveyor SC05 (waste rock)	1,2	1,2	6	464605,56	6926876,42	1327,08
7	VOL6	Load waste rock bin	1,2	1,2	6	464818,56	6926763,54	1325,79
8	VOL7	Load conveyor SC06A (ore)	1,2	1,2	6	464603,58	6926883,44	1326,9
9	VOL8	Load conveyor SC07A (ore)	1,2	1,2	6	464592,24	6926888,45	1326,65
10	SLINE1	conveyor SC07A (ore)	*	*	6	multiple	multiple	multiple
11	SLINE2	conveyor SC01/SC02 (ore/waste rock)	*	*	6	multiple	multiple	multiple
12	SLINE3	conveyor SC03 (ore/waste rock)	*	*	6	multiple	multiple	multiple
13	SLINE4	conveyor SC04 (ore/waste rock)	*	*	6	multiple	multiple	multiple
14	SLINE5	conveyor SC05 (waste rock)	*	*	6	multiple	multiple	multiple
15	SLINE6	conveyor SC06A (ore)	*	*	6	multiple	multiple	multiple

APPENDIX D

WIND SPEEDS ACCORDING TO THE BEAUFORT SCALE

Table D1: Beaufort Wind Speed Scale Categories (Artemova, n.d.).

Beaufort number	Wind type	Wind speed	Land conditions
0	**Calm**	**0 m/s**	Calm, Smoke rises vertically
1	**Light air**	**0-2 m/s**	Wind motion visible in smoke
2	**Light breeze**	**2-3 m/s**	Wind felt on exposed skin, Leaves rustle
3	**Gentle breeze**	**3-5 m/s**	Leaves and smaller twigs in constant motion
4	**Moderate breeze**	**5-8 m/s**	Dust and loose paper are raised. Small branches move
5	**Fresh breeze**	**8-11 m/s**	Smaller trees sway
6	**Strong breeze**	**11-14 m/s**	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult
7	**Near gale**	**14-17 m/s**	Whole tree in motion. Some difficulty when walking into wind
8	**Gale, fresh gale**	**17-21 m/s**	Twigs broken from trees. Cars veer on road
9	**Severe gale**	**21-24 m/s**	Light structure damage
10	**Storm whole gale**	**24-28 m/s**	Trees uprooted. Considerable structural damage
11	**Violent storm**	**28-33 m/s**	Widespread structural damage
12	**Hurricane storm**	**>33 m/s**	Considerable and widespread structural damage

APPENDIX E

IMPACT ASSESSMENT METHODOLOGY

The significance of each identified impact was determined using the approach outlined below, which was adopted from SE Solutions' proposed impact rating methodology report (O'Beirne, 2024). However, it is noted that O'Beirne's 2024 report is in draft phase and under public review. This approach incorporates two aspects for assessing the potential significance of impacts, namely consequence/inherent risk and likelihood. Consequence and likelihood are then combined to estimate the anticipated residual risk//overall impact significance rating.

A. Inherent Risk

What ***could*** happen is expressed as ***inherent risk***, given any activity in question. For example, if there will be emissions of SO_2 from a proposed activity, then adverse human health effects are an inherent risk. Expressing inherent risk is important in significance ratings to respect the concerns of stakeholders in public participation, who are fully entitled to raise concerns about what *could* happen if an activity is authorised (O'Beirne, 2024). A preliminary list of potential consequences associated with any proposed activity is given in Table E1. This table is qualitative but can be refined over time to include additional characteristics added to each of the categories (O'Beirne, 2024).

Table E1: The hierarchy of potential consequences of changes in the receiving environment (impacts). These consequences are expressed as inherent risks or benefits (viz. what could happen) because of the impacts.

	Environmental Cost	Rating
Inherent Risk/Benefit	Human health – morbidity / mortality, loss of threatened species population(s), loss of strategic water source potential or sequestered carbon stocks.	High
	Material reductions in threatened or endemic species populations or habitat, loss of livelihoods, individual economic loss.	Moderate-high
	Material reductions or degradation of environmental quality – air. Loss of habitat, loss of heritage, amenity.	Moderate
	Nuisance	Moderate-low
	Negative change - with no other consequences.	Low
	Environmental Benefits	
	Net improvement in human welfare or threatened species habitat.	Moderate – high
	Improved environmental quality – air, soil, water. Improved individual livelihoods.	Moderate
	Economic Development but no tangible environmental benefit or impact.	Moderate-low
	Positive change – with no other consequences.	Low

There is no 'high' rating for benefits. This is to reflect that there are certain environmental costs that are intolerable regardless of the benefit they bring, and these costs cannot be 'traded off'. There is also no scientific way to 'match' the categories (viz. a moderate cost being equivalent to a moderate benefit) (O'Beirne, 2024). However, O'Beirne's 2024 report still details the importance of cost-benefit analysis to decision-making. But the author notes that cost-benefit analysis cannot be done with qualitative findings, which are presented in Table E1.

B. Likelihood

The regulations call for 'probability' to be used in defining significance. However, Johan Nel, previously of the CEM at NWU, argues that 'likelihood' is a preferable term compared to the term 'probability', since 'probability' implies a solid statistical foundation. In most if not all instances, the probability of a given consequence is going to be expressed qualitatively rather than quantitatively in an Environmental Impact Assessment (EIA), and likelihood better articulates the qualitative nature of the assessment. One way or another, expressing the residual risk of an inherent risk requires an articulation of probability (which for significance ratings in EIA is then expressed as 'likelihood') (O'Beirne, 2024).

The likelihood of the consequences is given as a function of the scale of the impact and the sensitivity of the affected environment. Likelihood defines the difference between an inherent risk (what *could* happen) and a residual risk (what is *likely* to happen). Significance categories in the regulations can (and must) be used to argue the likelihood of the consequence viz extent, duration, intensity, etc Proposed likelihood categories are provided in Table E2 (O'Beirne, 2024).

Table E2: Likelihood categories and definitions in ascribing impact significance.

Likelihood	Definitions
Highly unlikely	The possibility of the consequence occurring is negligible
Unlikely but possible	The possibility of the consequence occurring is low but cannot be discounted entirely
Likely	The consequence may not occur, but a balance of probability suggests it will.
Highly likely	The consequence may still not occur, but it is most likely that it will.
Definite	The consequence will definitely occur.

C. Residual Risk/Impact Significance

The specialist (or Environmental Assessment Practitioner) must then ascertain what is likely to happen given the specific circumstances of the activity and the characteristics of the receiving environment. What is likely to happen (in the specialist's opinion) is expressed as residual risk. Residual risk is what must be accepted if the application is to be approved. Stated differently, what will have to be 'lived with' if the activity goes ahead? The competent authority must decide on the application based on the residual risks and how these reflect who wins and who loses (O'Beirne, 2024).

Significance is expressed as the residual risk of the consequence. The matrix given in Tabel E3 is used to combine likelihood and consequence, which provides an estimate of the residual risk/impact significance (O'Beirne, 2024).

Table E3: Residual risk matrix combining likelihood and consequence.

		Residual Risk				
Consequence	High	Moderate	High	High	Fatally Flawed	
	Moderate-high	Low	Moderate	High	High	High
	Moderate	Low	Moderate	Moderate	Moderate	Moderate
	Moderate-low	Low	Low	Low	Low	Moderate
	Low	Low	Low	Low	Low	Low
		Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
		Likelihood				

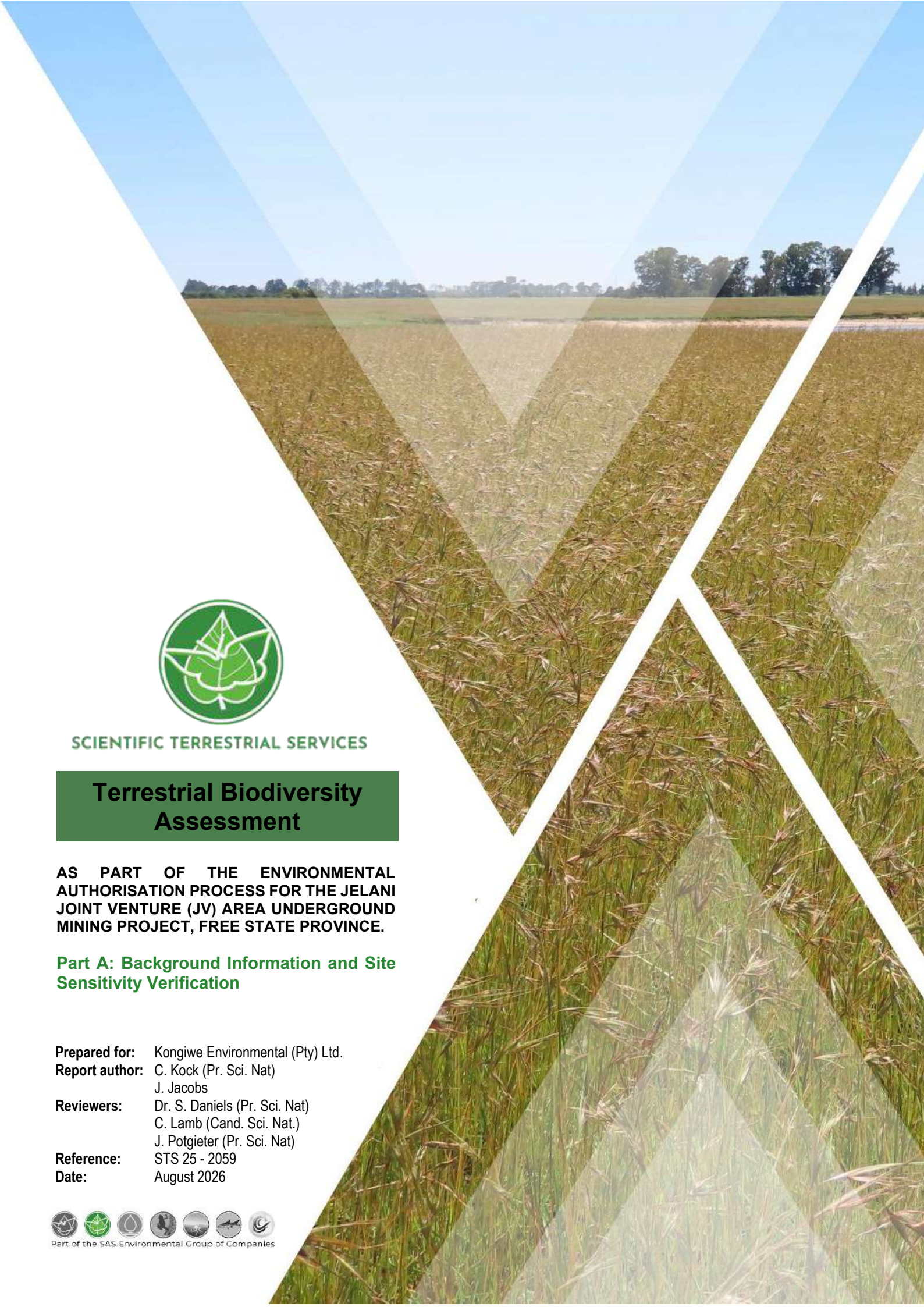
D. *Reasoned opinion regarding whether activity should be authorised.*

After determining the impact significance associated with any proposed activity, O'Beirne (2024) recommends the inclusion of a reasoned opinion regarding whether the proposed activity should be authorised in all specialist reports, in line with requirements of the EIA regulations. Ratings provided in Table E4 are proposed by O'Beirne (2024), to help assess the acceptability of any project.

Table E4: Decision-making implications of the different significance categories.

Rating	Implication for decision-making
Fatally Flawed	The project cannot be authorised.
High	The project can be authorised but with strict conditions and high level of compliance and enforcement.
Moderate	The project can be authorised but with conditions and routine inspections.
Low	The project can be authorised with a low risk of environmental degradation.

Appendix D3 - Biodiversity Assessment



SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE JELANI JOINT VENTURE (JV) AREA UNDERGROUND MINING PROJECT, FREE STATE PROVINCE.

Part A: Background Information and Site Sensitivity Verification

Prepared for: Kongiwe Environmental (Pty) Ltd.
Report author: C. Kock (Pr. Sci. Nat)
J. Jacobs
Reviewers: Dr. S. Daniels (Pr. Sci. Nat)
C. Lamb (Cand. Sci. Nat.)
J. Potgieter (Pr. Sci. Nat)

Reference: STS 25 - 2059
Date: August 2026

Part of the SAS Environmental Group of Companies

EXECUTIVE SUMMARY

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the for the Jelani Exploration Joint Venture (EJV) area underground mining project, Free State province. The area proposed for underground mining will henceforth be refereed to as the "**study area**".

The study area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11 kilometres (km) northwest of Odendaalsrus, 2.5 km west of Allanridge, and 22 km east of Wesselsbron, in the Free State Province. The study area is located within Ward 36 of the Matjhabeng Local Municipality, which is an administrative jurisdiction of the Lejweleputswa District Municipality.

The proposed project will utilise existing underground access and infrastructure associated with the Harmony Target mining right. All required infrastructure will be confined to the existing mining right area, with no new surface infrastructure proposed within the focus area. Underground access will comprise refurbished facilities at existing Target shafts (Nos. 3, 4 and 5) or newly constructed infrastructure at Target Shaft No. 2, all located within the existing mining right. This report will only focus on the impact associated with the underground mining activities and not the activities taking place in the existing Harmony Target mining right area.

DESKTOP ASSESSMENT RESULTS

According to the Red Listed Ecosystems (RLE) Database (SANBI 2022a & b), the study area is situated within the remaining extents of the Least Concern (LC) Western Free State Clay Grassland and the Endangered (EN) Vaal-Vet Sandy Grassland.

The Free State Biodiversity Plan (FSBP) Dataset (2019) identified an area in the northeastern portion and centre of the study area as a Critical Biodiversity Areas (CBA) and the remainder of the study area as Ecological Support Areas (ESA) 2 and ESA 1 habitat.

The Mining and Biodiversity Guidelines (2012) identified a small section in the northeastern portion of the study area as Highest Biodiversity Importance. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. Authorisations if granted, may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into licence agreements and/or authorisations.

No protected areas was identified within the study area or within a 10 km radius of the study area.

HABITAT AND SPECIES SUMMARIES

The floral communities identified during the site assessment (10th December 2025) are described under three (3) broad[1] habitat units. The three broad habitat units were delineated based on vegetation structure and the dominant plant groups observed within the vegetation communities, as well as on habitat integrity and the ecological processes the habitats provide or support. The delineated habitat units thus included:

- **Grassland habitat:** Consisting of the Vaal Vet Sandy Grasslands[2] and Modified Grasslands communities;
- **Transformed Habitat:** Including the cultivated areas and built-up areas (including farmhouses, old mining infrastructure and roads); and
- **Freshwater Ecosystems, which consisted of two subunits, namely:**
  - Artificial impoundments; and
  - Seep Wetlands and Depression Wetlands.

[1] Broad habitat categories have been delineated and provide an indication of the main vegetation types associated with the mining right area.

[2] A moderately sized portion of the study area is represented by primary threatened grasslands (EN Vaal Vet Sandy Grassland).

From a floral perspective, the majority of the study area is considered to be low Site Ecological Importance (SEI) (as the study area is associated with cultivated areas), the secondary grassland habitat (i.e., Modified Grasslands) is considered to be of low SEI along with the Freshwater Ecosystems and the Vaal Vet Sandy Grassland habitat is regarded as medium SEI. No threatened floral Species of Conservation (SCC) were expected or observed on site, however two provincially protected species (as listed under the Free State Nature Conservation Ordinance, 1969 (ordinance No. 8 of 1969) (FSNCO)) were observed on site and several other species have a medium-high potential to occur within the study area as suitable habitat therein is present.

From a faunal ecological and resource management perspective, the Transformed Habitat Unit obtained a very **low** SEI, the Vaal Vet Sandy Grassland is of **high** SEI**,** but the Modified Grassland is of **low** SEI, and the Freshwater Ecosystems are of **high** SEI. These sensitivities are based on historic and current anthropogenic activities that have reduced the presence of preferred habitat and overall faunal diversity within several sections of the site; however there exists focal points around the study site that contain essential resources that are able to support SCC as well as other faunal diversity and abundance.

IMPACT ASSESSMENT

The proposed underground mining activities are not anticipated to impact on any terrestrial habitats for surface infrastructure, and the risk of subsidence is considered unlikely (given the design and pillar safety factor of the proposed underground mine). The current pillar safety is 1.2 (which is higher than 1) indicating the pillar is theoretically stable. Therefore, the anticipated risks to floral diversity and terrestrial biodiversity are considered **low post mitigation** (given all mitigation measures are implemented).

The greatest impacts to floral and faunal communities and ecology (i.e., habitat, diversity, SCC) are anticipated from ***the potential*** of subsidence to occur (however considered unlikely), where the direct loss of habitat and species can take place. The impact of significant subsidence is regarded as a high impact to floral and terrestrial biodiversity. Additionally, should a significant subsidence impact occur significantly impact CBA, ESA or threatened vegetation can be expected and therefore discussion with governmental authorities regarding the possible offset preparation will need to be considered. The impact of possible subsidence also provides risk to floral SCC (provincially protected species), therefore, in areas showing signs of minor subsidence a walkdown of the site will be required and if necessary, a permit will be required to relocated identified protected floral species.

Faunal Impact Discussion:

The proposed underground mining activities are not anticipated to directly impact on any faunal habitats, and the risk of subsidence is considered unlikely Therefore, the anticipated risks to faunal systems are considered **low post mitigation** (given all mitigation measures are implemented). The greatest impacts to faunal communities and ecology (i.e., habitat, diversity, SCC) are anticipated from ***the potential*** of subsidence to occur (however considered unlikely), where the direct loss of habitat and species can take place. The impact of significant subsidence is regarded as a high impact to faunal biodiversity. Another potential impact is faunal displacement and disturbance as a result from underground mining, such as the noise generated from equipment and vibrations felt from explosions. The impact of underground mining activities such as noise and vibrations is regarded as a medium impact to faunal biodiversity.

During the site visit eight (8) faunal SCC were observed within the Freshwater Habitat in the study area; namely the *Anas undulata* (Yellow-billed Duck, NT), *Anhinga rufa* (African Darter, NT), *Mycteria ibis* (Yellow-billed Stork, VU), *Spatula smithii* (Cape Shoveler, NT), *Podiceps cristatus* (Great Crested Grebe, VU), *Phoenicopterus roseus* (Greater Flamingo, NT), *Anas erythrorhyncha* (Red-billed Teal, NT), *Sarkidiornis melanotos* (Knob-billed Duck, NT). Six (6) other SCC have a high POC for the study area, whilst five (5) faunal SCCs have a medium POC - which may potentially be encountered within the study area. It is noted that these species are not likely dependent on the study area for survival, and the area may only be a part of their larger home ranges or foraging areas. Provided that mitigation measures are implemented, the overall impact to faunal SCC as a result of the construction and operation activities is unlikely to significantly impact SCC populations in the region.

Reasoned Opinion:

It is the opinion of the ecologists that several risks associated with the proposed project can be reduced to acceptable levels, taking into consideration the provided mitigation measures and aim of the Decommissioning phase (followed by subsequent rehabilitation). This study is deemed to provide the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources will be made in support of the principle of sustainable development.

DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Biodiversity** as published in Government Gazette 43110 dated 20 June 2020.

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
2	**Terrestrial Biodiversity Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	**Part A – C:** Cover Page **Part A:** Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	**Part A**: Section 1
2.3	**The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:**	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	**Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	**Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	**Part A:** Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	**Part A:** Section 3 (desktop analysis) **None associated with the study area.**
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes, and fine scale habitats; and d) species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified;	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 (flora) **Part C:** Section 3 (fauna)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	**Part B**: Section 4 (flora) **Part C:** Section 4 (fauna)
2.3.7	**The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:**	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: *a) the reasons why an area has been identified as a CBA;* *b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;* *c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);* *d) the impact on ecosystem threat status;* *e) the impact on explicit subtypes in the vegetation;* *f) the impact on overall species and ecosystem diversity of the site; and*	**Part A**: Section 3 (desktop analysis) **Part B**: Section 3 **Part C:** Section 3

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
	g) *the impact on any changes to threat status of populations of species of conservation concern in the CBA;*	
2.3.7.2	Terrestrial Ecological Support Areas (ESAs), including: *a) the impact on the ecological processes that operate within or across the site;* *b) the extent the proposed development will impact on the functionality of the ESA; and* c) *loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;*	
2.3.7.3	Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- *a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;*	**Part A**: Section 3 (desktop analysis). **Part B**: Section 3
2.3.7.4	Priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	**Part A**: Section 3 (desktop analysis).
2.3.7.5	SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* b) *the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);*	**Part A**: Section 3 (desktop analysis). **None associated with the study area.**
2.3.7.6	FEPA sub catchments, including- *a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;*	Not part of the scope of this report.
2.3.7.7	Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* b) *percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	Not applicable. No forests associated with this project.
2.4	**The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.**	
	Part B: Results of the **Floral Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to floral communities. **Part C:** Results of the **Faunal Assessment** as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
3	**Terrestrial Biodiversity Specialist Assessment Report**	
3.1	**The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:**	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	**Part A:** Appendix E
3.1.2	A signed statement of independence by the specialist;	**Part A:** Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**Part B:** Section 1 & 2 (flora) **Part C:** Section 1 (fauna)
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	**Part A:** Appendix D **Part B:** Section 2 (flora) & Appendix A (flora) **Part C:** Section 2 (fauna) & Appendix A (fauna)
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	**Part B:** Sections 1 & 2 (flora) **Part C:** Section 1 (fauna)

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	**Part B:** Section 4 (flora) **Part C:** Section 4 (fauna)
	Impact Assessment Requirements 3.1.7 Additional environmental impacts expected from the proposed development; 3.1.8 Any direct, indirect and cumulative impacts of the proposed development; 3.1.9 The degree to which impacts and risks can be mitigated; 3.1.10 The degree to which the impacts and risks can be reversed; 3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources; 3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Part B:** Sections 5 & 6 (flora) **Part C:** Sections 5 & 6 (fauna)
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	**Part B:** Section 4 (flora) **Part C:** Section 4 (fauna)
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	**To be completed by the EAP.**
3.1.15	Any conditions to which this statement is subjected.	**Part B:** Section 6 (flora) **Part C:** Section 6 (fauna)
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	**To be completed by the EAP.**
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	

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GLOSSARY OF TERMS

Biodiversity priority areas (Skowno et al., 2019)	Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: protected areas, Critically Endangered (CR) and Endangered (EN) ecosystems, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), Freshwater Ecosystem Priority Areas (FEPA), high water yield areas, flagship free-flowing rivers, priority estuaries, focus areas for land-based protected area expansion, and focus areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future. The different categories are not mutually exclusive and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be complementary, with overlaps reinforcing the importance of an area.
Biological diversity or Biodiversity (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA))	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biome (Mucina and Rutherford (2006); after Low and Rebelo (1998))	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (Mucina and Rutherford (2006))	A bioregion is a composite of spatial (vegetation) units sharing similar biotic and physio-geographical features and connected by processes operating on a regional sale.
Critical Biodiversity Area (CBA; SANBI, 2020)	An area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible.
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Critically Endangered (CR, i.e., International Union for Conservation of Nature (IUCN) Red List category (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction.
Degradation (Skowno et al., 2019)	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Development footprint (as per the National Environmental Management Act, 1998 (Act No. 107 of 1998) - NEMA definition)	"In respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity"
Ecological Support Area (ESA; Skowno et al., 2019)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Endangered (EN, i.e., IUCN Red List category (Skowno et al., 2019))	**Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN

	ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.
Endemic species (SANBI, 2020)	A species that is naturally restricted to a particular, well-defined region, i.e., species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
Ground·Truth	To check the accuracy of (remotely sensed data) by means of in-situ observations.
Habitat (NEMBA)	A place where a species or ecological community naturally occurs.
Important Bird and Biodiversity Area (IBA) (Marnewick et al, 2015a; 2015b)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Listed alien species	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
Quarter Degree Square (QDS) (SANBI, 2020)	A way of dividing the longitude latitude degree square cells into smaller squares of 15' × 15' (roughly 24 × 27 km), forming in effect a system of geocodes.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the IUCN, organisms that fall into the Extinct in the Wild (EW), CR, EN, Vulnerable (VU) categories of ecological status.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as protected species of relevance to the project.
Terrestrial Species (SANBI, 2020)	For the purposes of the species environmental guidelines (SANBI, 2020), terrestrial species are considered to represent species that are not exclusively marine and occur on land (at least for a portion of their life cycle). This includes amphibians (frogs and toads) but excludes other freshwater aquatic species which are considered to be aquatic (e.g., fish, diatoms and aquatic macroinvertebrates). This definition is not an accurate biological definition but rather applied in this manner to align with the Protocol on Terrestrial Biodiversity.
Threatened ecosystem (Skowno et al., 2019)	An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The Biodiversity Act allows the Minister of Environmental Affairs or a provincial Member of the Executive Council (MEC) for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making.
Threatened species	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
Vulnerable (VU, i.e., IUCN Red List category (Skowno et al., 2019))	Applied to both species/taxa and ecosystems: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

LIST OF ACRONYMS

BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resource Act, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CR	Critically Endangered
DEM	Digital Elevation Model
DFFE	Department of Forestry, Fisheries, and the Environment
E-GIS	Environmental Geographical Information Systems
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EN	Endangered
EPL	Ecosystem Protection Level
ESA	Ecological Support Area
EW	Extinct in the Wild
FEPA	Freshwater Ecosystem Priority Areas
FSBP	Free State Biodiversity Plan
FSNCO	Free State Nature Conservation Ordinance, 1969 (Ordinance No. 8 of 1969)
GIS	Geographic Information System
GN	Government Notice
Ha	hectares
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
JV	Joint Venture
km	kilometres
km²	square kilometres
m	metres
mm	millilitres
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MEC	Member of Executive Council
MFD	Mean Frost Days
MPRDA	Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NFA	National Forest Act, 1998 (Act No. 84 of 1998)
NPAES	National Protected Areas Expansion Strategy
NT	Near threatened
NWA	The National Water Act, 1998 (Act No. 36 of 1998)
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
RDL	Red Data List
RLE	Red List of Ecosystems
SABAP 2	Southern African Bird Atlas 2
SACAD	South Africa Conservation Areas Database
SACNASP	South African Council for Natural Scientific Professions

SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Area Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services (Pty) Ltd
SWSA	Strategic Water Source Area
TOPS	Threatened Or Protected Species
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VEGMAP	National Vegetation Map Project
VU	Vulnerable
WSAs	Water Source Areas

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the for the Jelani Joint Venture (JV) area underground mining project, Free State province (Figure 1 and 2).

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11 kilometres (km) northwest of Odendaalsrus, 2.5 km west of Allanridge, and 22 km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

1.1 Background Information and Project Description

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area (hereafter the "**study area**").

The proposed project will utilise existing underground access and infrastructure associated with the Harmony Target mining right. All required infrastructure will be confined to the existing mining right area, with no new surface infrastructure proposed within the focus area. Underground access will comprise refurbished facilities at existing Target shafts (Nos. 3, 4 and 5) or newly constructed infrastructure at Target Shaft No. 2, all located within the existing mining right. This report will only focus on the impact associated with the underground mining activities and not the activities taking place in the existing Harmony Target mining right area.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

1.2 Structure of the Biodiversity Report

Part A of this report served to introduce the study area, as well as the general approach to the study. Part A also presents the results of general desktop information reviewed as part of the study, including the information generated by the relevant authorities, as well as the context of the site in relation to the surrounding anthropogenic activities and ecological character.

Part B (to follow after the summer field verification) presents the results of the floral field assessment, data analyses and discussion of the results. Part B then presents the results of the impact assessment, where the impacts on floral ecology and biodiversity are discussed.

Part C (to follow after the summer field verification) presents the results of the faunal field assessment, data analyses and discussion of the results. Part C then presents the results of the impact assessment, where the impacts on faunal ecology and biodiversity are discussed.

1.3 Scope of Work

Specific outcomes in terms of Part A of the report are as follows:

- To update the desktop assessment using all relevant information as presented by the South African National Biodiversity Institute's (SANBI) Biodiversity Geographic Information Systems (BGIS) website (http://bgis.sanbi.org) and the Department of Forestry, Fisheries and the Environment (DFFE) Environmental Geographical Information Systems (E-GIS) website (https://egis.environment.gov.za/). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the study area;
- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix E);
- To outline the legislative requirements that were considered for the assessment (Section 1.5 and Appendix B of this report);
- To provide a Site Sensitivity Verification (Section 4) to outline the type of reporting requirements needed for specialist reports applicable to the Environmental Impact Assessment (EIA); and
- To provide the methodologies followed relating to the impact assessment (provided by the proponent) and development of the mitigation measures (Appendix C) that were applied in the floral and faunal assessments (Part B and Part C).

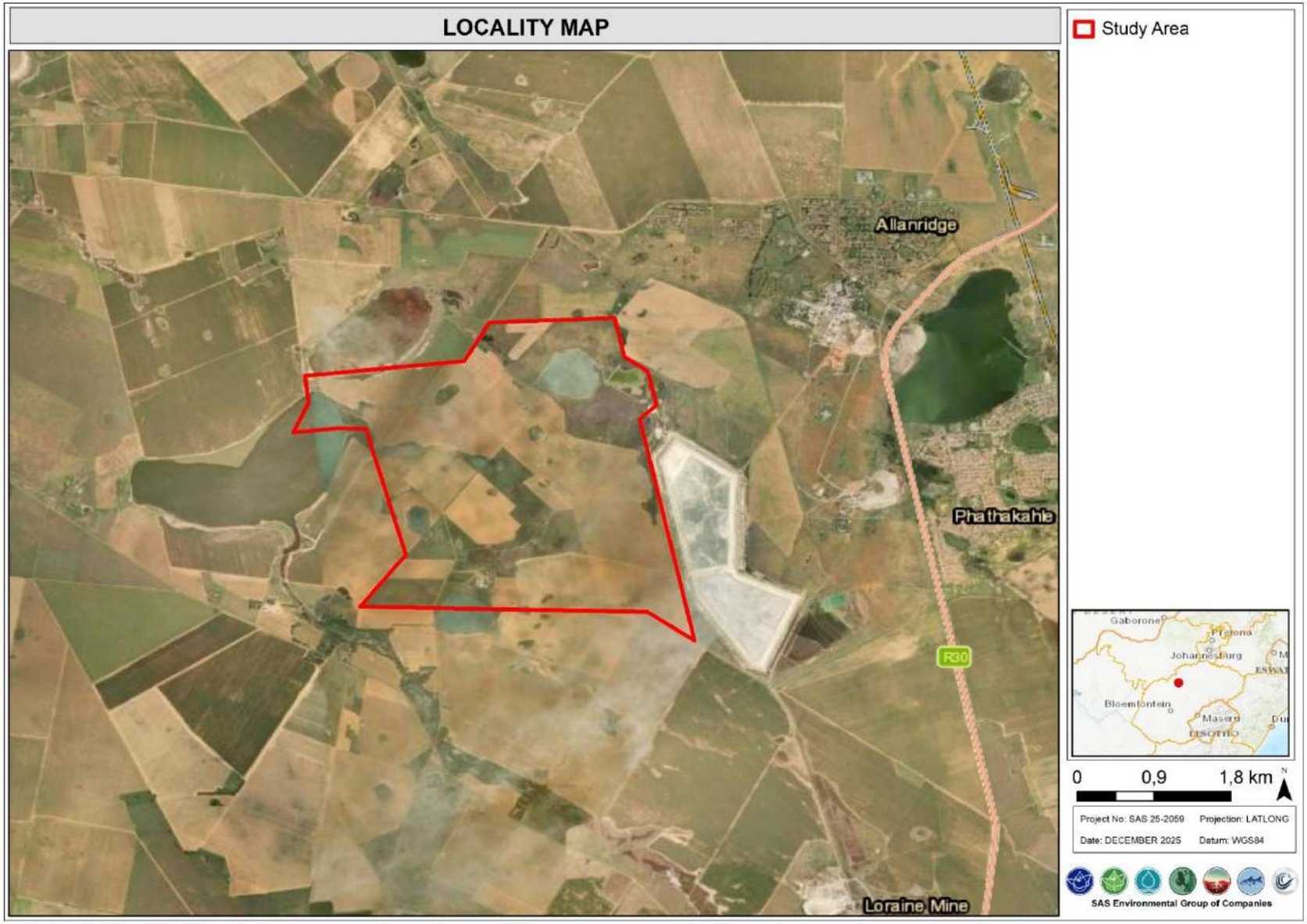


Figure 1. Digital satellite image depicting the study area within greater project area in relation to surrounding area.

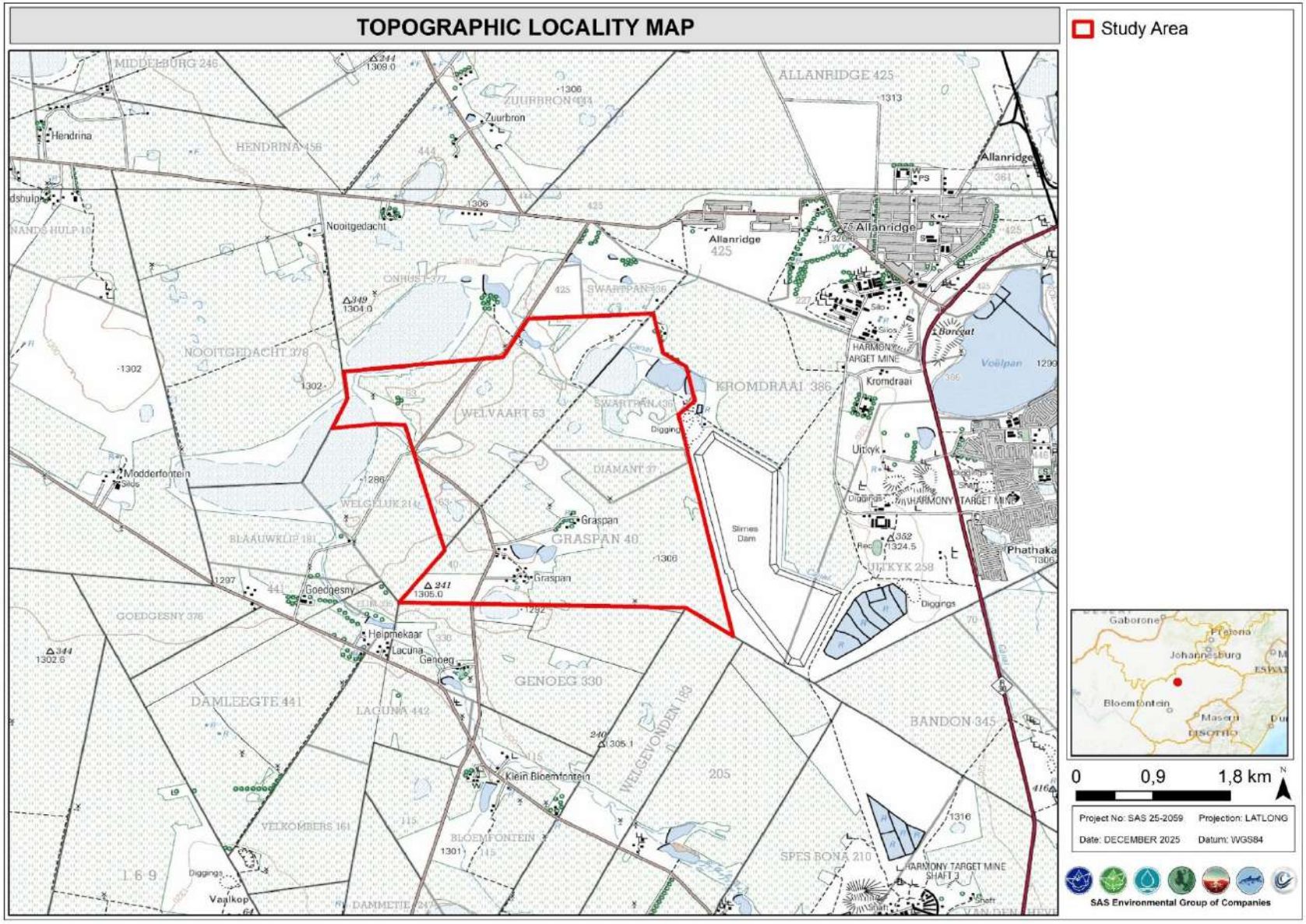


Figure 2. The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the adjacent properties, although ecological important or sensitive areas according to the desktop databases of surrounding areas and the greater project area have been included on the relevant maps;
- The DFFE Screening Tool (hereafter "screening tool") provides names of Sensitive Species likely to be present within the study area and its surrounds. Within the screening tool outcome, the names of some species are not provided. These species are rather assigned a number keeping them unidentifiable (e.g., Sensitive Species 1). This procedure is followed because of the vulnerability of the species to threats such as illegal harvesting and overexploitation. According to the best practice guidelines provided by the SANBI, the identity of Sensitive Species may not appear in the final EIA report nor any of the specialist reports released into the public domain. However, the conservation threat status of such species has been provided; and
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the assessed area's actual site characteristics at the scale required to inform more intricate planning, e.g., at the scale needed for an EA. Nevertheless, this information is useful as background information to the study and is important in legislative contextualisation of risk and impact and was used as a guideline to inform the biodiversity assessment (refer also to Parts B and C), and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified, ground-truthed information must carry more weight in the decision-making process.

1.5 Legislative Requirements

The following legal requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[3];
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);

[3] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996". It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.

- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
    - Government Notice (GN) number 2747: The Revised National List of Ecosystems that are Threatened and in need of Protection, published in Gazette No. 47526, dated 18 November 2022, as it relates to the NEMBA;
    - GN number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA;
    - Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020; and
    - GN number 30568: Threatened or Protected Species (TOPS) list dated 14 December 2007, as it relates to the NEMBA.
- The National Forest Act, 1998 (Act No. 84 of 1998, amended) (NFA);
    - GN 1935: List of Protected Tree Species as published in the Government Gazette 46094 dated 25 March 2022, as it relates to the NFA;
- The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA); and
- Government Gazette 45421 dated 10 May 2019 as it relates to the DFFE national environmental screening report required with an application for EA as identified in regulation 16(1)(v) of EIA Regulations:
    - For the Terrestrial Biodiversity Theme: GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020; and
    - For Animal and Plant Species Themes: GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Animal Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).
- The Free State Nature Conservation Ordinance, 1969 (Ordinance No. 8 of 1969) (FSNCO).

The details of each of the above, as they pertain to this study, are provided in Appendix B of this report.

2 ASSESSMENT APPROACH

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. Relevant databases and documentation that were considered during the assessment of the study area include[4]:

- National Protected Areas Expansion Strategy (NPAES) – 2018 database (DEA, 2018);
- The South African Conservation Areas Database, Quarter 2 (SACAD, 2025);
- The South African Protected Areas Database, Quarter 2 (SAPAD, 2025);
- Land Use Map of the Matjhabeng Local Municipality (Collins, N.B. 2018a);
- The Free State Biodiversity Plan (FSBP) Dataset of 2019 (Collins, N.B. 2018b);
- The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
    - 2024 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2024).
- The 2022 Red List of Ecosystems (RLE) for the terrestrial realm for South Africa (SANBI 2022a and 2022b). This database replaces the 2018 National Biodiversity Assessment (NBA) (SANBI, 2018a & 2018b) Terrestrial Assessment, which forms one of the base databases that the RLE database is generated upon;
- Key Biodiversity Areas (KBA) Key Biodiversity Areas (KBA). BirdLife International manages the KBA database on behalf of the KBA Partnership. Spatial data available for download here: https://www.keybiodiversityareas.org/request-gis-data;
- The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick et al., 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
- The Biosphere Reserves Dataset (Pool-Stanvliet and Coetzer, 2020);
- From the 2021 Strategic Water Source Areas (SWSA) project:
    - 2021 SWSA **Surface water** (Lötter & Le Maitre (2021) and Mpumalanga Tourism and Parks Agency (MTPA: 2021)).
- The International Union for Conservation of Nature (IUCN) list of threatened species (IUCN, 2022a and 2022b); and
- The Screening Tool (accessed 2025).

[4] Datasets obtained from:

- SANBI BGIS (2023). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2023; and
- Department of Environmental Affairs (DEA) Environmental Geographical Information Systems (E-GIS) website. URL: https://egis.environment.gov.za/

The field assessment (10th of December 2025) aimed to determine whether any changes had occurred in the ecological status of the study area and to ground-truth the findings of the desktop assessments.

3 RESULTS OF THE DESKTOP ANALYSIS

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Tables 1 and 2). The dashboard report aims to present concise summaries of the data on as few pages as possible, allowing for improved assimilation of results by the reader. Where required, further discussion and interpretation are provided.

Table 1: Summary of the biodiversity characteristics associated with the study area [Quarter Degree Squares (QDS) 2726DC]. Abbreviations are provided at the bottom of the table.

DETAILS OF THE STUDY AREA IN TERMS OF MUCINA & RUTHERFORD (2006) AND THE NATIONAL VEGETATION MAP PROJECT (SANBI, 2024) - ORIGINAL EXTENT OF MAPPED VEGETATION TYPE					
Biome	The study area is situated in the **Grassland Biome.**				
Bioregion	The study area is situated within the **Dry Highveld Grassland Bioregion.**				
Vegetation Type (Figure 3).	The study area is situated within the **Vaal-Vet Sandy Grassland** (Gh10) and **Western Free State Clay Grassland** (Gh9) vegetation types.				
DESCRIPTION OF EGOLI GRANITE GRASSLAND VEGETATION TYPE RELEVANT TO THE STUDY AREA (MUCINA & RUTHERFORD, 2006)					
VAAL-VAT SANDY GRASSLAND (GH 10)					
Distribution	**North-West and Free State Provinces:** South of Lichtenburg and Ventersdorp, stretching southwards to Klerksdorp, Leeudoringstad, Bothaville and to the Brandfort area north of Bloemfontein.				
Climate	Warm-temperate, summer-rainfall climate. High summer temperatures. Severe frost occurs in winter.				
	MAP* (mm)	**MAP* (mm)**	**MAP* (mm)**	**MAP* (mm)**	**MAP* (mm)**
	530	530	530	530	530
Altitude (metre; m)	1 220–1 560 m, but mostly 1 260–1 360 m.				
Conservation	**Endangered (EN).** Target 24%. Only 0.3% statutorily conserved in the Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves. More than 63% transformed for cultivation (ploughed for commercial crops), and the rest was under strong grazing pressure from cattle and sheep. Erosion is very low (85.3%) and low (11%).				
Geology & Soils	Aeolian and colluvial sand overlying sandstone, mudstone and shale of the Karoo Supergroup (mostly the Ecca Group), as well as older Ventersdorp Supergroup andesite and basement gneiss in the north. Soil forms are mostly Avalon, Westleigh and Clovelly.				
Vegetation & landscape features (refer also to Appendix D)	Plains-dominated landscape with some scattered, slightly irregular, undulating plains and hills. Mainly low-tussock grasslands with an abundant karroid element. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of *T. triandra* and the associated increase in *Elionurus muticus, Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall.				
WESTERN FREE STATE CLAY GRASSLAND (GH 9)					
Distribution	**Free State Province:** Region covering part of the western Bloemfontein District (south), Boshof (southwest), Hertzogville (west), Wesselsbron (north) and Brandfort (east).				
Climate	Seasonal rainfall is concentrated from November to March. Cool temperate regime and the occurrence of frost is frequent.				
	MAP* (mm)	**MAP* (mm)**	**MAP* (mm)**	**MAP* (mm)**	**MAP* (mm)**
	451	451	451	451	451
Altitude (m)	1 200–1 420 m.				
Conservation	**Least threatened.** Target 24%. None is conserved in statutory conservation areas. Almost 20% already been transformed for maize and wheat cultivation. A species of *Prosopis* appears as an occasional invasive alien. Erosion is very low (38%), low (30%) and moderate (28%).				
Geology & Soils	Deposits of sandstone, mudstone and shale (Volksrust Formation, Ecca Group) underlie extensive areas of flat to undulating plains, interrupted by dolerite sills in places. No rivers or streams drain away from these plains, and all the water drains into the numerous playas (pans)—a unique feature of this landscape. Dry, clayey, duplex soils.				

Vegetation & landscape features (refer also to Appendix D)	Restricted to flat bottomlands which support dry, species-poor grassland with a high number of salt pans (playas) embedded. Dwarf karoo shrublands surround the playas in disturbed habitats. **Remark:** The vegetation of the salt pans embedded within this grassland unit is treated as a separate vegetation unit; AZi 10 Highveld Salt Pans.
CONSERVATION DETAILS PERTAINING TO THE STUDY AREA (VARIOUS DATABASES) – FIGURE 4	
2022 RLE	According to the RLE dataset (2022), the study area) is situated within the remaining extents of the **Least Concern (LC) Western Free State Clay Grassland** and the **EN Vaal-Vet Sandy Grassland.** The Vaal-Vet Sandy Grassland is under Trigger Sub-Criteria: A3 - National land cover data show that the Vaal-Vet Sandy Grassland has experienced extensive spatial declines of approximately 72 % since 1750 (https://bgis.sanbi.org/Ecosystems/home/Detail/114) (Government of South Africa, 2022). The RLE dataset further indicates that both ecosystems are endemic to South Africa. The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The revised list (known as the RLE 2022) is based on assessments that followed the IUCN RLE framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 critically endangered (CR), 51 EN and 14 vulnerable (VU) types). Following a series of consultations with conservation authorities and the public in 2020/21, the revised list of terrestrial ecosystems that are threatened and in need of protection was approved by the minister for implementation in August 2022. The revised list was published in the government gazette (gazette number 47526, notice number 2747) and came into effect on 18 November 2022.
2018 NBA	The NBA lists the Western Free State Clay Grassland as **Poorly Protected**, and the Vaal-Vet Sandy Grassland as **Not Protected**. **DEFINITION:** Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the NEMPAA.
NATIONAL PROTECTED AND CONSERVATION AREAS ASSOCIATED WITH THE STUDY AREA	
THE NPAES (2018), SACAD (2025, Q2), SAPAD (2025, Q2), BIODIVERSITY RESERVE ZONES (2024), SWSA (2021), THE IBA (2015) AND THE KBA (2024) DATABASES WERE CHECKED TO DETERMINE IF ANY PROTECTED AND/OR CONSERVATION AREAS ARE LOCATED WITHIN 10 KM OF THE STUDY AREA.	
SAPAD (2025, Q2)[5], SACAD (2025, Q2)[6], & NPAES (2018)	According to the SAPAD (2025_Q2), no protected areas are located within the study area, nor within 10 km of the study area. According to the SACAD (2025_Q2), no conservation areas are located within the study area, nor within a 10 km radius of the study area. According to the NPAES database (2018), the study area is not located within a Protected Area, a Priority Focus Area, or an Area Under Negotiation.
BIODIVERSITY RESERVE ZONES (BRZ) (2024)	The database indicates that the study area is not within a BRZ, or within 10 km thereof.

[5] **SAPAD (2025):** The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act No. 57 of 2003) (NEMPAA). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the "System of Protected Areas", which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention.

[6] **SACAD (2025):** The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.

	A biosphere reserve is an area of terrestrial, coastal, or marine ecosystems recognised by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to promote a balanced relationship between people and nature. These zones aim to conserve biological diversity and promote sustainable development by integrating conservation, research, education, and sustainable use of resources.
IBA (2015)	According to the IBA Database, the study area is not associated with any IBAs, nor within a 10 km radius of any IBAs.
KBA (2024)	The study area is not located within a KBA or within 10 km of a KBA. While KBAs represent a broader, multi-taxa framework that builds on the former IBA network, IBAs have not been formally replaced. BirdLife South Africa, together with the KBA National Coordination Group, is in a ten-year transition phase where IBAs are being assessed to determine which qualify as KBAs. The IBA network will therefore remain the main reference for bird conservation, while KBAs serve as the wider framework for identifying sites important for conserving all biodiversity.
FREE STATE BIODIVERSITY PLAN (FSBP) DATASET (2019) – FIGURE 5	
Critical Biodiversity Area (CBA)	The northeastern corner of the study area is identified as CBA 1, along with a central portion of the study area (associated with a large depression wetland). CBA 1 are sites that are irreplaceable or near irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the site. Such sites are therefore critical, and they need to be maintained to ensure that future targets are achieved and that such features persist (Collins, N.B. 2018b). CBA 2 are sites that have been selected based on their complementarity for meeting biodiversity targets. CBA Optimal sites are therefore important, but their maintenance is not critical to ensure that feature targets are achieved and that such features persist (Collins, N.B. 2018b).
Ecological Support Area (ESA)	A patch in the southern portion of the study area and a section of the study area in the west are indicated as ESA 1, while the majority of the study area is identified as ESA 2. ESAs are areas that play an important role in supporting the ecological functioning of a protected area or CBA, or in delivering ecosystem services. In most cases, ESAs are currently in at least fair ecological condition and should remain in at least fair functioning condition. ESA 1 are sites with minimal degradation. ESA 2 are sites with degradation, i.e., they can be totally degraded but not totally transformed.
Other Areas (or Other Natural Areas)	No sections of the study area are identified as “Other Natural Areas”. Areas identified as “Other Areas” account for approximately 16% of the province's land area. These are areas of natural habitat that are not required to meet biodiversity targets for ecosystem types, species or ecological processes, i.e., natural areas not selected as CBAs or (ESAs.
Degraded Areas (No Natural Remaining)	A section in the southeastern portion of the study area corresponding to large agricultural areas and mining areas is identified as “Degraded Areas”. Areas classified as degraded are considered to no longer represent functioning ecosystems with intact or near-intact ecological and evolutionary processes. These areas are not in climax condition due to factors other than physical disturbance. Degraded Areas account for approximately 18% of the province’s land area.
LAND USE MAP OF THE MATJHABENG LOCAL MUNICIPALITY (2018) – FIGURE 6	
Cultivation	The majority of the study area’s farms and agricultural areas are located in areas that are considered to be cultivated. These areas mostly correspond to the ESA 2 and Degraded areas identified by the FSBP (2019).
Natural	The smaller pan-depressions and their adjacent areas are identified as natural areas; these areas correspond to areas identified as CBAs and ESAs by the FSBP (2019).

Urban Built-Up	There are no areas within the study area classified as urban built-up.
Waterbodies	The pan-depressions in the northeast, northwest and south and one dam in the northeast are classified as waterbodies, and these largely correspond to ESA 1 and 2 by the FSBP (2019).
Mine	A portion of the study area in the northeast is indicated as a Mining area.
SWSA FOR SURFACE WATER (Lötter and Le Maitre, 2021; MTPA, 2021)	
Surface water SWSAs are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.	
Name & Criteria	study area is not located within a surface water SWSA, nor within a 10 km radius of a surface water SWSA.
MINING AND BIODIVERSITY GUIDELINES (2012) – FIGURE 7	
Highest Biodiversity Importance	The study area in the northern sections is classified as areas of Highest Biodiversity Importance from a mine planning perspective. **Risk for mining:** Highest risk for mining. **Implications for mining:** Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features and provide a site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision-making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. An environmental impact assessment should include the strategic assessment of optimum, sustainable land use for a particular area will determine the significance of the impact on biodiversity. This assessment should fully take into account the environmental sensitivity of the area, the overall environmental and socio-economic costs and benefits of mining, as well as the potential strategic importance of the minerals to the country. Authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into licence agreements and/or authorisations.

BRZ = Biosphere Reserve Zones; CBA = Critical Biodiversity Areas; EN = Endangered, ESA = Ecological Support Area, FSBP = Free State Biodiversity Plan; IBA = Important Bird Area; KBA = Key Biodiversity Areas; LC = Least Concern, MAP = Mean annual precipitation; MAPE = Mean annual potential evaporation; MASMS = Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); MAT = Mean annual temperature; MFD = Mean Frost Days; MM = Millimeters; NBA = National Biodiversity Assessment; NEMA = National Environmental Management Act, NPAES = National Protected Areas Expansion Strategy; RLE = Red List of Ecosystems., SACAD = South African Conservation Areas Database; SAPAD = South African Protected Areas Database; SWSA = Strategic Water Source Area; UNESCO = United Nations Educational, Scientific and Cultural Organization and WSA = Water Source Areas .

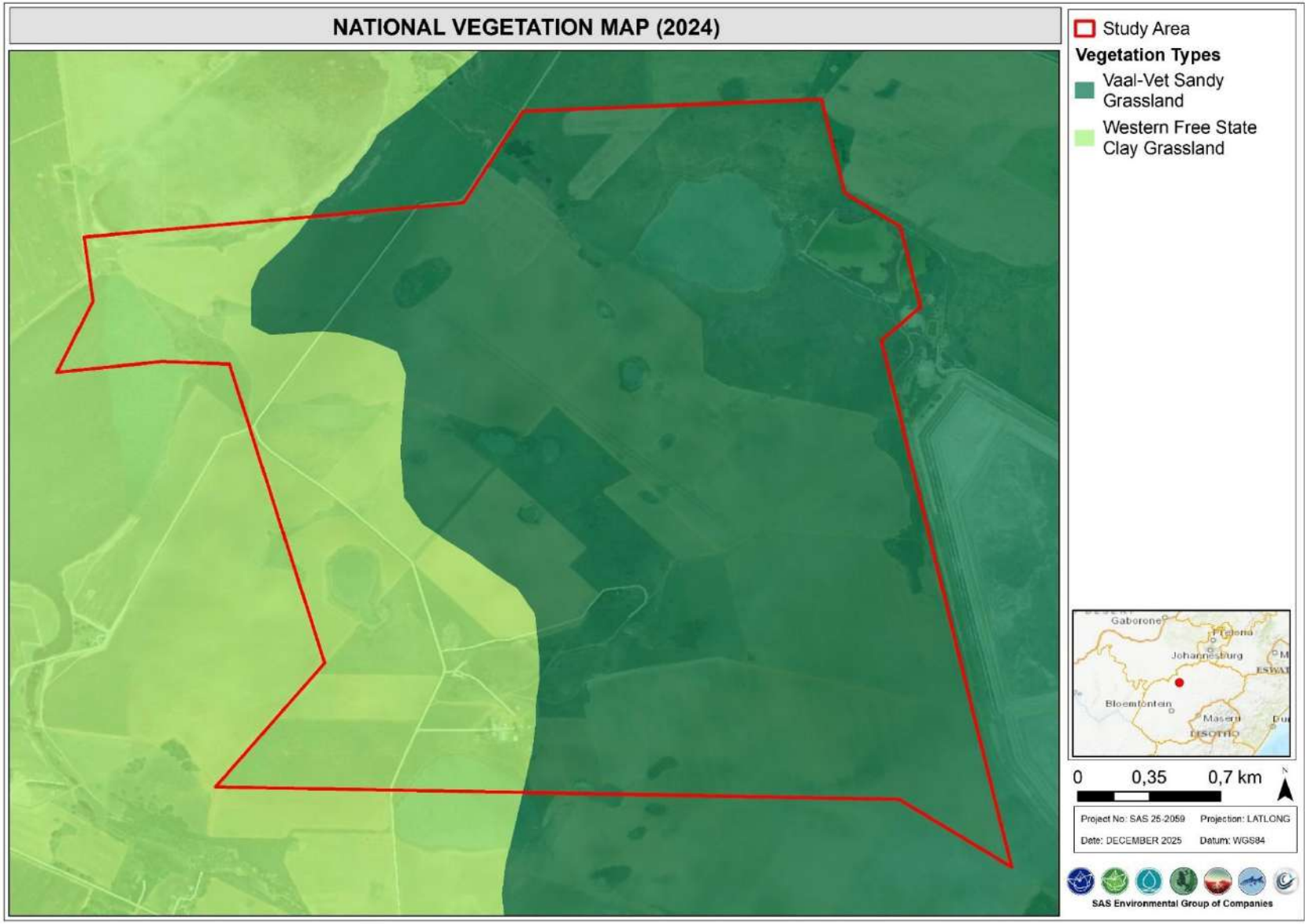


Figure 3: Vegetation Types associated with the study area as per the National Vegetation Map (SANBI, 2024).

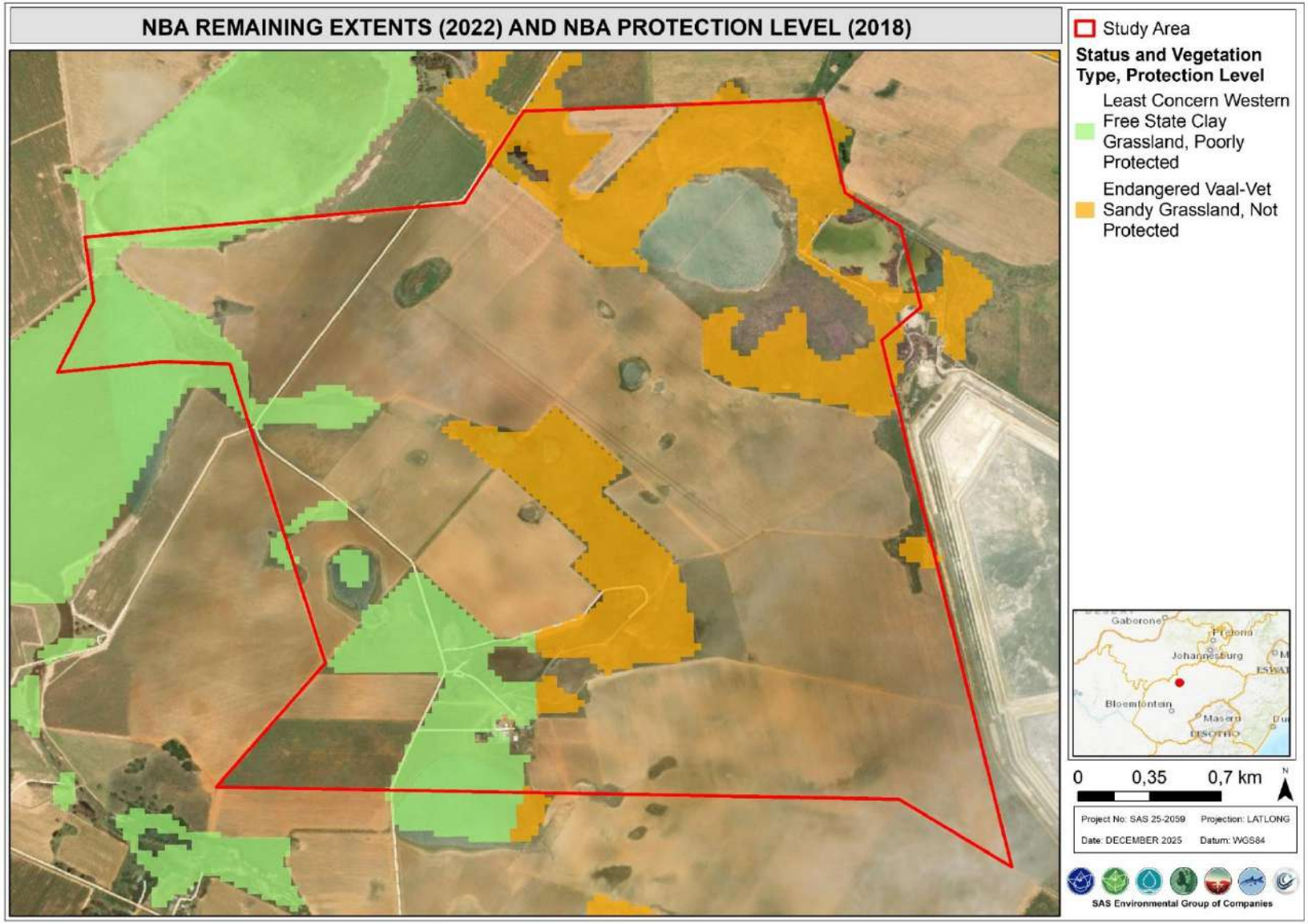


Figure 4: The study area in relation to the remaining extent of threatened ecosystems as per the RLE (SANBI, 2022a, 2022b) and the associated protection level (NBA, 2018).

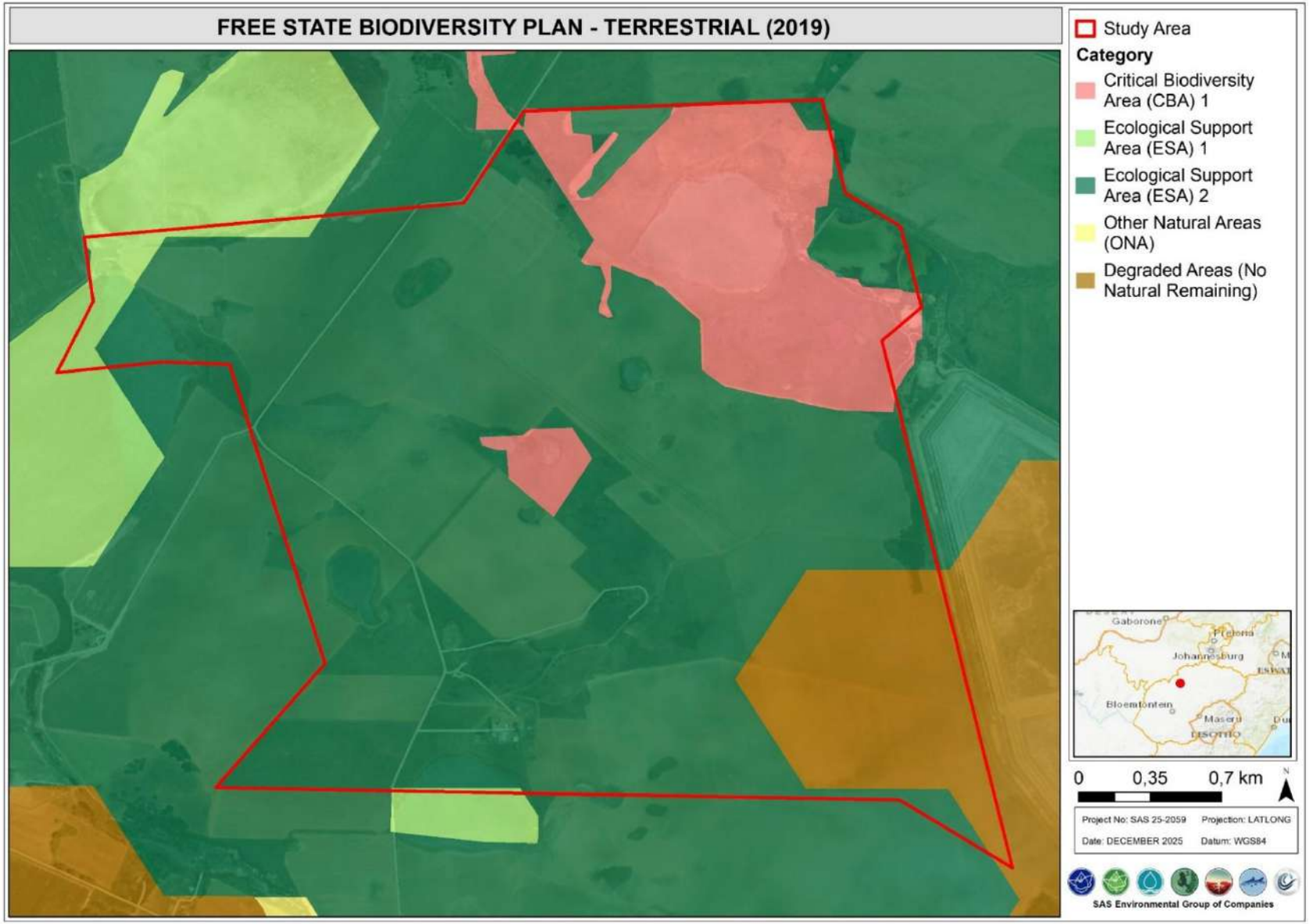


Figure 5: The important biodiversity areas (e.g., CBAs) in relation to the study area, according to the Free State Biodiversity Plan (2019).

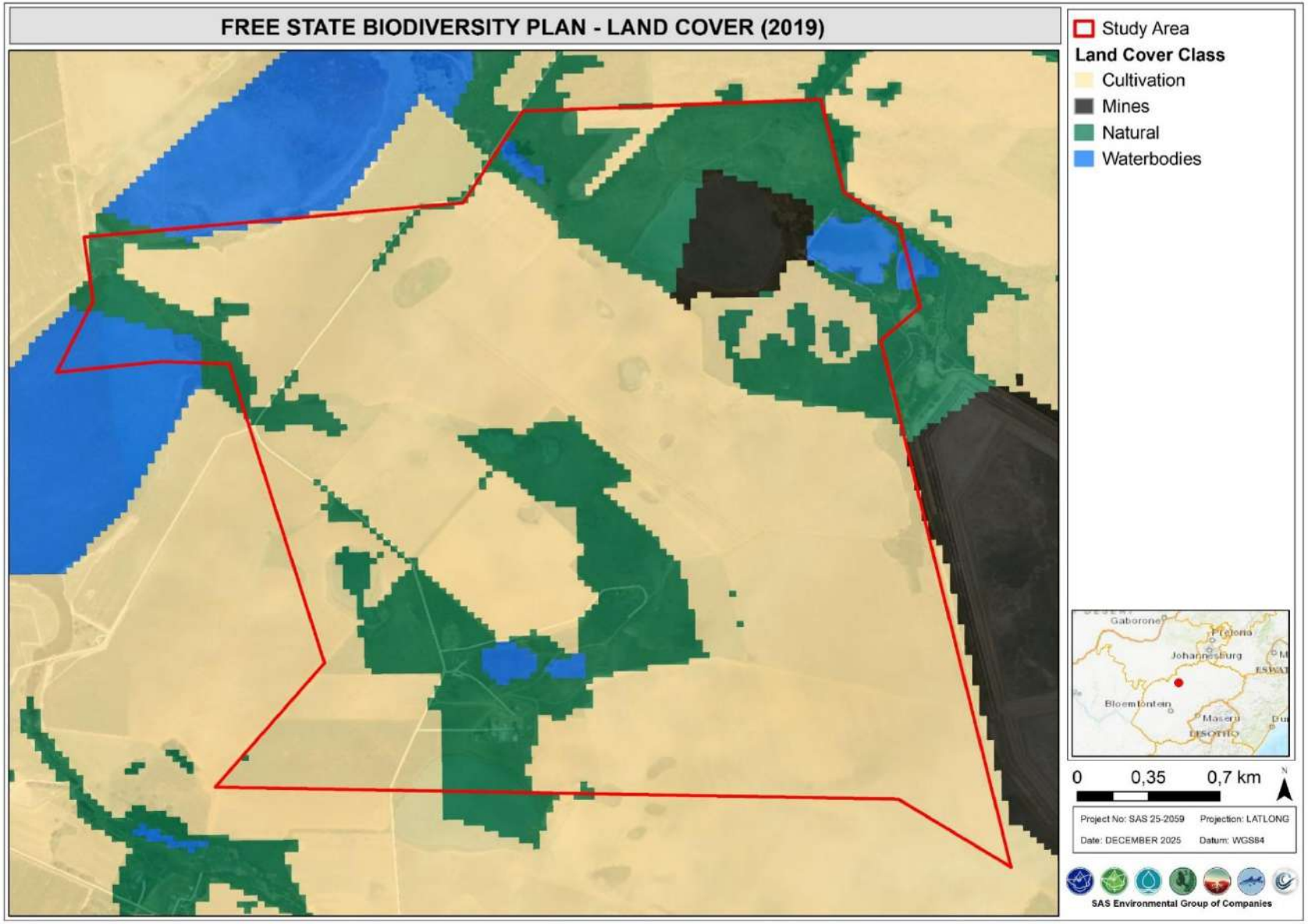


Figure 6: Land use map of the Matjhabeng local municipality (2018).

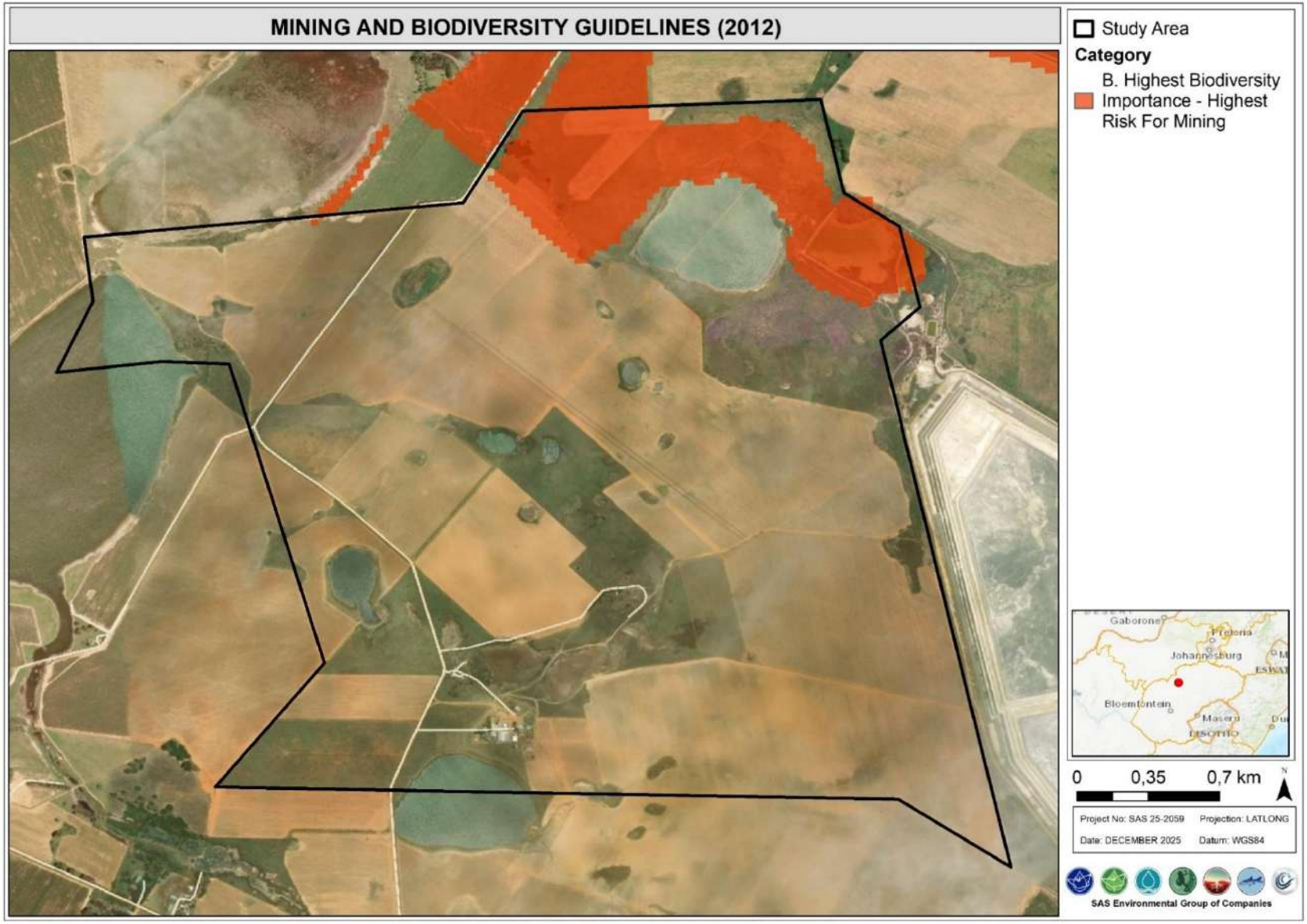


Figure 7: Biodiversity Importance based on the Mining Guidelines dataset (2012).

4 SITE SENSITIVITY VERIFICATION

According to the "Protocols for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes ("the Protocols") published in Government Gazette No. 43110 on 20 March 2020 and Government Gazette No. 43855 on 30 October 2020, the Environmental Assessment Practitioner (EAP) must verify the current use of the site in question and its environmental sensitivity as identified by the screening tool to determine the need for specialist inputs concerning the themes included in the Protocols. The Protocols are allowed for in terms of Sections 24(5)(a) and (h) and 44 of the NEMA. The Protocols must be complied with for every new EA application that is submitted after 9 May 2020. The screening tool identifies species and ecosystem spatial triggers likely to indicate environmental sensitivity associated with a particular proposed development site, which in turn **determines the necessity and requirements for specialist studies**. The screening tool evaluates 'environmental sensitivity' at a **larger scale** than that of a proposed development site and frequently includes modelled data that require **field verification/ ground-truthing**. As such, the initial site sensitivity verification is required to verify the screening tool outcomes, and such verified sensitivities are used to inform the minimum reporting requirements for the Plant Species, Animal Species, and Terrestrial Biodiversity Specialist Assessment Reports. The outcome of the screening tool is presented in Table 2.

Table 2: Screening Tool outcomes for the study area.

The Screening Tool is intended to allow for the pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. The different sensitivity ratings of the Plant [and Animal] Protocols are described below: ➢ Very High: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 square kilometres (km^2) are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under CR, EN, or VU D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitats have been manually mapped at a fine scale. ➢ High: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. ➢ Medium: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. ➢ Low: Areas where no threatened species are known or expected to occur.	
Animal Species Theme (Figure 8)	For the animal species theme, the study area occurs within **medium sensitivity** area; however, the majority of the study area is indicated as **low Sensitivity.** The triggered species for the medium sensitivity include: **Medium Sensitivity:** ➢ Aves: *Sterna caspia* (Caspian Tern, VU); and ➢ Mammalia**:** *Hydrictis maculicollis* (Spotted-Necked Otter, VU).
Plant Species Theme (Figure 9)	For the plant species theme, the entire study area occurs within a **low sensitivity** area.
Terrestrial Biodiversity Theme (Figure 10)	For the terrestrial biodiversity theme, the entire study area occurs within a **Very High sensitivity** area. The triggered features for the very high sensitivity include: ➢ CBA 1, ESA 1, and ESA 2 as indicated by the FBSP (2019); and ➢ The EN Vaal-Vet Sandy Grassland.

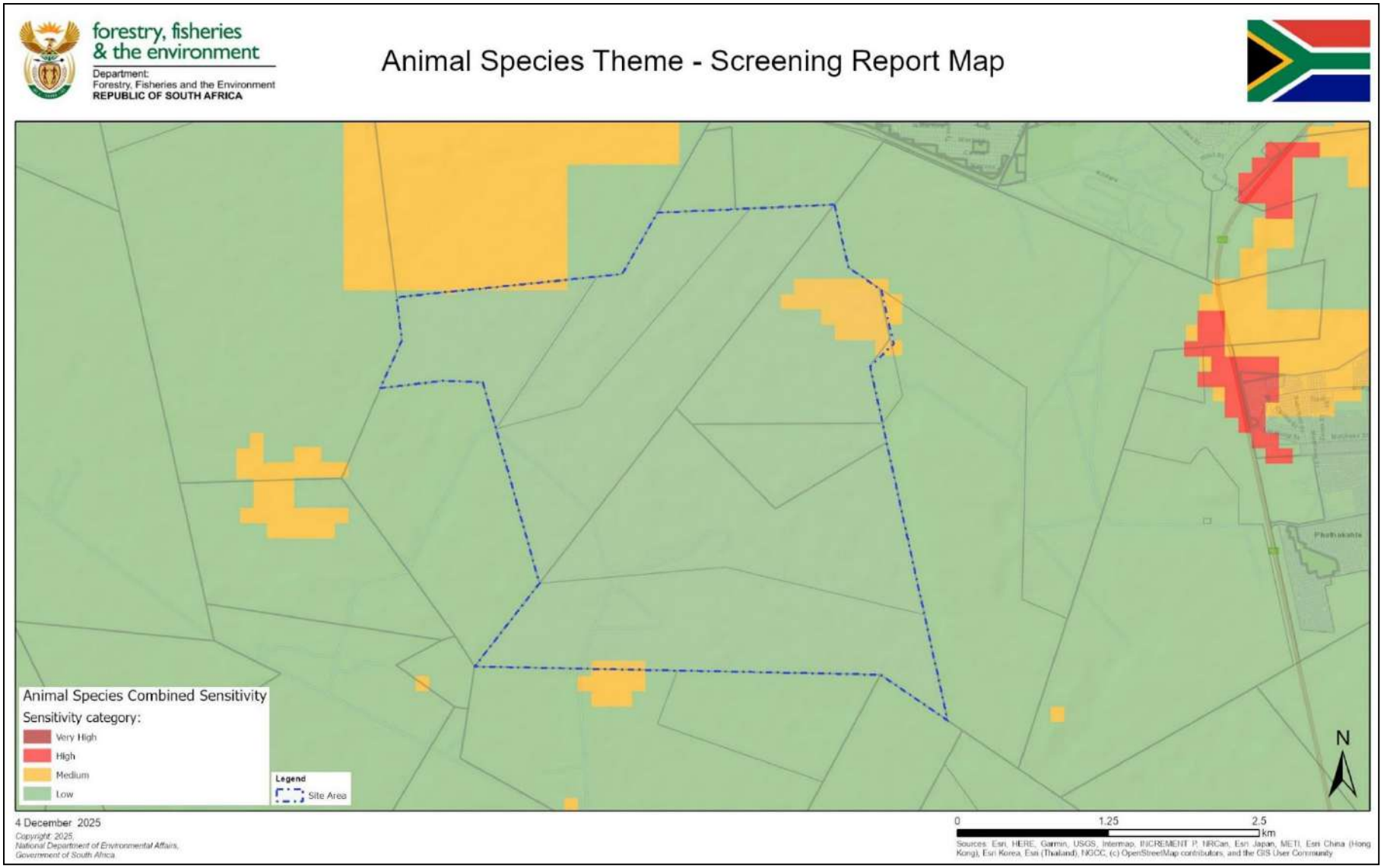


Figure 8: Animal Species Theme sensitivity for the study area as obtained from the screening tool (accessed 2025).

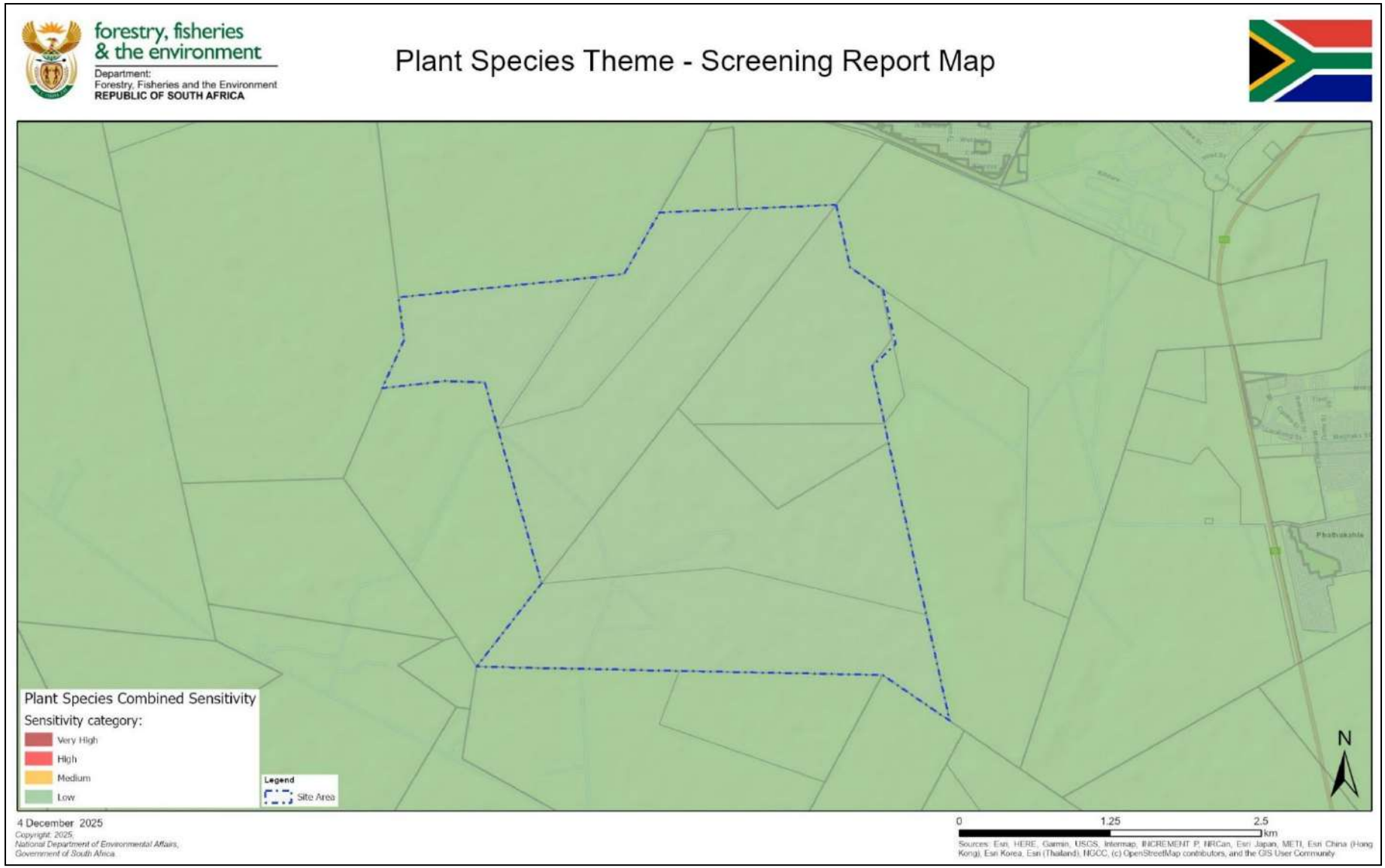


Figure 9: Plant Species Theme sensitivity for the study area as obtained from the screening tool (accessed 2025).

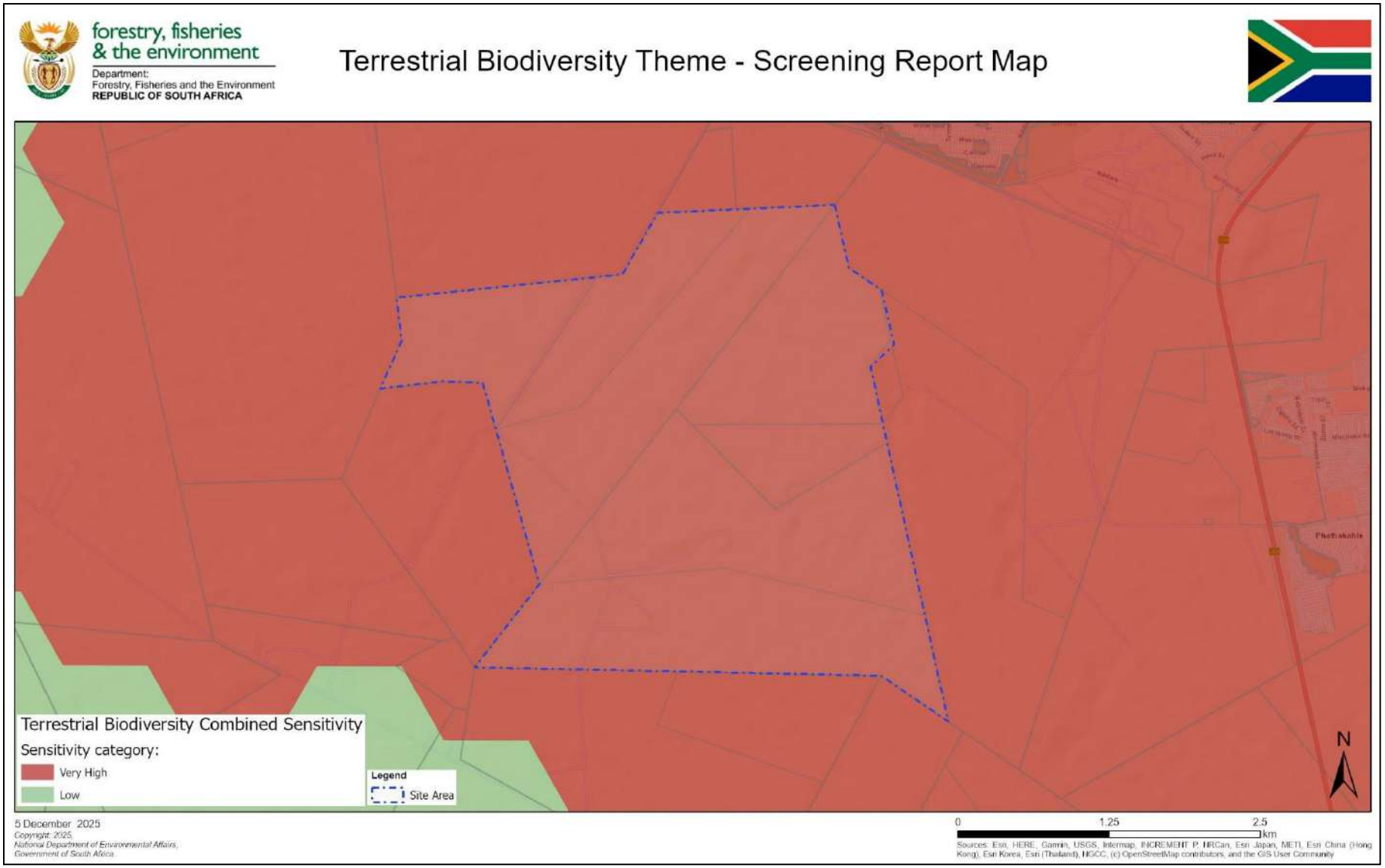


Figure 10: Terrestrial Biodiversity Theme sensitivity for the study area as obtained from the screening tool (accessed 2025).

The site sensitivity verification took place on the 10th of December 2025. A South African Council for Natural Scientific Professions (SACNASP) registered consultant ground-truthed the terrestrial biodiversity aspects (i.e., faunal, floral and terrestrial), and the surveys were restricted to the study area.

The study area consists of several habitats, which have been impacted in various degrees through historic and current anthropogenic activities (especially agriculture). The largest habitat unit within the study area consisted cultivated fields and built-up areas (Figure 9). These transformed areas are of low plant and terrestrial importance with no significant floral assemblages and ecosystems functionality. The remaining natural areas are made up of various freshwater ecosystems (that are classified as true watercourses[7] as per National Water Act 1998 (Act No. 36 of 1998) (NWA) based on freshwater report - SAS 25 – 1090 (2026)), secondary grasslands and a moderate portion of primary threatened grasslands (EN Vaal Vet Sandy Grassland) (Figure 10). The study area did have a high abundance and diversity of Alien and Invasive Plant (AIP) species, especially within the freshwater ecosystems and secondary grasslands that are very closely associated with agricultural activities (the primary grasslands had a very low abundance and diversity of AIPs).

The vegetation cover of the Grasslands Habitat may provide refuge for a number of faunal species, such as small mammals, which in turn could attract several predatory herpetofauna and avifauna, as well as house an abundance of pollinating invertebrate species. Good grazing is provided within this habitat, and this will likely support SCC as well as a great diversity and abundance of faunal species, particularly invertebrates. The Modified Grassland habitat has a more heterogeneous vegetation layer that offers a variety of possible host plants, as well as foraging and nesting opportunities. Species that are adapted to disturbance and that can utilise increased transformed landscapes, such as reptiles and smaller-bodied mammals, are more likely to be found in the Transformed Habitat; especially species which can utilise the food resources in the cultivated areas when crops are producing. The combination of open water, dense wetland vegetation, and elevated moisture levels in the Freshwater Habitat supports amphibians, invertebrates, and wetland-associated vertebrates, contributing to the overall faunal importance of these habitats within the study area. Several SCC were recorded utilising these wetlands, primarily for foraging and refuge. The availability of standing water within an otherwise transformed landscape attracts a wide range of water-

[7] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:1) a river or spring, 2) a natural channel which water flows regularly or intermittently, 3) a wetland, dam, or lake into which, or from which, water flows, and 4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. Reference to a watercourse includes, where relevant, its bed and banks.

associated fauna, making these impoundments focal points for feeding and temporary habitat use

The medium screening tool animal species sensitivity (Figure 8) is triggered by *Hydroprogne caspia* (Caspian Tern, VU) and *Hydrictis maculicollis* (Spotted-necked Otter, VU) which both have a verified medium POC as they may be found in the study area but are unlikely to permanently depend on it due to historic and current anthropogenic impacts. In some areas of the study area the low sensitivity is disputed and a medium sensitivity verified instead. In the remaining areas the low sensitivity is verified.

During the site visit, eight (8) faunal SCC were observed within the study area; namely the *Anas undulata* (Yellow-billed Duck, NT), *Anhinga rufa* (African Darter, NT), *Mycteria ibis* (Yellow-billed Stork, VU), *Spatula smithii* (Cape Shoveler, NT), *Podiceps cristatus* (Great Crested Grebe, VU), *Phoenicopterus roseus* (Greater Flamingo, NT), *Anas erythrorhyncha* (Red-billed Teal, NT), *Sarkidiornis melanotos* (Knob-billed Duck, NT). Six (6) other SCC have a high POC for the study area, whilst five (5) faunal SCCs have a medium POC.



Figure 11: Example of transformed areas that are being utilised for cultivation within the study area.



Figure 12: Remaining natural habitat areas within the study area comprising of grasslands and various freshwater ecosystems.

The table below presents the site-verified results for the study area compared with the screening tool outcomes. It also indicates the required minimum reporting protocols.

Table 3: Specialist comparison with the screening tool sensitivity rating and professional rating. The table further provides the specialist's recommendation for biodiversity reporting.

Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
Animal Species Theme	**Medium**	There were medium and low-sensitivity areas for the Animal Species, with the low areas covering large parts of the study area (Figure 8). No triggered faunal SCC were observed in the study area. Although there is a confirmed presence of other SCC in the study area, there remains a medium probability of occurrence of the Screening tool species *Hydroprogne caspia* (Caspian Tern, VU) and *Hydrictis maculicollis* (Spotted-necked Otter, VU) due to historic and current anthropogenic impacts affecting theses specific species. In some parts of the study area the low sensitivity is disputed, due to the occurrence of suitable habitat for triggered SCC, and a medium sensitivity verified instead. In the remaining areas the low sensitivity is verified.	**Medium**	Animal Species Specialist Assessment	GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).
	Low		**Medium**		
			Low		

Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
Plant Species Theme	**Low**	The screening tool identified the study area to be of low plant sensitivity. No threatened plant species were observed during the site visit, and none are anticipated to occur within the study area. Based on the historic and current impacts associated with cultivation the likelihood of floral SCC being present within the study area is highly unlikely. While the study area does consist of other secondary and primary vegetation no additional threatened floral SCC are anticipated to occur within the area (based on background review and general habitat conditions).	**Low**	Plant Species Compliance Statement	GN 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species as published in Government Gazette 43855 dated 30 October 2020 (as amended in GN 3717 of 2023).
Terrestrial Biodiversity Theme	**Very High**	The terrestrial biodiversity theme is considered to be of very high sensitivity area. The triggered features for the very high sensitivity include CBA 1, ESA 1, ESA 2 (as indicated by the FBSP (2019)) and presence of EN Vaal-Vet Sandy Grassland. The presence of threatened ecosystems was confirmed for the study area, given the confirmed presence of EN Vaal-Vet Sandy Grassland. As such, the very high sensitivity as triggered for the study area was confirmed. Furthermore, the presence of CBA 1 is associated with the EN Vaal-Vet Sandy Grassland and is therefore also confirmed. Large portions of the study area is represented by ESA 1 and ESA 2 (based on desktop information). The remaining portions of secondary grasslands and freshwater systems do represent functioning ESA 1 and ESA 2	**Very High**	Terrestrial Biodiversity Specialist Assessment	GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020

Theme	DFFE Screening Sensitivity	Comments	Specialist Proposed Sensitivity	Proposed Assessment	Applicable Legislation
		habitat which further contributed to the very high terrestrial biodiversity sensitivity.			
	Very High	Large areas (central) of the study area is identified as ESA 2 habitat. However, the study area has been heavily impacted by cultivation (across large portions of the study area) that are currently utilised as cultivated areas. Therefore, large portion of the study area (that are transformed) are no longer considered to be ecologically functional and therefore the presence of ESA 2 is disputed in these areas.	**Low**	Terrestrial Biodiversity Specialist Assessment- If one is of the study area is identified as very high that applies to the whole study area.	GN 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 March 2020

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APPENDIX A: Indemnity and Terms of Use of this Report

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and STS (Pty) Ltd. and its staff reserve the right to, at their sole discretion, modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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APPENDIX B: Legislative Requirements

THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of Section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with Section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.

THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed and environmental authorisation obtained. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the anticipated impacts.

THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) (NEMBA)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

a) A specimen of a listed threatened or protected species;
b) Specimens of an alien species; or
c) A specimen of a listed invasive species without a permit.

GOVERNMENT NOTICE NUMBER R.1020: ALIEN AND INVASIVE SPECIES REGULATIONS, 2020 (IN GOVERNMENT GAZETTE 43735), INCLUDING GOVERNMENT NOTICE NUMBER 1003: ALIEN AND INVASIVE SPECIES LISTS, 2020 (IN GOVERNMENT GAZETTE 43726) AS IT RELATES TO THE NEMBA

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aims to:

- Prevent the unauthorized introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and
- Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004) as:

(a) A species that is not an indigenous species; or
(b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Categories according to NEMBA (Alien and Invasive Species Regulations, 2020):

- **Category 1a:** Invasive species that require compulsory control;
- **Category 1b:** Invasive species that require control by means of an invasive species management programme;
- **Category 2:** Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and
- **Category 3:** Ornamentally used plants that may no longer be planted.

NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT NO. 57 OF 2003) AS AMENDED[8] (NEMPAA)

The objective of this act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; for the continued existence, governance and functions of South African National Parks; and for matters in connection thereof.

[8] Amendments to the NEMPAA:

- National Environmental Management: Protected Areas Amendment Act 31 of 2004 – Gazette No. 27274, No. 131. Commencement date: 1 November 2005 [Proc. No. R. 58, Gazette No, 28123]
- National Environment Laws Amendment Act 14 of 2009 – Gazette No.32267, No. 617. Commencement date: 18 September 2009 [Proc. 65, Gazette No. 32580]
- National Environmental Management: Protected Areas Amendment Act 15 of 2009 – Gazette No. 32660, No. 748. Commencement date: 23 October 2009 – except for sections 1 and 8 [Proc. No. 69, Gazette No. 32660]
- Schedule 2 amended by Government Notice R236 in Government Gazette 36295 dated 27 March 2013. Commencement date: 1 April 2013 of sections 1 and 8 (relating to Schedule 2) of the National Environmental Management Protected Areas Amendment Act, 15 of 2009 [Proc. No. 7, Gazette No. 36296]
- National Environmental Management: Protected Areas Amendment Act 21 of 2014 - Government Notice 445 in Government Gazette 37710 dated 2 June 2014. Commencement date: 2 June 2014.
- Schedule 2 amendment by General Notice 2 of 2016 in Government Gazette 39728 dated 25 February 2016. Commencement date: 25 February 2016.

THE CONSERVATION OF AGRICULTURAL RESOURCES ACT, 1983 (ACT NO. 43 OF 1983) (CARA)

Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of AIP and weed species should take place throughout the construction and operation, phases in line with an approved AIP Management Plan.

SPECIALLY PROTECTED AND PROTECTED SPECIES

Species that are deemed important from a provincial biodiversity perspective include, e.g., species listed in the Free State Nature Conservation Ordinance 1969 (No. 8 of 1969) (FSNCO) includes provincially protected plants under Schedule 6 (Protected Plants). Permits for removing, harming, or destroying species on the FSNCO list will require permits from the authorising governmental institution.

NATIONAL WATER ACT OF SOUTH AFRICA (ACT NO. 36 OF 1998).

The National Water Act of South Africa (1998) is the main law governing how water is managed and protected in South Africa. It declares that water is a national resource owned by the state, to be managed for the benefit of all people. The Act prioritizes basic human needs and environmental protection, requires licenses for most water use, promotes equitable access, and aims for sustainable, efficient, and integrated water management to address past inequalities and ensure long-term water security.

APPENDIX C: Proponent's Impact Assessment Methodology

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.
The impact significance rating system is presented in Table ,

Step ***2: Determining Consequence Rating***

Rate consequence based on definition of magnitude, spatial extent and duration.

Table, and

Step *3: Determining Significance Ratin*

Rate significance based on consequence and probability.
Table and involves three parts:

1. **Step 1**: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;
2. **Step 2**: Use the matrix to determine a rating for impact consequence based on the definitions identified in Step 1; and
3. **Step 3**: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Step 2**) and the probability of occurrence.

Please make use of the excel spreadsheet attached to this docket to do the impact calculations.

Step 1: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequence in Part B.

Table C1: Consequence Rating Methodology

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Step 2: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration.

Table C2: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
Magnitude					
Minor	**DURATION**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**DURATION**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**DURATION**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Step 3: Determining Significance Ratin

Rate significance based on consequence and probability.

Table C3: Significance Rating Methodology

Probability (of Exposure to Impacts)	**Consequence Negative**			**Consequence Positive**		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

Impact Tables

Please use the table below to rank impacts and propose mitigation measures.

Table C4: Typical tables used to identify and classify the significance of identified impacts

NATURE OF THE IMPACT: ***DESCRIBE THE IMPACT IN RESPECT TO THE ACTIVITY TO BE UNDERTAKEN***		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: *(positive or negative)*		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		
Calculated Significance Rating *(Low, Medium, High)*		
Reversibility: *(Reversible or Irreversible)*		
Irreplaceable loss of resources: *(Yes or No)*		
Can impacts be enhanced: *(Yes or No)*		
Residual impacts ❖ (List these below)		
Mitigation measures ❖ (List these below)		

Cumulative Impact

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Table C5: Typical table used to identify and classify the significance of identified <u>cumulative</u> impacts

NATURE OF THE CUMULATIVE IMPACT: ***DESCRIBE THE IMPACT IN RESPECT TO THE ACTIVITY TO BE UNDERTAKEN***		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status: *(positive or negative)*		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		
Calculated Significance Rating *(Low, Medium, High)*		
Reversibility: *(Reversible or Irreversible)*		
Irreplaceable loss of resources: *(Yes or No)*		
Can impacts be enhanced: *(Yes or No)*		
Residual impacts ❖ (List these below)		
Mitigation measures ❖ (List these below)		

Mitigation

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy (Figure D17) in general consists of the following in order of which impacts should be mitigated (DEA *et al.,* 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology, and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation usually does not lead to

adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:

- **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;
- **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the focus area supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
- **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community or community suitable for supporting the intended post closure land use; and
- **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.

➢ **Offset impact:** refers to compensating for residual or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.[9]

In light of the above discussion the following points present the key concepts considered in the development of mitigation measures for the proposed project:

➢ Mitigation and performance improvement measures and actions that address the risks and impacts[10] are identified and described in as much detail as possible;
➢ Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation where possible; and
➢ Desired outcomes are defined and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation wherever possible.

The mitigation sequence/hierarchy is shown in Error! Reference source not found. below.

[9] Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.
[10] Mitigation measures should address both positive and negative impacts

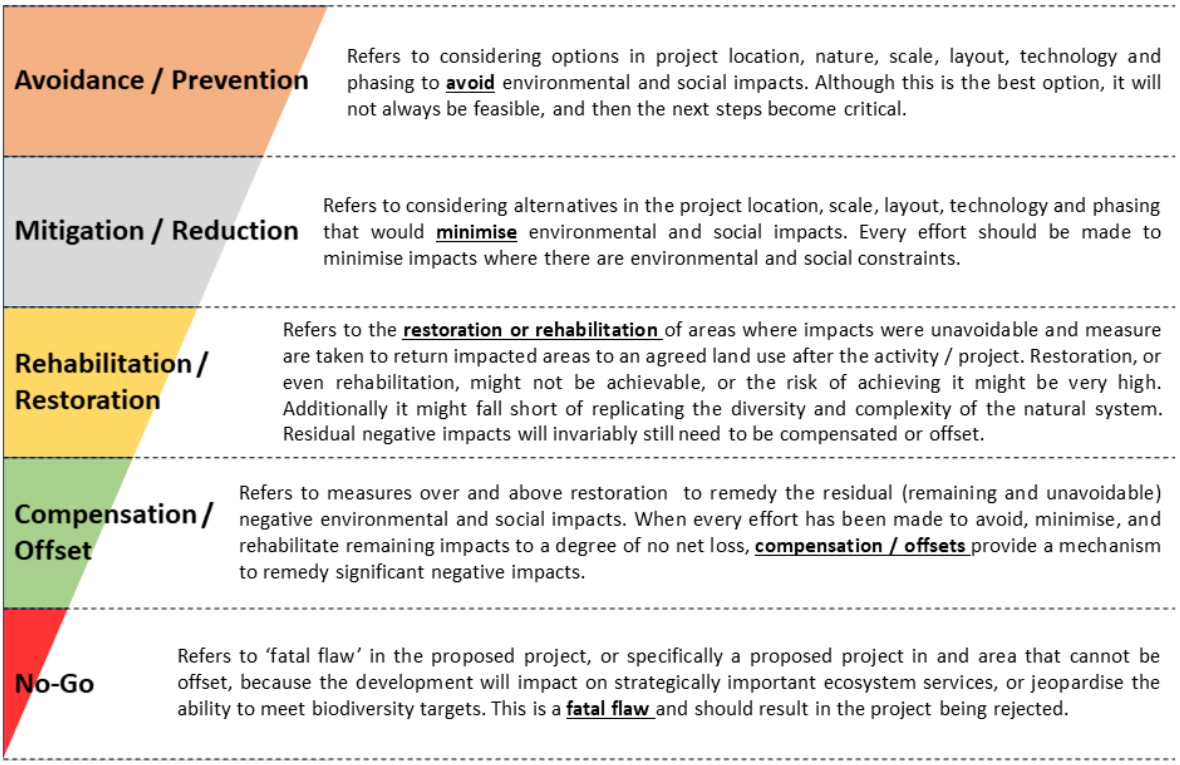


Figure C1: Mitigation Sequence/Hierarchy

Recommendations

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operational phases.

APPENDIX D: Reference Vegetation Type

Vaal Vet SandY Grassland (GM10)

Table D1: Floristic species of the Vaal Vet Sandy Grassland (Mucina & Rutherford, 2006).

Plant Community	Species
Dominant and typical floristic species	
Woody Layer	
Low Shrubs	*Felicia muricata* (d), *Pentzia globosa* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *H. paronychioides*, *Ziziphus zeyheriana*.
Forb layer	
Herbs	*Stachys spathulata* (d), *Barleria macrostegia*, *Berkheya onopordifolia var. onopordifolia*, *Chamaesyce inaequilatera*, *Geigeria aspera* var. *aspera*, *Helichrysum caespititium*, *Hermannia depressa*, *Hibiscus pusillus*, *Monsonia burkeana*, *Rhynchosia adenodes*, *Selago densiflora*, *Hilliardiella oligocephala*.
Geophytic Herbs	*Bulbine narcissifolia*, *Ledebouria marginata*.
Succulent Herbs	*Tripteris aghillana var. integrifolia*.
Graminoid layer	
Graminoids	*Anthephora pubescens* (d), *Aristida congesta* (d), *Chloris virgata* (d), *Cymbopogon caesius* (d), *Cynodon dactylon* (d), *Digitaria argyrograpta* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. plana* (d), *E. trichophora* (d), *Heteropogon contortus* (d), *Panicum gilvum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus berteronianus* (d), *Brachiaria serrata*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis curvula*, *E. obtusa*, *E. superba*, *Panicum coloratum*, *Pogonarthria squarrosa*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*.

**(d) = dominant.*

Western Free State Clay Grassland (GH 9)



Figure D1: Gh 9 Western Free State Clay Grassland: Dry Grassland with abundant karroid elements near Uitkyk (Boshof District, Free State) as photographed in 1960's (page 384 Mucina & Rutherford 2006). Photograph taken by J.P.H Acocks.

Table D2: Floristic species of the Western Free State Clay Grassland (Mucina & Rutherford, 2006).

Plant Community	Species
Dominant and typical floristic species	
Woody Layer	
Low Shrubs	*Lycium cinereum* (d), *Pentzia globosa* (d), *Amphiglossa triflora, Aptosimum elongatum, Berkheya annectens, Felicia filifolia* subsp. *filifolia, F. muricata, Gnidia polycephala, Helichrysum dregeanum, Melolobium candicans, Nenax microphylla, Rosenia humilis, Selago saxatilis.*
Succulent Shrubs	*Hertia pallens.*
Forb layer	
Herbs	*Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Gnaphalium declinatum, Indigofera alternans, Kohautia cynanchica, Nidorella microcephala, Platycarpha parvifolia, Salvia stenophylla, Selago paniculata, Stachys spathulate.*
Geophytic Herbs	*Bulbine narcissifolia, Oxalis depressa.*
Succulent Herbs	*Tripteris aghillana* var. *integrifolia.*
Graminoid layer	
Graminoids	*Aristida adscensionis* (d), *A. bipartita* (d), *Cynodon dactylon* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *Panicum coloratum* (d), *Themeda triandra* (d), *Aristida congesta, Cymbopogon pospischilii, Digitaria eriantha, Eragrostis bicolor, E. curvula, E. micrantha, E. obtusa, E. plana, E. superba, E. trichophora, Heteropogon contortus, Setaria nigrirostris, Tragus berteronianus, T. koelerioides, T. racemosus.*

**(d) = dominant.*

APPENDIX E: Details, Expertise and Curriculum Vitae of Specialists

1. (a) (i) Details of the specialist who prepared the report

Candice Lamb	MSc Zoology (University of Pretoria)
Charne Kock	MSc Plant Science (University of Pretoria)
Jandre Potgieter	BSc (Hons) Entomology (University of Pretoria)
Justin Jacobs	BSc (Hons) Entomology (University of Pretoria)
Samantha Leigh Daniels	PhD (Plant Science) (University of Pretoria)

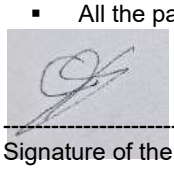
1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialists	**Scientific Terrestrial Services (Pty) Ltd.**
Postal address:	PO. Box 751779, Gardenview
Postal code:	2047
Telephone:	011 616 7893
Name / Contact person:	**Candice Lamb**
E-mail:	candice@sasenvgroup.co.za
Qualifications	MSc Zoology (University of Pretoria) BSc (Hons) Zoology (University of Pretoria) BSc Environmental Science (University of Pretoria)
Registration / Associations	A candidate member of the South African Council for Natural Scientific Professions (SACNASP).
Name / Contact person:	**Charne Kock**
E-mail:	charne@sasenvgroup.co.za
Qualifications	MSc (Plant Science) (University of Pretoria) BSc (Hons) Plant Science (University of Pretoria) BSc (Environmental Sciences) (University of Pretoria)
Registration / Associations	SANAP (South African National Antarctic Programme) Golden Key Honorary Society Member of the Botanical Society of South Africa (BotSoc) Member of the Land Rehabilitation Society of Southern Africa (LARSSA) Member of the South African Association of Botanists (SAAB) Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP – Reg No. 169998)
Name / Contact person:	**Jandre Potgieter**
E-mail:	jandre@sasenvgroup.co.za
Qualifications	BSc (Hons) Entomology (University of Pretoria) BSc Entomology (University of Pretoria)
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Name / Contact person:	**Justin Jacobs**
E-mail:	justin@sasenvgroup.co.za
Qualifications	BSc (Hons) Biological Sciences (University of Cape Town) BSc Zoology (University of Pretoria)
Name / Contact person:	**Dr Samantha-Leigh Daniels**
E-mail:	samantha@sasenvgroup.co.za
Qualifications	PhD (Plant Science) (University of Pretoria) MSc (Plant Science) (University of Pretoria) BSc (Hons) Zoology & Entomology (University of Pretoria) BSc Zoology & Entomology (University of Pretoria)
Registration / Associations	Member of the South African Association of Botanists (SAAB) Member of the Botanical Society of South Africa (BotSoc) Member of the Association for Tropical Biology and Conservation (ATBC) Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Candice Lamb, declare that -

- I act as the **independent specialist (faunal reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Charne Gouws, declare that -

- I act as the **independent specialist (floral)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Specialist Signature

I, Justin Jacobs, declare that -

- I act as the **independent specialist (faunal)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Jandre Potgieter, declare that -

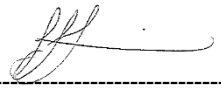
- I act as the **independent specialist (faunal reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Samatha- Leigh Daniels, declare that -

- I act as the **independent specialist (floral reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CANDICE LAMB

PERSONAL DETAILS

Position in Company	Junior Faunal Ecologist
Joined SAS Environmental Group of Companies	January 2024

MEMBERSHIP IN PROFESSIONAL SOCIETIES

A candidate member (Cand. Sci. Nat) of the South African Council for Natural Scientific Professions (SACNASP)

EDUCATION

Qualifications

MSc Zoology (University of Pretoria)	2022
BSc (Hons) Zoology (University of Pretoria)	2018
BSc Environmental Science (University of Pretoria)	2017

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Limpopo, Northern Cape, KwaZulu-Natal, Eastern Cape, North West
Africa - Lesotho

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Avifaunal Assessments
- Faunal Assessments
- Desktop Studies, Mapping and Background Information Research

Freshwater Assessments

- Desktop Studies, Mapping and Background Information Research
- Desktop Freshwater Delineation
- Freshwater (wetland / riparian) Delineation and Assessment

GIS

- Mapping and GIS for various sectors and various disciplines (biodiversity, freshwater, aquatic, soil, and land capability).

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHARNE KOCK

PERSONAL DETAILS

Position in Company	Floral Ecologist
Joined SAS Environmental Group of Companies	2022

MEMBERSHIP IN PROFESSIONAL SOCIETIES

SANAP (South African National Antarctic Programme)
Golden Key Honorary Society
Member of the Botanical Society of South Africa (BotSoc)
Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 169998)
Member of the Land Rehabilitation Society of Southern Africa (LARSSA)
Member of the South African Association of Botanists (SAAB)

EDUCATION

Qualifications

MSc Plant Science (University of Pretoria)	2021
BSc (Hons) Plant Science (University of Pretoria)	2018
BSc Environmental Science (University of Pretoria)	2017

Short courses and Training

- Advanced Grass Identification Course (2019)
- CREW Tree Identification Course (2019)
- ISO 140001 Environmental Management Course (2020)
- Ecological Practices and Theory Short Course (2020)

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Limpopo, Mpumalanga, North West, Northern Cape, KwaZulu-Natal and Eastern Cape
Africa: Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Floral Assessments
- Floral walkdowns
- Alien and Invasive Plant Control Plan (AIPCP)
- Alien control monitoring
- Desktop Studies, Mapping and Background Information Research
- Plant permits

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF JANDRE POTGIETER

PERSONAL DETAILS

Position in Company	Faunal Ecologist
Joined SAS Environmental Group of Companies	2022

EDUCATION

Qualifications

PGCE Senior and intermediate phase (UNISA)	2021
BSc (Hons) Entomology (University of Pretoria)	2013
BSc Entomology (University of Pretoria)	2012

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 170165/24)

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Eastern Cape, Limpopo, Western Cape, Mpumalanga, Northern Cape, Free State, North West and KZN
Africa – Angola, Namibia, Malawi and Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments
- Faunal Species Rescue and Relocation Plans

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF JUSTIN SHAUN JACOBS

PERSONAL DETAILS

Position in Company	Junior Faunal Consultant
Joined SAS Environmental Group of Companies	2025

EDUCATION

Qualifications

BSc (Honours) Biological Sciences (University of Cape Town)	2019
BSc Zoology (University of Pretoria)	2017

AREAS OF WORK EXPERIENCE

South Africa – Free State, Gauteng, Mpumalanga, North West, Western Cape

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Desktop Studies and Background Information Research
- Faunal Assessments
- Avifaunal Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF DR SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

Position in Company	Senior Floral Ecologist
Joined SAS Environmental Group of Companies	2020

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP)
Member of the South African Association of Botanists (SAAB)
Member of the Botanical Society of South Africa (BotSoc)

EDUCATION

Qualifications

PhD (Plant Science) (University of Pretoria)	2023
MSc (Plant Science) (University of Pretoria)	2017
BSc (Hons) Zoology & Entomology (University of Pretoria)	2014
BSc Zoology & Entomology (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Free State, Northern Cape, Western Cape
Africa – Lesotho, Democratic Republic of Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Desktop Studies, Mapping and Background Information Research
- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Alien and Invasive Plant Control Plans (AIPCPs)
- Terrestrial Monitoring
- Species Rescue and Relocation Plans
- Rehabilitation and Management Plans
- Strategic Net Positive Impact (NPI) Accounting

Offsets

- Biodiversity Offsets
- Wetland Offsets

Training

- Plant species identification
- Herbarium usage and protocols



SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE JELANI JOINT VENTURE (JV) AREA UNDERGROUND MINING PROJECT, FREE STATE PROVINCE.

Part B: Terrestrial Biodiversity Specialist Assessment Report and Plant Species Compliance Statement

Prepared for: Kongiwe Environmental (Pty) Ltd.
Report author: C. Kock (Pr. Sci. Nat)
Reviewers: Dr. S. Daniels (Pr. Sci. Nat)
Reference: STS 25 - 2059
Date: August 2026

Part of the SAS Environmental Group of Companies

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DOCUMENT GUIDE

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Theme-Specific Requirements as per Government Notice No. 1150 Plant Theme – Low Sensitivity Protocol followed		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
1.	**General Information**	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "medium sensitivity" for plant species, must submit either a Plant Species Specialist Assessment Report or a Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4	**Part B:** Section 5 - A Plant Species Compliance Statement is compiled within this report.
1.2	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "low" sensitivity for plant species, must submit a Plant Species Compliance Statement.	**Part B:** Section 5 - A Plant Species Compliance Statement is compiled within this report.
1.3	Where the nature of the activity is expected to have an impact on species of conservation concern beyond boundary of the preferred site, the project areas of influence must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the area of assessment must include the project areas of influence, as determined.	Not applicable to this study. A Plant Species Compliance Statement is compiled within this report.
5	**Terrestrial Plant Species Compliance Statement**	
5.1	**The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).**	**Part A**: Appendix E **Parts A and B**: Cover page
5.2	**The compliance statement must:**	
5.2.1	Be applicable within the study area;	**Part B:** Section 1 & 2
5.2.2	Confirm that the study area is of "low" sensitivity for terrestrial plant species;	**Part A:** Section 4 (site verification report) **Part B:** Section 5
5.2.3	Indicate whether or not the proposed development will have any impact on SCC.	**Part B:** Section 5
5.3	**The compliance statement must contain, as a minimum, the following information:**	
5.3.1	Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;	**Part A**: Appendix E
5.3.2	A signed statement of independence by the specialist;	**Part A**: Appendix E
5.3.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**Part B:** Section 1 & 2
5.3.4	A description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;	**Part A**: Appendix D **Part B:** Appendix A
5.3.5	Where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;	**Part B:** Section 5
5.3.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data;	**Part B:** Section 1
5.3.7	The mean density of observations/ number of samples sites per unit area;	**Part B:** Section 2
5.3.8	Any conditions to which the compliance statement is subjected.	**Part B:** Section 5
A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.		

ACRONYMS

AIP	Alien and Invasive Plant
ASG	Advanced Strike Gully
BI	Biodiversity Importance
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries, and the Environment
EIS	Ecological Importance and Sensitivity
EN	Endangered
EOO	Extent of Occurrence
ESA	Ecological Support Area
FoS	Factor of Safety
FSBP	Free State Biodiversity Plan
FI	Functional Integrity
FSNCO	Free State Nature Conservation Ordinance 1969 (No. 8 of 1969)
GBIF	Global Biodiversity Facility
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
ha	hectares
HGM	Hydromorphic
JV	Joint Venture
km	Kilometres
LC	Least Concern
LOM	Life of Mine
m	metres
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFA	National Forest Act, 1998 (Act No. 84 of 1998), as amended
NT	Near threatened
NWA	National Water Act, 1998 (Act No. 36 of 1998), as amended
PES	Present Ecological State
POC	Probability of Occurrence
PPE	Personal Protective Equipment
PR	Prospecting Rights
RDL	Red Data Listed
RLE	Red List of Ecosystems
RR	Receptor Resilience
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
STS	Scientific Terrestrial Services (Pty) Ltd
TOPS	Threatened or Protected Species
VU	Vulnerable

GLOSSARY OF TERMS

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Baseline (IEM Series: DEAT, 2004)	Conditions that currently exist. Also called "existing conditions".
Biodiversity priority areas (Skowno et al., 2019)	Features in the landscape or seascape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. They include the following categories, most of which are identified based on systematic biodiversity planning principles and methods: protected areas, Critically Endangered (CR) and Endangered (EN) ecosystems, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), Freshwater Ecosystem Priority Areas, high water yield areas, flagship free-flowing rivers, priority estuaries, focus areas for land-based protected area expansion, and focus areas for offshore protection. Marine ecosystem priority areas and coastal ecosystem priority areas have yet to be identified but will be included in future. The different categories are not mutually exclusive and, in some cases, overlap, often because a particular area or site is important for more than one reason. They should be complementary, with overlaps reinforcing the importance of an area.
Biological diversity or Biodiversity (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA))	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biome (Mucina and Rutherford (2006); after Low and Rebelo (1998))	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (Mucina and Rutherford (2006); after Low and Rebelo (1998))	A bioregion is a composite of spatial (vegetation) units sharing similar biotic and physio-geographical features and connected by processes operating on a regional sale.
Critical Biodiversity Areas (CBA: SANBI, 2020)	An area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible.
Community Characterisation	Comparisons can be made among communities using attributes such as species richness, species diversity, and evenness. ➢ Species richness is simply the number of species in a community. ➢ Species diversity is more complex and includes a measure of the number of species in a community, and a measure of the abundance of each species. ➢ Species evenness is a description of the distribution of abundance across the species in a community. Species evenness is highest when all species in a sample have the same abundance. Evenness approaches zero as relative abundances vary. Source: https://tinyurl.com/2p9yr3j8
Corridor (van Wilgen et al., 2020)	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Critically Endangered (CR), i.e., International Union for Conservation of Nature (IUCN) Red List category (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction.

Degradation (Skowno et al., 2019)	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Development footprint (National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA))	"In respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity."
Disturbance (van Wilgen et al., 2020)	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Driver (ecological) (Lead et al., 2005)	A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers.
Ecological Condition	"*Ecological condition*" means the extent to which the composition, structure and function of an area or biodiversity feature has been modified from a reference condition of "natural". Various terminology can be used for the precision of language: ➢ Fair ecological condition: Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised. Can apply to a site or an ecosystem. ➢ Good ecological condition: Areas that are natural or near-natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem. ➢ Poor ecological condition: Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem.
Ecological Support Areas (ESA: Skowno et al., 2019)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Endangered (EN), i.e., Red List category (Skowno et al., 2019)	**Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.
Endemic species (SANBI, 2020)	A species that is naturally restricted to a, well-defined region, i.e., species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
Ground·Truth	To check the accuracy of (remotely sensed data) through in-situ observations.
Habitat (NEMBA)	A place where a species or ecological community naturally occurs.
Indigenous species (synonym: native species)	SANBI (2020) definition: Occurring naturally in a defined area (contrast with endemic) – the area must be specified and is normally taken to be the historical range of a species, notwithstanding the effects of naturally initiated range expansions/ contractions, e.g., the baobab (*Adansonia digitata*) is indigenous but not endemic to South Africa, but it is not indigenous to KwaZulu-Natal. NEMBA definition: A species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic of South Africa but excludes a species that has been introduced in the Republic as a result of human activity, e.g., the bontebok (*Damaliscus pygragus pygargus*) is indigenous to only South Africa, but according to the previous definition would only be indigenous to the Western Cape.
Indigenous vegetation (NEMA) - compare with "endemic" and "native"	Vegetation that occurs naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	"An ecosystem is generally understood to have integrity when its dominant ecological characteristics (e.g., elements of composition, structure, function, and ecological processes) occur within their natural ranges of variation and can

	withstand and recover from most perturbations" (CBD/SBSTTA/24/3/Add.2/Rev.1, para. 18). Indicators of ecosystem integrity may include the "structure, function and composition of an ecosystem relative to the preindustrial range of variation of these characteristics" (Hansen et al., 2021).
Invasive species (ecological) (van Wilgen et al., 2020)	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed alien species	All alien species that are regulated in South Africa under the NEMBA: Alien and Invasive Species Regulations, 2020.
Least Threatened	Least threatened ecosystems are still largely intact.
Native species	A species that is within its known natural range, and occurs naturally in a given area or habitat, as opposed to an introduced species or invasive species.
Primary grasslands (SANBI, 2013)	Primary grasslands are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristics.
Quarter Degree Square (QDS) (SANBI, 2020)	A way of dividing the longitude latitude degree square cells into smaller squares of 15' × 15' (roughly 24 × 27 kilometres (km)), forming in effect a system of geocodes.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the IUCN, organisms that fall into the Extinct in the Wild (EW), CR, EN, Vulnerable (VU) categories of ecological status.
Secondary grasslands (SANBI, 2013)	Secondary grasslands are those that have undergone irreversible modification from their original ecological state. Such grasslands may superficially have the appearance of primary grasslands, but differ markedly with respect to species composition, vegetation structure and ecological functioning.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as protected species of relevance to the project.
Terrestrial Species (SANBI, 2020)	For the purposes of the species environmental guidelines (SANBI, 2020), terrestrial species are considered to represent species that are not exclusively marine and occur on land (at least for a portion of their life cycle). This includes amphibians (frogs and toads) but excludes other freshwater aquatic species which are considered to be aquatic (e.g., fish, diatoms and aquatic macroinvertebrates). This definition is not an accurate biological definition but rather applied in this manner to align with the Protocol on Terrestrial Biodiversity.
Threatened ecosystem (Skowno et al., 2019)	An ecosystem that has been classified as CR, EN or VU, based on an analysis of ecosystem threat status. A threatened ecosystem has lost or is losing vital aspects of its structure, function, or composition. The Biodiversity Act allows the Minister of Environmental Affairs or a provincial Member of the Executive Council for Environmental Affairs to publish a list of threatened ecosystems. To date, threatened ecosystems have been listed only in the terrestrial environment. In cases where no list has yet been published by the Minister, such as for all aquatic ecosystems, the ecosystem threat status assessment in the National Biodiversity Assessment (NBA) can be used as an interim list in planning and decision making.
Threatened species (Skowno et al., 2019)	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
Vulnerable (VU), i.e., Red List category (Skowno et al., 2019)	Applied to both species/taxa and ecosystems: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the for the Jelani Joint Venture (JV) area underground mining project, Free State province (Figure 1).

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11 kilometres (km) northwest of Odendaalsrus, 2.5 km west of Allanridge, and 22 km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

1.1 Scope of Work

This report aims to present a detailed account of the terrestrial biodiversity and plant species data (interchangeably referred to as the “floral assessment”) for the area of interest and to identify areas of increased ecological importance and sensitivity (EIS) from a botanical perspective, as well as the mapping of such areas, and to describe the present ecological state (PES) of the area of interest relating to the terrestrial biodiversity theme and the plant species theme of the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter "screening tool").

The primary objective of this assessment is not to compile an exhaustive floral species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of species of conservation concern (SCC), and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

The terrestrial biodiversity and plant species report includes the following:

- A description of the various floral habitat types, communities, and the ecological state of such communities within the study area and a ranking of each habitat type based on conservation importance and ecological sensitivity;
- Inventories of floral species as encountered within the study area;
- Maps and discussions of sensitive landscapes associated with the study area such as indigenous forests, rocky ridges, wetlands and/or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs);
- An assessment of Red Data Listed (RDL) floral species as well as an assessment of other floral SCC (such as nationally and provincially protected flora), including the potential for such species to occur within the study area; and

- Information and recommendations that will ensure the ongoing functioning of the ecosystem within the study area in a manner that supports local and regional conservation requirements, allows regional and national biodiversity targets to be met, and sustains the provision of ecological services in the local area.

1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The results of the floral assessment as presented in this report is confined to the study area. The immediate surroundings do not form part of this assessment but were included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- This report will only focus on the activities associated with the study area, which is focussed on underground mining activities. Any other activities related to the Harmony Target mining right area (i.e., refurbishment of existing infrastructure) is not associated with this scope of work for this report;
- Sampling by its nature means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. Nevertheless, given the experience of the specialist within the area, together with adequate coverage of the study area within an appropriate flowering season (see bullets below), the survey was deemed sufficient for drawing adequate conclusions regarding the ecological condition and sensitivity of the various habitats therein;
- The identities of some floral SCCs will not be disclosed in this report, although their potential occurrence within the study area was still evaluated. According to the best practice guideline accompanying the DFFE's screening tool and the Species Environmental Assessment Guidelines (SANBI, 2020), the names of sensitive species may not appear in any of the specialist reports that would be publicly available. Such species will be referred to as sensitive plants, with their threat status included; and
- The floral assessment took place on 10th December 2025 (summer season); according to the Species Environmental Assessment Guideline (SANBI 2020) this period of assessment is in line with the optimal survey periods for grassland ecosystems, i.e., peak flowering time for grassland ecosystems is considered between October and April.

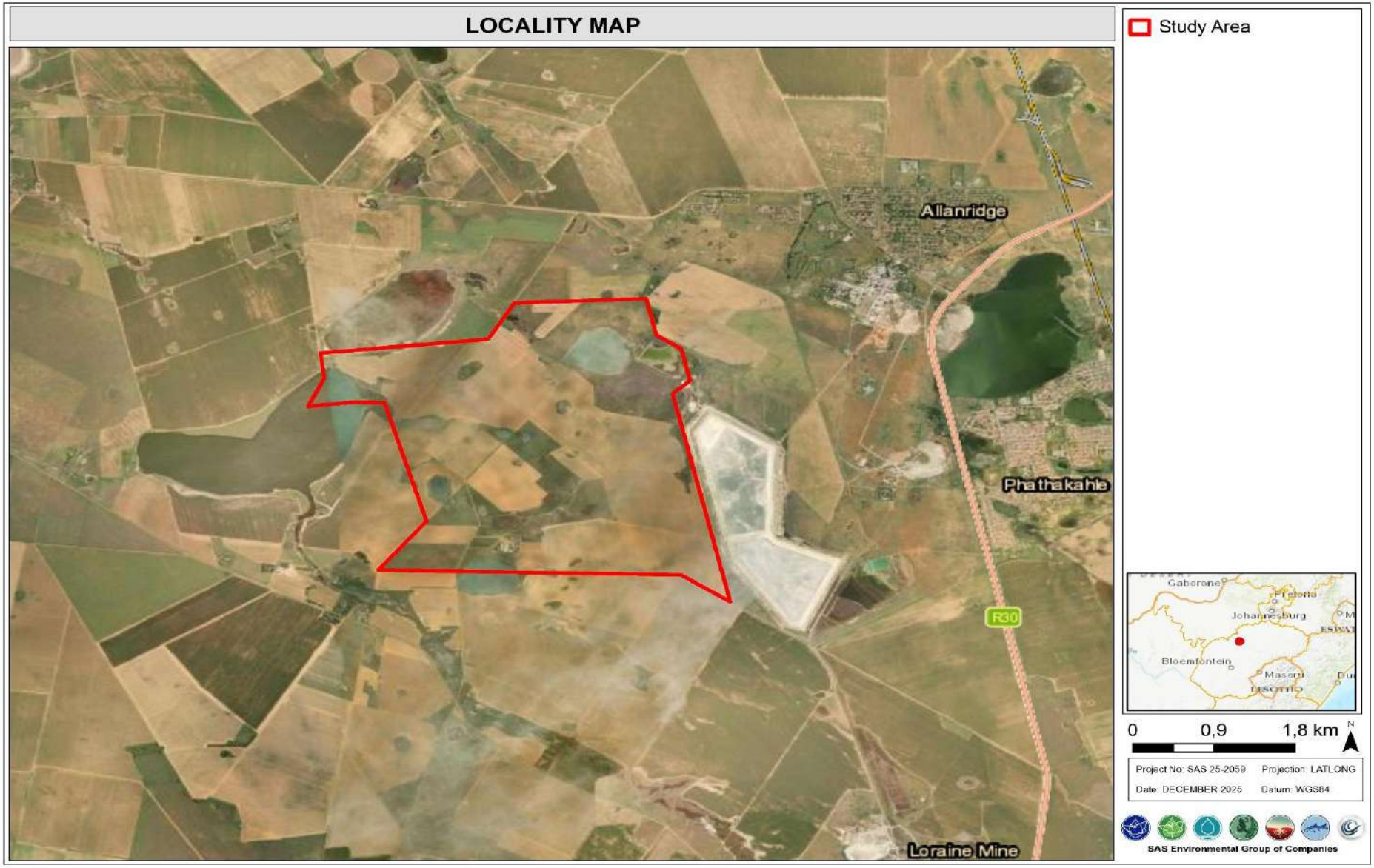


Figure 1: Location and extent of the study area.

2 ASSESSMENT APPROACH

This section briefly outlines the assessment method employed for the botanical study. Further information regarding the approach adopted can be found in Appendix A of this report.

2.1 Reporting Protocol

The study area was identified as a low sensitivity area for the Plant Species Theme according to the screening tool. Conversely, the study area was identified as a very high sensitivity area for the Terrestrial Biodiversity Theme. Following the December 2025 field assessment, the low sensitivity for the Pant Species Theme was confirmed. The very high sensitivity for the Terrestrial Biodiversity Theme was confirmed, owing to the presence of CBAs, ESAs and threatened vegetation types (refer to Section 3.3).

Consequently, the reporting protocol for the Plant Species Theme adhered to the requirements of a Plant Species Compliance Statement, whereas the Terrestrial Biodiversity Theme adheres to the protocol for very high/high sensitivity and thus a Terrestrial Biodiversity Specialist Assessment was undertaken (please refer to the document guides in both Parts A and B).

For refined sensitivities, please refer to the Site Ecological Importance (SEI) breakdown in Section 4 of this report.

2.2 General Approach

Before conducting the field assessment, a desktop study was performed to gather background information regarding the study area, including the surrounding areas (refer to **Part A**). This involved consulting maps, aerial photographs, and digital satellite images to determine broad habitats and potential sensitive areas. A literature review of the habitats, vegetation types, and distributions of floral species within and surrounding the study area was undertaken, while also considering the threat status of the ecosystem(s) in the study area. The conservation requirements and biodiversity goals, at national and provincial levels, of the biodiversity features associated with the study area were also considered.

Following the desktop assessment and literature review, a field assessment was undertaken to confirm the presence of potentially sensitive habitats and to compile floral species inventories for each habitat type identified within the study area. The developed species lists include potential floral SCC and alien floral species.

2.3 Sampling Effort

The floral assessment took place on the 10th of December 2025. As above-mentioned, the floral assessment occurred during an optimal time for SCC detection and involved a site assessment carried out by a botanist registered with the South African Council for Natural Scientific Professions (SACNASP). The botanical specialist walked several meanderings during the field assessment, surveying various plant species and recording the habitat conditions.

2.4 Definitions, descriptions, and taxon nomenclature

Scientific nomenclature for plant species in this report follows that of the Red List of South African Plants[1] (http://redlist.sanbi.org/index.php) and the South African National Biodiversity Institute (SANBI) Biodiversity Advisor[2] (https://biodiversityadvisor.sanbi.org/). This largely follows the nomenclature of the World Flora Online (WFO) Plant List[3] (https://wfoplantlist.org/), however, some names differ between the WFO and the Red List of South African Plants. For alien (or exotic) species, the definitions of Richardson et al. (2011) are used. The description of vegetation structure broadly followed guidelines from Edwards (1983) (refer to **Appendix A: Figure A1**).

2.5 Sensitivity Mapping

All the botanical features (different vegetation and habitat types, as well as specific plant species distributions, where deemed necessary) within the study area were considered. Areas of increased sensitivity and conservation value were delineated using a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery, and the sensitivity thereof was mapped. The various habitat types were assigned SEI categories (SANBI, 2020) based on their functional integrity, conservation value, the presence of SCCs and their resilience to disturbances. Refer to **Appendix A** for a breakdown of the SEI methodology.

[1] The Threatened Species Program is one of the continent's largest collaborative conservation projects to date. South Africa has become the first megadiverse country to fully assess the status of its entire flora. The Red List of South African Plants Online provides up-to-date information on the national conservation status of South Africa's indigenous plants.
[2] Open access to South Africa's biodiversity data: 1) Occurrence records: 2 120 409, 2) Animal and plant checklists: 3, 3) Data partners: 17, 4) Image records: 194 863, 5) Species of plants, animals and fungi: 85 878, and 6) Planning and ecosystem assessment spatial layers: 551.
[3] The standardisation and cataloguing of plant names are critical in various fields of biology, including biodiversity, biogeography, and vegetation research. The WFO Plant List is the most comprehensive and authoritative list of the world's plants, maintained by the global community of taxonomic experts as a free and open-access resource.

3 RESULTS OF THE PLANT SPECIES ASSESSMENT

This section provides a description and discussion of the baseline data collected during the floral site assessment.

3.1 Existing Impacts and Ecological Overview

The study area has been impacted significantly by agricultural activities, such as cultivation and livestock grazing (cattle mostly) with approx. 65% of the study area comprised thereof (Figure 2). From 2003 (the earliest imagery available) to 2023 (the most recent imagery), no substantial expansion of cultivated areas is evident. The remaining natural habitat patches, which although encapsulated by the agriculture activities, are still considered to be indigenous vegetation as per NEMA definition[4] and represent grassland habitat. The study area consists of two Hydromorphic (HGM) units, namely seep wetlands and depression wetland, that were identified by a freshwater specialist (SAS 25 – 0190, 2025) as true watercourses in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA)[5]. Within the study area a high diversity and abundance of Alien and Invasive Plant (AIP) species were observed within especially the freshwater ecosystems and habitats which are adjacent to the cultivated areas (probably as a result of edge effects). Various AIPs identified are agricultural weeds, and disturbed areas (especially along sides of cultivated fields) are often places where AIPs become problematic leading to possible source population where nearby areas can become invaded.

[4] **The NEMA definition of indigenous vegetation**: vegetation that occurs naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

[5] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:1) a river or spring, 2) a natural channel which water flows regularly or intermittently, 3) a wetland, dam, or lake into which, or from which, water flows, and 4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. Reference to a watercourse includes, where relevant, its bed and banks.

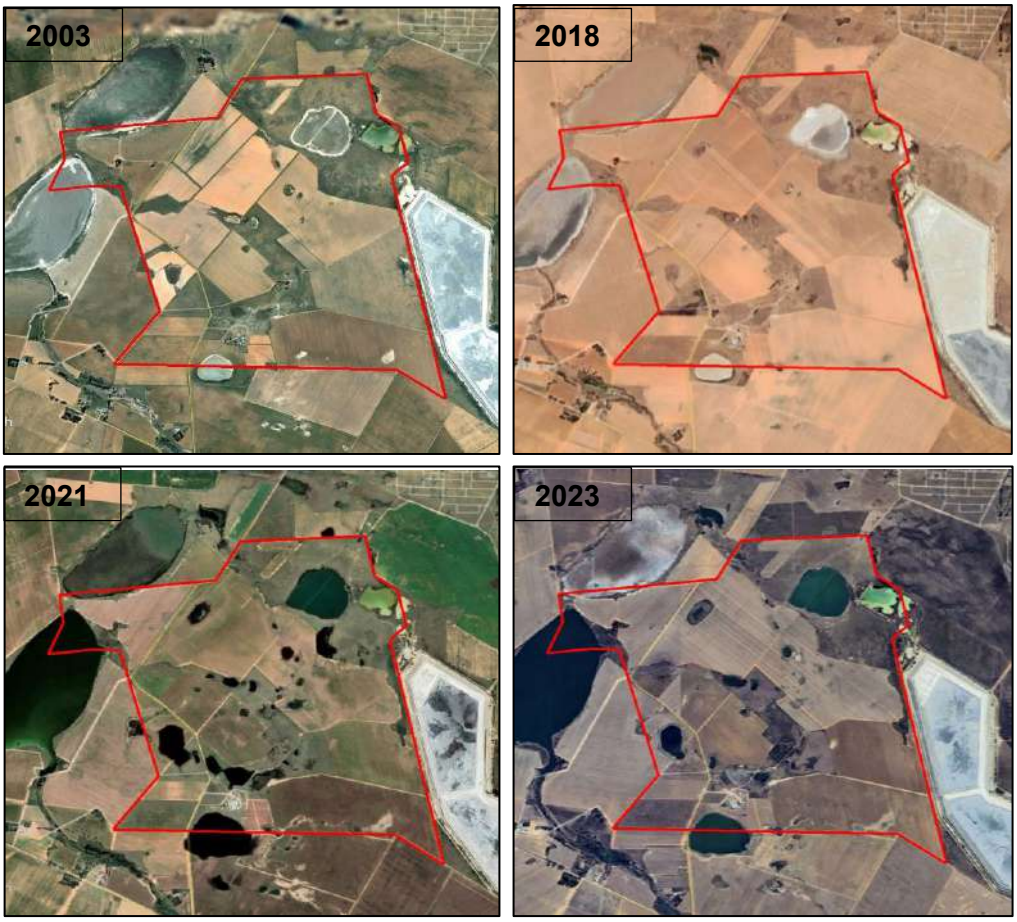


Figure 2: Satellite imagery (Google Earth) for the study area from 2003 to most recent images from 2023.

The study area is located in the Dry Highveld Grassland Bioregion where the main ecological characteristics of Dry Highveld Grassland are characterised by (1) climate, (2) grazing, (3) plant life histories, (4) fire, (5) encroachment by invasive woody species and (6) underlaying geology (SANBI, 2013). Changes in some of these ecological drivers are unlikely (i.e., climate and geology) however changes in grazing, fire and encroachment by invasive woody species can negatively impact a grasslands integrity and ecological functioning. In this case, natural grazing regimes in particular, which is considered an important 'driver' in these grassland systems has been significantly impacted (lost due to habitat transformation). Only small, isolated areas are still connected and utilized for domestic grazing and therefore these areas (often associated with the freshwater ecosystems) easily become overgrazed and trampled. Furthermore, bush encroachment by native trees such as *Vachellia karoo*, or woody drought-tolerant shrubs (such as *Pentzia* and *Felicia* species) can occur within Dry Highveld Grasslands especially with changes in fire regimes and low rainfall periods. Some areas within the study area did have a high abundance of low growing woody species such as *Felicia muricata, Gomphocarpus fruticosus* and *Pentzia incana*. Particularly within the Modified

Grassland, *Pentzia incana* was observed to form monospecific stand and reduce the occurrence of other native plant species.

There are however still some areas that have experienced little edge effects, i.e., the north eastern portion, from the surrounding farming activities. This portion is less isolated by cultivation and due to its size (approx. 46 ha) the habitat can possibly display a higher resilience to such disturbances. This section of the study area still provide refuge for a high diversity of floral species (which contribute to ecological resilience).

Based on the above, the study area is associated with a variety of floral communities (based on historic and recent land-uses). The verified habitat units and habitat descriptions associated with the study area is provided below in section 3.2.

3.2 Vegetation Types and Fine-Scale Habitats

As per SANBI (2024) database, the study area is characterised by two (reference) vegetation type, namely the Vaal Vet Sandy Grassland and Western Free State Clay Grassland. According to the 2022 Red List of Ecosystems (RLE) database (SANBI, 2022a; 2022b), most of the study area is modified by cultivation with only small portions Vaal Vet Sandy Grassland (mostly eastern section) and Western Free State Clay Grassland (mostly western section) considered to be likely present within the study area (see Part A). At a broad landscape scale, the above-mentioned vegetation types were used as the reference state against which floral communities were compared to ascertain habitat integrity and deviance from, and/or similarity to, the expected state.

The verified site conditions differed from the background data, with less representative habitat present than what was expected from the RLE database. The study area consisted of large, cultivated areas (i.e., transformed habitat), grassland communities and various freshwater habitats. Therefore, floral communities identified during the site assessment are described in this report under three (3) broad[6] habitat units (Figure 3). The three broad habitat units were delineated based on vegetation structure and the dominant plant groups observed within the vegetation communities, as well as on habitat integrity and the ecological processes the habitats provide or support. The delineated habitat units thus included:

- **Grassland habitat:** Consisting of the Vaal Vet Sandy Grasslands and Modified Grasslands communities.

[6] **Broad habitat categories** have been delineated and provide an indication of the main vegetation types associated with the MRA.

- **Transformed Habitat:** Including the cultivated areas and built-up areas (including farmhouses, old mining infrastructure and roads).
- **Freshwater Ecosystems, which comprised of two subunits, namely:**
  - Artificial impoundments;
  - Seep wetlands and Depression Wetlands.

The deviance of each vegetation type from its reference state (where applicable), including the ecological condition of each of the habitat units, is further described and discussed in the dashboards below under Tables 2 – 4. The extent of the habitat units observed within the study area (and the breakdown of each where applicable) is shown in Table 1 below.

Table 1: The extent of identified habitat units associated with the study area.

HABITAT UNIT	EXTENT (HA)
Transformed Habitat	**616**
• Agriculture	596
• Built-up areas	6
• Mining infrastructure	6
• Roads	7
Freshwater Ecosystems	**144.91**
• Artificial Impoundment	63
• Depression Wetland	56
• Seep Wetland	26
Grasslands	**198.46**
• Modified Grasslands	152
• Vaal Vet Sandy Grasslands	46

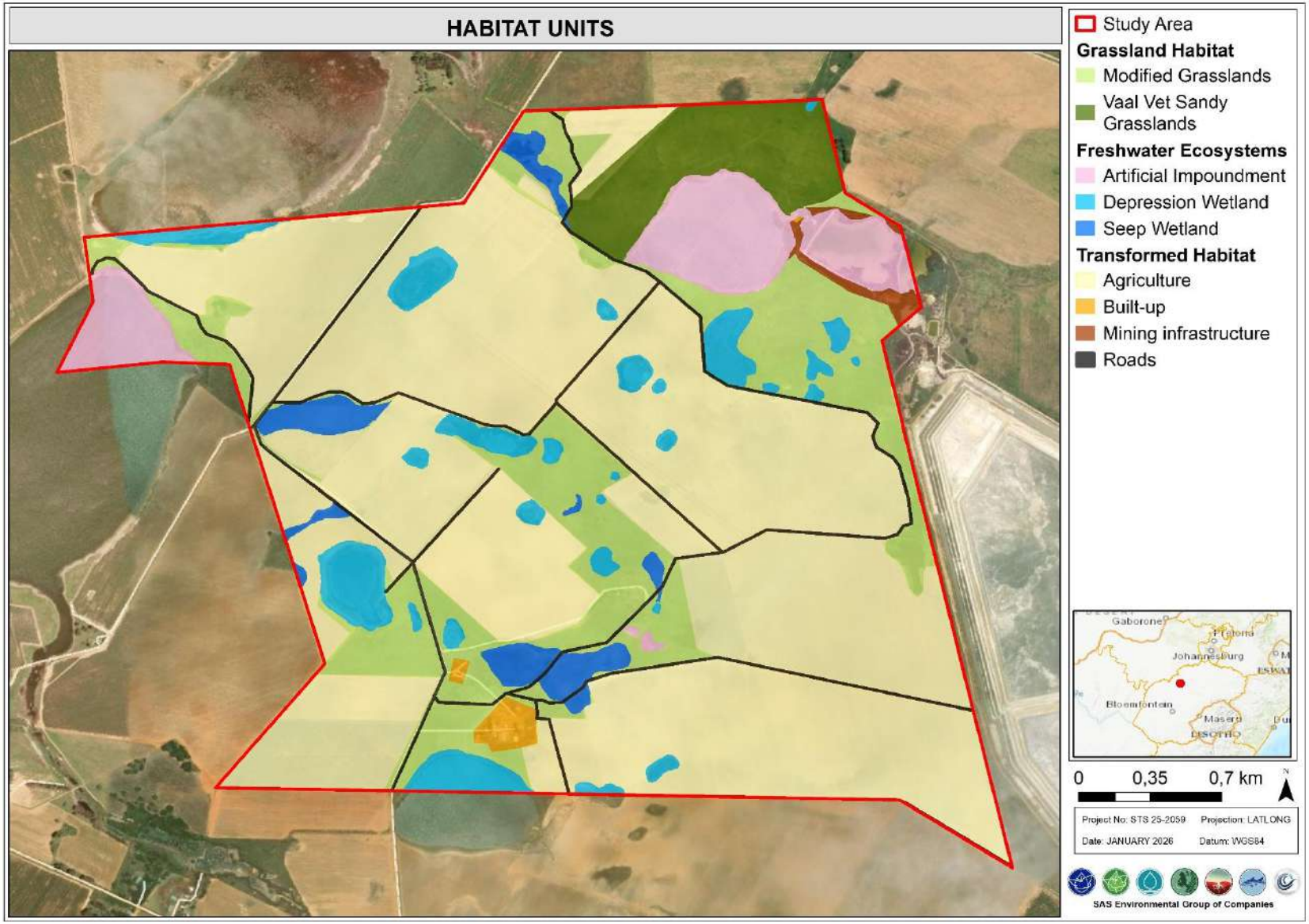


Figure 3: Conceptual illustration of the habitat units within the study area.

Table 2: Grassland Habitat.

HABITAT & SPECIES OVERVIEW
VAAL VET SANDY GRASSLAND





A relatively small portion of the total study area (i.e., only 46 ha) consists of a primary grassland[7] community (according to the SANBI definition). Based on desktop review and satellite imagery, the area had not undergone any significant changes over at least the past two decades (SANBI, 2013). The species composition within the habitat supports the notion of primary vegetation; that is, the predominance of *Themeda triandra* (as seen in the habitat photographs above) and the high prevalence of many more species associated with the reference vegetation type (i.e., Vaal Vet Sandy Grassland specifically). The grassland community is similar in species composition and vegetation structure than the representative of the EN Vaal Vet Sandy Grassland. Despite its location to sources of disturbance and edge effect, the Vaal Vet Sandy Grassland had a low abundance and diversity of AIPs (e.g., *Bidens Pilosa, Cirsium vulgare, Richardia brasiliensis* and *Verbena bonariensis)*. The vegetation structure of the Vaal Vet Sandy Grassland habitat is described as a **tall, closed grassland** (as shown in Diagram A1 in Appendix A). Considering the above the Vaal Vet Sandy Grassland is considered to be in an overall good[8] ecological condition.

The overall plant species diversity in this habitat depicts a representative subset of the reference state; the species composition of the Vaal Vet Sandy Grassland habitat unit contains various floral species representative of the reference vegetation type. Examples of species observed in the Vaal Vet Sandy Grassland include (refer also to Appendix B):

- Forb component: *Arctotis venusta, Barleria macrostegia, Bulbine narcissifolia, Chlorophytum cooperi, Commelina africana, Dipcadi viride, Drimia elata*, *Felicia muricata, Geigeria aspera var. aspera, Helichrysum dregeanum, Ipomoea ommanneyi, Hibiscus pusillus, Ledebouria marginata, Ledebouria luteola, Monsonia burkeana, Selago densiflora* and *Wahlenbergia undulata*;

[7] Primary grasslands are those that have not been significantly modified from their original state; even though they may no longer have their full complement of naturally occurring species, they have not undergone significant or irreversible modification and still retain their essential ecological characteristic.
[8] Areas that are natural or near-natural. An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem.

- Graminoid component: *Cymbopogon pospischilii, Digitaria eriantha, Eragrostis plana, Eragrostis superba, Enneapogon scoparius, Hyparrhenia hirta, Melinis repens, Themeda triandra* and *Triraphis andropogonoides;* and
- Woody component: *Gomphocarpus fruticosus*.

MODIFIED GRASSLAND





The Modified Grassland habitat has a higher abundance of woody species and is generally more associated with the mapped Western Free State Clay Grassland reference vegetation type (i.e., the western portions of the study area as per the desktop databases). The impacts from the surrounding agriculture activities have had a much more significant impact on the habitat integrity of the Modified Grassland as compared to the Vaal Vet Sandy Grassland (as described above) and as illustrated in the photographs above, with various woody AIPs present (including *Datura stramonium*, *Lantana camara* and *Melia azedarach*). Based on the current habitat condition and influence from historic and current land uses the Modified Grasslands is considered to be secondary grasslands (as per SANBI definition)[9]. The vegetation structure of the Modified Grassland can be described as **short, closed grassland** (as shown in Diagram A1 in Appendix A).

While the Modified Grassland shares some affinity (especially vegetation structure and location- i.e., scattered between various pans) with the Western Free State Clay Grassland vegetation type, the dissimilarities in species composition have been modified from the reference vegetation type, especially with the apparent incidence of AIP species. The vegetation structure is similar to the Western Free State Clay Grassland however the species composition has diverged significantly (due to AIP proliferation and historic land use). Given the modified of the Modified Grassland this habitat is considered to be in an overall fair[10] ecological condition.

[9] Secondary grasslands are those that have undergone extensive modification and a fundamental shift from their original state (e.g., to cultivated areas) but have then been allowed to return to a 'grassland' state (e.g., when old, cultivated lands are re-colonised by a few grass species). Although secondary grasslands may superficially look like primary grasslands, they differ markedly with respect to species composition, vegetation structure, ecological functioning and the ecosystem services they deliver.

[10] Areas that are moderately modified, semi-natural. An ecological condition class in which ecological function is maintained even though composition and structure have been compromised.

The overall plant species diversity in this habitat falls short of what is anticipated for its reference state; the species composition of the Modified Grassland habitat unit contains some floral species representative of the Western Free State Clay Grassland vegetation type, but these species are also common species occurring throughout the grassland biome in many vegetation types and some are also an indication of disturbed veld, with the forbs and grasses present also commonly found in other highveld grassland types. These species have a broad distribution and can thrive in various habitat types. Examples of species observed in the Modified Grassland include (refer also to Appendix B):

- Forb component: *Chlorophytum cooperi, Commelina africana*, *Conyza bonariensis, Felicia muricata, Gnaphalium declinatum, Helichrysum rugulosum, Kohautia amatymbica, Ledebouria luteola, Nidorella microcephala, Oxalis depressa, Pentzia incana, Salvia stenophylla;*
- Graminoid component: *Cynodon dactylon, Digitaria eriantha, Enneapogon scoparius, Eragrostis lehmanniana, Eragrostis plana, Eragrostis superba, Hyparrhenia hirta, Megathyrsus maximus, Melinis repens, Panicum coloratum* and *Setaria sphacelata*; and
- Woody component: *Asparagus laricinus*, *Gomphocarpus fruticosus, Searsia pyroides* and *Vachellia karoo*.

COLLAGE OF GRASSLAND SPECIES



Example species, from left to right, observed within the Grassland Habitat: *Opuntia ficus-indica* (an AIP species), *Eragrostis superba, Chlorophytum cooperi, Dipcadi viride, Bulbine narcissifolia,* and *Verbena bonariensis* (an AIP species).

SPECIES OF CONSERVATION CONCERN

	Vaal Vet Sandy Grassland	Modified Grassland
Protected Species (refer also to Appendix C).	**Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (FSNCO -protected):** ➢ *Aloe sp*. (Status = Species-specific. POC = Medium);	**Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (FSNCO -protected):** ➢ *Boophone sp.* (Status = Species-specific. POC = Medium);

	➢ *Boophone sp.* (Status = Species-specific. POC = Medium); ➢ *Erythrina zeyheri* (Status = LC. POC = High); ➢ *Haemanthus* sp. (Status = Species-specific. POC = High); ➢ *Gladiolus* sp. (Status = Species-specific. POC = High) ➢ Nerine sp. (Status = Species-specific. POC = Medium); ➢ Orchidaceae sp. (Status = Species-specific. POC = High); ➢ *Watsonia sp.* (Status = Species-specific. POC = Medium); and ➢ *Helichrysum rugulosum* and *Helichrysum dregeanum* (Status = LC. POC = **Confirmed**).	➢ *Gladiolus* sp. (Status = Species-specific. POC = High) ➢ Orchidaceae sp. (Status = Species-specific. POC = Medium); and ➢ *Helichrysum rugulosum* (Status = LC. POC = **Confirmed**).
Threatened species	None anticipated. Refer to Appendix C.	

Table 3: Transformed Habitat.

HABITAT & SPECIES OVERVIEW
  
The Transformed Habitat includes areas where all vegetation has been either removed to erect buildings and roads or where habitat has been significantly modified (altered composition and function). Most of the study area, 615 ha, is currently utilised for agriculture where the native vegetation has been completely removed. Although some of these areas, especially along roadsides and farm steads, are still vegetated, they do not accurately represent the reference vegetation type in terms of vegetation structure or species composition. Ultimately, the areas where grasslands have been significantly modified now is represented by various weeds and common species prone to disturbance. The ecological condition of the Transformed Habitat is regarded as poor, encompassing areas that are severely or irreversibly modified, where both ecological function and structure have been compromised in composition. The vegetation within the Transformed Habitat is no longer considered to be indigenous (as per NEMA definition). The condition of the Transformed Habitat is considered to be in a poor ecological condition[11]. From a species perspective, the Transformed Habitat is of low diversity and associated with species that are not representative of the reference state. Examples of species observed in the Transformed Habitat include (refer also to Appendix B): ➢ Forb component: *Conyza bonariensis, Plantago lanceolata* and *Scabiosa columbaria*; ➢ Graminoid component: *Cynodon dactylon, Hyparrhenia hirta,* and *Melinis repens*; ➢ Succulent component: None, and none anticipated for this habitat; and ➢ Woody component: *Gomphocarpus fruticosus, Searsia lancea* and *Vachellia karroo*.
COLLAGE OF GRASSLAND SPECIES

[11] Areas that are severely or irreversibly modified. An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem.



Example species, from left to right, observed within the Transformed Habitat: *Tagetes minuta, Cirsium vulgare* (an AIP species), *Tamarix ramosissima* (an AIP species), *Argemone ochroleuca* subsp. *ochroleuca* (an AIP species), *Verbena bonariensis* (an AIP species) and *Xanthium strumarium* (an AIP species).

SPECIES OF CONSERVATION CONCERN	
Protected Species (refer also to Appendix C).	The Transformed Habitat are not important for populations of protected plant species. Although some **FSNCO** -listed species have the potential to be present, the incidence of these species in these grasslands would be low. Refer to the outcome of the SCC assessment for these habitat units below. **Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (FSNCO -protected):** ➢ *Helichrysum sp.* (Status = Species-specific. POC = High).
Threatened species	None anticipated. Refer to Appendix C.

Table 4: Freshwater Ecosystems.

HABITAT & SPECIES OVERVIEW
SEEP AND DEPRESSION WETLAND
  
Within the study area two HGM units, namely the seep wetlands and depression wetland were identified as true watercourses[12] in terms of the NWA (SAS 25 – 0190, 2026), Approximately, 81 ha of seep wetlands[13] and depression wetland[14] was identified within the study area (Ollis *et al.*, 2013). The vegetation community associated with the seep wetlands and depression wetland were very similar is composition and structure and thus they are explained together. A dominant species associated with the peripheries (or boundary) of wetlands within the study area was *Tamarix ramosissima* (NEMBA category 1b), however the floral habitat was often dominated by graminoid species (both grasses and sedge species). The seep wetland was associated with a slightly higher diversity of forbs compared to the depression wetlands. Considering the wetland habitat (seep wetlands and depression wetland) current condition the overall ecological condition is fair. The vegetation structure of the wetland habitats can be described as **tall, closed grasslands** as shown in Diagram A1 in Appendix A. From a species perspective, the seep wetlands and depression wetland has a relatively low diversity. Examples of species observed in the seep wetlands and depression wetland include (refer also to Appendix B): ➢ Forb component: *Denekia capensis, Drimia elata, Lobelia erinus, Monsonia angustifolia* and *Senecio coronatus;* ➢ Graminoid component: *Afroscirpoides dioeca*, *Aristida congesta*, *Cyperus congestus*, *Cyperus laevigatus, Cyperus marginatus*, *Imperata cylindrica*, *Juncus rigidus, Kyllinga alba*, *Phragmites australis, Sporobolus africanus* and *Typha capensis;*

[12] The National Water Act, 1998 (Act No. 36 of 1998) (NWA) define a watercourse as follows:1) a river or spring, 2) a natural channel which water flows regularly or intermittently, 3) a wetland, dam, or lake into which, or from which, water flows, and 4) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse. Reference to a watercourse includes, where relevant, its bed and banks.

[13] A wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley, but they do not, typically, extend into a valley floor.

[14] A wetland with closed (or near-closed) elevation contours which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates, giving rise to vertical water fluctuations. Depressions may be linked to a river and have channelled in and out flow (exorheic) but may also form in the absence of a river where the water table (groundwater input) intercepts the land surface, with no in and outflow channel present (known as endorheic isolated depressions).

- Succulent component: None, and none anticipated for this habitat given the increased moisture levels therein; and
- Woody component: *Asparagus laricinus* and *Gomphocarus fruticosus*.

ARTIFICIAL IMPOUNDMENTS





The anthropogenic impoundments are not defined as a true watercourse (based on the Freshwater report; SAS 25 – 0190, 2025). Alien Invasive plants (especially *Tamarix ramosissima*) have encroached along the Anthropogenic impoundments, and this encroachment is likely to intensify as a result of disturbances relating to the current land use (i.e., agriculture). The Anthropogenic impoundments are considered to be in a poor ecological condition based on the predominantly AIP vegetated and artificial nature (with little indigenous vegetation). The vegetation structure of the Anthropogenic impoundments can be described as either tall**, closed grasslands** and or **short, closed woodlands** (as shown in Diagram A1 in Appendix A).

From a species perspective, the Anthropogenic impoundments are of very low diversity. Examples of species observed in the Anthropogenic impoundments:

- Forb component: *Monsonia angustifolia* and *Senecio coronatus;*
- Graminoid component: *Hyparrhenia hirta, Imperata cylindrica*, *Phragmites australis* and *Typha capensis;*
- Succulent component: None, and none anticipated for this habitat given the increased moisture levels therein; and
- Woody component: *Asparagus laricinus*.

COLLAGE OF FRESHWATER SPECIES



Example species, from left to right, observed within this habitat unit: *Tamarix ramosissima* (an AIP species), *Juncus rigidus, Cyperus congestus, Sporobolus africanus*, *Denekia capensis* and *Lobelia erinus*.

SPECIES OF CONSERVATION CONCERN		
	Watercourses (seep & depression wetlands)	Anthropogenic impoundments
Protected Species (refer also to Appendix C).	**Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (FSNCO - protected):** ➢ *Haemanthus* sp. ((Status = Species-specific. POC = High); ➢ *Gladiolus* sp. (Status = Species-specific. POC = High); ➢ Nerine sp. (Status = Species-specific. POC = Medium); ➢ Orchidaceae sp. (Status = Species-specific. POC = Medium); ➢ *Kniphofia sp.* (Status = Species-specific. POC = Medium); ➢ *Zantedeschia sp.* (Status = Species-specific. POC = Medium); and ➢ *Helichrysum sp.* (Status = Species-specific. POC = High).	The Anthropogenic impoundments are not important for populations of protected plant species. Although some **FSNCO** listed species have the potential to be present, the incidence of these species in these habitats be low. **Protected species under the NEMBA TOPS Regulations (GN R152 of 2007):** ➢ None were recorded and none were anticipated to be present. **Protected trees on the NFA List of Protected Tree Species (GN 1935 of 2022):** ➢ None were recorded and none were anticipated to be present. **Specially Protected and Protected Species (FSNCO - protected):** ➢ *Kniphofia sp.* (Status = Species-specific. POC = Medium); ➢ *Zantedeschia sp.* (Status = Species-specific. POC = Medium); and ➢ *Helichrysum sp.* (Status = Species-specific. POC = High).
Threatened species	None anticipated. Refer to Appendix C.	

3.3 Biodiversity Priority Areas/ Conservation Significance

The biodiversity importance and the conservation significance of the study area is largely determined based on the triggering features identified in the screening tool (Terrestrial Biodiversity Theme), as well as additional provincial and national datasets as presented in Part A. The conservation features and their relation to the habitat units identified for the study area are presented in the table below.

Table 5 provides a breakdown of the biodiversity importance associated with the various habitat units.

Table 5: Biodiversity Priority Areas / Conservation Significance.

CBA 1	The northeastern corner of the study area was identified as CBA 1 (by the background database and which overlaps with Vaal Vet Sandy Grassland, Modified Grassland, Transformed Habitat and Seep wetland habitats), along with a central portion of the study area (associated with a large depression wetland). The presence of watercourses, such as seep wetlands and depression wetland in the areas identified as CBA 1 confirm the importance of this area with regards to ecological functioning and ecosystem services. Furthermore, the Freshwater Ecosystem does provide habitat for confirmed avifaunal SCC (STS 25 – 2059, 2026). Therefore, these watercourses confirm the presence of CBA 1 within the study area (especially the northeastern portion and central depression wetland). However, the area within the northeastern portion that correspond to transformed habitat (such as cultivated fields and old mining infrastructure) is not considered to be CBA 1. CBA 1 are sites that are irreplaceable or near irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with the site. Such sites are therefore critical, and they need to be maintained to ensure that future targets are achieved and that such features persist (Collins, N.B. 2018b).
ESA 1 & 2	A patch in the southern portion of the study area and a section of the study area in the west are indicated as ESA 1 from a desktop perspective, while the majority of the study area is identified as ESA 2. The areas associated with ESA 1 corresponds to depression wetlands, modified grasslands, anthropogenic impoundments and transformed habitat. The definition of ESA 1 based on the Free State Biodiversity Plan (FSBP) Dataset (2019) states that an "ESA 1 are sites with minimal degradation (Collins, N.B. 2018b)", therefore the transformed habitat (cultivated areas and anthropogenic impoundments) is not considered to be ESA 1 but the presence of modified grassland and watercourses are confirmed as ESA 1. The ESA 1 areas still provide an important role in supporting the ecological functioning of the area and support associated CBAs. ESA 2 are sites with degradation, i.e., they can be totally degraded but not totally transformed. Based on this classification in the FSBP the transformed habitat (i.e., cultivated areas and built-up areas) is not considered ESA 2 since they have been significantly modified. The remaining areas identified as ESA 2 by the database include modified grassland and watercourses (seep wetlands and depression wetlands) which is confirmed to represent ESA 2.
EN Vaal Vet Sandy Grassland	According to the 2022 RLE, the majority of the eastern portion of the study is located within the remaining extent of the **Vaal Vet Sandy Grassland** threatened ecosystem**.** Based on the filed verified conditions, only a portion of the study area (in the northeastern section) was confirmed to be representative of **the EN Vaal Vet Sandy Grassland (namely the habitat unit identified and termed "Vaal Vet Sandy Grasslands").** The remainder of the study area has been significantly impacted by anthropogenic activities (such as agriculture and/or transformation) either directly or indirectly (edge effects). The 46 ha in the northeastern section of the study area is considered to be primary grassland (i.e., little to no habitat modification) for at least two decades and the species composition and vegetation structure reflect that of the reference vegetation type. Therefore, the presence of threatened vegetation type is confirmed, only in the sections overlapping confirmed primary Grassland (i.e., ground-truthed and mapped **Vaal Vet Sandy Grasslands"**.
Highest Biodiversity Importance	The areas associated with the Highest Biodiversity Importance as indicated by Mining and Biodiversity Guidelines (2012) correspond to habitat that are confirmed as EN Vaal Vet Sandy Grassland, CBA 1 and ESA 2. Therefore, the Highest Biodiversity Importance is confirmed.

3.4 Alien and Invasive Plant (AIP) Species

South Africa is home to an estimated 759 naturalised or invasive terrestrial plant species (Richardson et al., 2020), with 327 plant species, most of which are invasive, listed in national legislation[15]. Many introduced species are beneficial, e.g., almost all agriculture and forestry production are based on alien species, with alien species also widely used in industries such as horticulture. However, some of these species manage to "escape" from their original locations, spread and become invasive. Although only a small proportion of introduced species become invasive (~0.1–10%), those that do proceed to impact negatively on biodiversity and the services that South Africa's diverse natural ecosystems provide (from ecotourism to harvesting food, cut flowers, and medicinal products) (van Wilgen and Wilson, 2018).

3.4.1 Legal Context

South Africa has released several articles of legislation that are applicable to the control of alien species. Currently, invasive species are controlled by the NEMBA – Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020. AIPs defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2020) in accordance with Section 70(1)(a) of the NEMBA:

- **Category 1a** species are those targeted for urgent national eradication;
- **Category 1b** species must be controlled as part of a national management programme, and cannot be traded or otherwise allowed to spread;
- **Category 2** species are the same as category 1b species, except that permits can be issued for their usage (e.g., invasive tree species can still be used in commercial forestry, providing a permit is issued that specifies where they may be grown and that permit holders "*Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to Regulation 3*"); and
- **Category 3** are listed invasive species that can be kept without permits, although they may not be traded or further propagated, and must be considered a Category 1b species if they occur in riparian zones.

[15] Government Notice (GN) number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).

Duty of Care, or responsibilities, regarding listed invasive species are mentioned in Section 73 of NEMBA[16]. Both environmental and economic considerations drive the motivation for this duty of care. The management of alien species in South Africa is estimated to cost at least ZAR 2 billion (approximately US$142 million) annually, which is the amount currently allocated by the national government's DFFE, specifically the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will ultimately reduce clearing costs.

3.4.2 Site Results

The study area is characterised by a moderate to high diversity of AIPs; the Modified Grassland and Transformed Habitat are associated with the highest abundance of AIPs specifically.

In total, 21 AIPs were recorded during the 2025 site assessment, of which 8 species are not currently listed. Species like *Bidens pilosa, Tagetes minuta,* and *Verbena aristigera* are not listed on the NEMBA list of invasive species, but these species tend to become problematic and proliferate in areas where there are increased disturbances. There is a risk that these problem plants may negatively impact indigenous species if not controlled. The remaining 14 species are NEMBA listed species with 12 Category 1b and one Category 2 NEMBA species.

Refer to Table 6 below for more information on the AIPs recorded within the various habitat units.

[16] Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-
a) notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;
b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and
c) take all the required steps to prevent or minimise harm to biodiversity.

Table 6: Alien and invasive alien species recorded in the study area.

Scientific name	Common Name	Origin	NEMBA Status	Grassland Habitat	Freshwater Ecosystems	Transformed Habitat
Agave americana	American Century Plant	Arid Chihuahua desert and the southwest United States	Not Listed	x	x	
Argemone mexicana	Yellow-Flowered Poppy	Mexico	1b	x	x	x
Argemone ochroleuca subsp. *ochroleuca*	Mexican Poppy	Mexico	1b	x	x	x
Bidens pilosa	Blackjack	Cosmopolitan weed native to South and Central America	Not Listed	x		x
Campuloclinium macrocephalum	Pompom Weed	Native to South America (Argentina and Brazil), Central America and Mexico	1b	x		
Cirsium vulgare	Spear Thistle, Scotch Thistle	Europe, western Asia, and northern Africa	1b	x	x	x
Conyza bonariensis	Flax-Leaved Horseweed	Central America or South America	Not Listed	x	x	x
Datura stramonium	Thorn Apple	Central America	1b	x		x
Lantana camara	Common Lantana	Central and South America	1b	x		
Melia azedarach	Chinaberry	Native to China, Japan, the Indian sub-continent	1b	x	x	
Opuntia ficus-indica	Prickly Pear	Mexico	1b	x		
Pinus pinaser	Cluster Pine	Mexico	2	x		
Phoenix canariensis	Date Palm	Canary Islands	Not Listed	x		
Richardia brasiliensis	Tropical Mexican Clover	South America	Not Listed	x		
Tagetes minuta	Wild Marigold	South and North America	Not Listed		x	x
Tamarix ramosissima	Pink Tamarisk	Western Europe and the Mediterranean to North Africa, Northeastern China, India and Japan	1b		x	
Taraxacum officinale	Dandelion	Eurasia	Not Listed	x		x
Tecoma stans	Yellow Bells	American southwest, from Texas to Arizona, and regions of Chihuahua and Sonora, Mexico	1b	x		
Verbena aristigera	South American Mock Vervain	South America	Not Listed	x		x
Verbena bonariensis	Purpletop Vervain	South America	1b	x	x	x
Xanthium strumarium	Large Cocklebur	North America	1b	x		

4 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

This section aims to (1) present the sensitivity of the receptors identified within the study area (e.g., SCC, the vegetation/fauna community or habitat type present on the site), and (2) clearly define and map areas where avoidance mitigation is strongly recommended if significant, negative residual impacts are to be avoided (and to prevent potential fatal flaws).

Based on the criteria provided in Appendix A of this report, all habitats within the study area were allocated an importance category, i.e., SEI category. SEI is a function of the biodiversity importance (BI) of the receptor and its resilience to impacts (receptor resilience [RR]). BI, in turn, is a function of conservation importance (CI) and the functional integrity (FI) of the receptor.

For an SEI of “Very High” and “High”, avoidance mitigation is. Table 7 indicates the individual SEI scoring for each habitat unit/receptor. Figure 4 illustrates the SEI for the receptors identified in the study area.

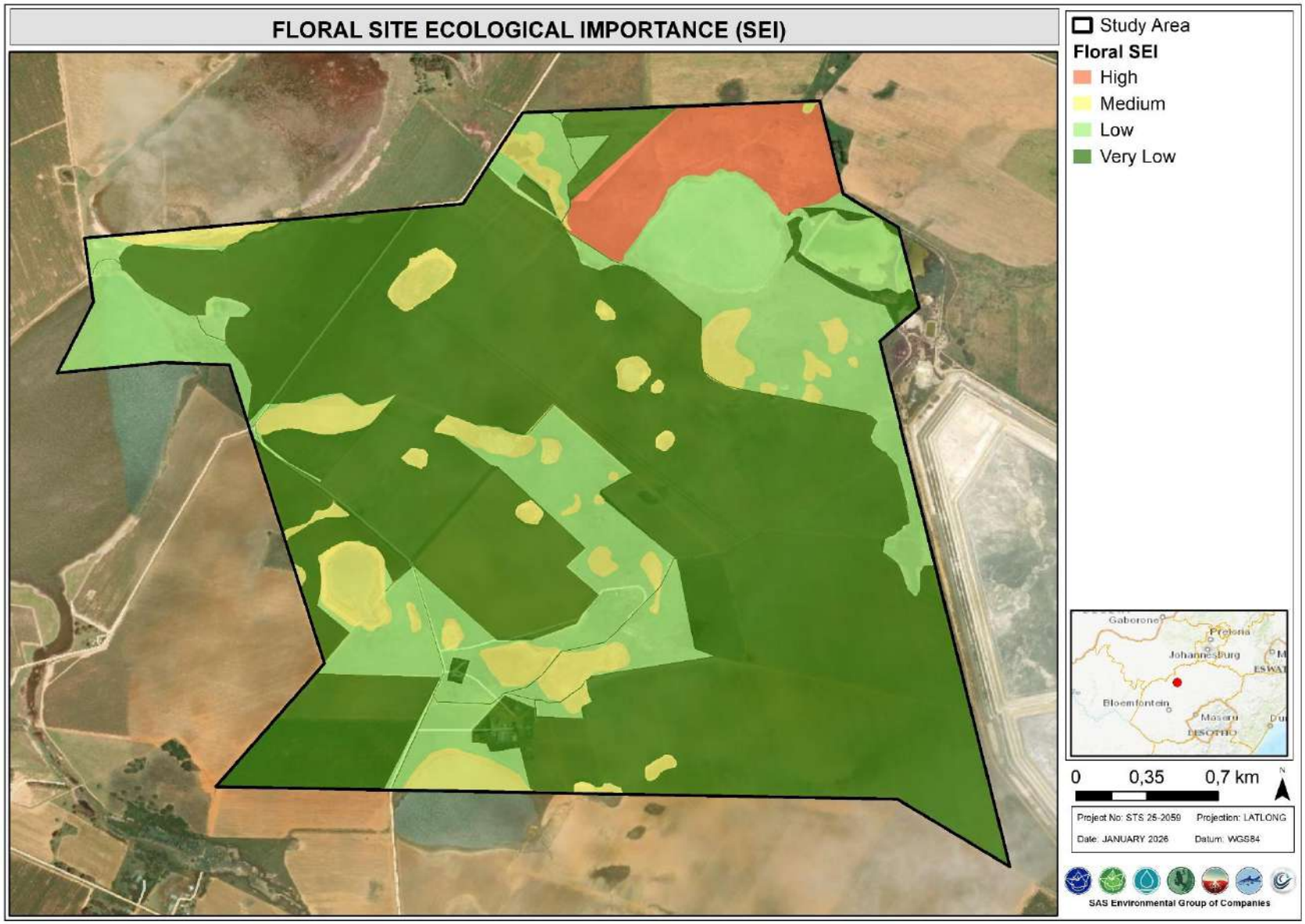


Figure 4: Conceptual illustration of the floral SEIs within the study area.

Table 7: SEI importance for the different habitat units (i.e., receptors) in the study area. Acronyms in the table header row include BI = biodiversity importance, CI = conservation importance, FI = functional integrity, RR = receptor resilience, and SEI = Site Ecological Importance.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Vaal Vet Sandy Grassland	**Low** No confirmed or highly likely populations of threatened SCC.	**High** Large (> 20 ha but < 100 ha) intact area of EN ecosystem types. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High	**Minimisation and restoration mitigation** – development activities of medium impact acceptable followed by appropriate restoration activities.
Modified Grassland	**Low** No confirmed or highly likely populations of threatened SCC.	**Medium** Medium (> 5 ha but < 20 ha) semi-intact area. Only narrow corridors of good habitat connectivity. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Low	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Low	**Minimisation and restoration mitigation** – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Freshwater Ecosystems: Seep wetland and Depression wetland	**Low** No confirmed or highly likely populations of threatened SCC.	**Medium** Medium (> 5 ha but < 20 ha) semi-intact area. Only narrow corridors of good habitat connectivity between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Low	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	Medium	**Minimisation and restoration mitigation** – development activities of medium to high impact acceptable followed by appropriate restoration activities.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Transformed Habitat and Anthropogenic impoundments	**Very Low** No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	**Very Low** Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.	**Very Low**	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	**Very Low**	**Minimisation mitigation –** development activities of medium to high impact acceptable and restoration activities may not be required.

5 IMPACT ASSESSMENT AND IMPACT STATEMENT

This section of the report aims to (1) provide a compliance statement for the verified “low sensitivity” of the screening tool’s Plant Species Theme (Section 5.1) and (2) provide a comprehensive impact assessment and discussion for the Terrestrial Biodiversity Theme (Section 5.2).

Existing underground access (shafts and level access), within the existing Harmony Target mining right (Harmony contribution) will be refurbished and re-equipped. **No new surface infrastructure** is planned within the study area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right. However, this report only focusses on the risks and mitigation with regards to underground mining associated with the study area.

5.1 Plant Species Compliance Statement

No threatened plant species were triggered by screening tool species, and none were present within the study area during the site assessment. Furthermore, no threatened species are anticipated to occur within the study area.

The proposed development has no anticipated impacts associated with surface development (i.e., infrastructure) and is limited to underground mining activities with existing mine shafts. Therefore, the proposed activities (underground mining) will not impact any floral SCCs, and no mitigation measures related to SCCs are required. Refer, however, to Section 5.2 for proposed mitigation measures related to vegetation and terrestrial biodiversity that will be affected by the proposed developments.

5.2 Terrestrial Biodiversity Theme Impact Assessment

The sections below outline the significance of the perceived impacts arising from the proposed activities within the focus area.

5.3 Impact registry

Given the underground nature of the proposed mining activities, no direct surface disturbance, vegetation clearance, or habitat loss is anticipated. Accordingly, this impact assessment does not assess direct impacts, but rather considers the **theoretical potential** for indirect or secondary effects associated with underground mining, including possible edge effects or subsidence-related processes[17]. These include:

- Potential habitat loss or fragmentation arising from unlikely surface expression; Potential soil disruption or degradation linked to subsidence, where applicable;
- A potential increase in AIPs in the event of surface disturbance; and
  Potential effects on significant biodiversity features should subsidence or surface expression occur.

An impact assessment and discussion of all potential i) Mining Phase (construction and operational phase) and (ii) Decommissioning Phase impacts are provided in Sections 5.4.1 and 5.4.2. All mitigatory measures required to minimise the calculated impacts are presented in Section 5.2.1. Life of Mine (LOM), which is 14 years.

5.4 Floral Impact Assessment Results

The tables (Table 8 - 13) below present the findings of the impact assessment, which was conducted with reference to the impacts both before and after the implementation of mitigation measures.

The mitigated results of the impact assessment have been calculated on the assumption that all mitigation measures stipulated in this report are adhered to and implemented. If such actions are not adhered to, post-mitigation impact scores will increase.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage).

[17] Mine subsidence is the **sinking, cracking, or collapse of the ground surface** due to underground mining (especially where support pillars are removed).

Conventional Breast Mining, where the orebody dips below 55°, conventional breast mining will be used. Footwall drives will be developed in the strike direction, between 40 to 48 metres (m) below the mining horizon. Crosscuts will subsequently be developed perpendicularly to the footwall drives, towards the reef horizon. Access to the reef horizon will be by travelling way, developed from the crosscut. Ore passes will be developed between the reef horizon and the crosscut for the removal of blasted ore from the stope. On the stope horizon, a raise or centre gully will be developed between levels up the centre of the mining block. Breast mining panels will be established off the centre gully. The panels will be mined approximately in the strike direction away from the centre gully to the stope block limit. An advanced strike gully (ASG) will be carried on the down dip side of each mining panel for access to the stope face and for clearing of blasted ore from the face. Typically, two stope ore passes will be situated in the centre gully which will connect the stoping areas to the footwall infrastructure. All ore produced in the stopes will be scraped into the ore passes for loading in the crosscut.

The breast faces will be drilled using hand-held, hydro-powered rock drills and airlegs. Blast holes will be charged with packaged emulsion explosives. Scraper cleaning will be used in the stope horizon. Ore will be scraped from the face, into the ASG and then into the centre gully. From the centre gully the rock is scraped over a stope grizzly into the ore pass. The bottom of the ore pass is equipped with a boxfront with a hydraulically operated gate. Where multiple reefs occur, and both are payable and are planned to be mined, the order of mining will be to extract the uppermost reef first, working downwards.

Shrinkage stoping is an overhand mining method that relies on broken material being left in the stope to be used as the “working floor” and to support the walls. The shrinkage stope is accessed via a travelling way. The stope is established and accessed by the development of two raises, one on each end of the stope panel. Two drives, separated by a sill pillar, are established at the bottom of the stope. Draw points are developed between the two drives for loading ore from the stope. Once the stope preparation development and equipping have been completed stoping commences by advancing the stope face up-dip from the sill drive. After each blast sufficient ore is drawn out to allow access between the new stope face and the top of the muckpile. Once the stope face reaches the upper limit, which is normally defined by a crown pillar, all men and equipment are withdrawn from the stope, and the remaining ore is drawn from the stope. Ore is drawn out of the stope by operating the scraper winch in the reef drive. This clears rock from the draw points and allows the ore to continue to flow.

The thickness of the sill pillar will vary from 5 to 8 m depending on the depth below surface and stope width. Draw points are developed between the sill drive and the reef drive approximately 5 to 7 m apart. The draw points will be equipped with box fronts for loading ore directly into hoppers. The geotechnical limit to the strike length per panel varies from 30 m on

the Basal Reef to 40 m on the B reef. These strike lengths are within the norms of operating a shrinkage stope, which is normally limited to 60 m by operational constraints. Adjacent stopes are separated by a rib pillar of 13 to 16 m in width.

The minimum factor of safety (FoS)[18] of 1.2 was used to determine support spacings and a summary of the support strategies for fairground conditions (Bara Consulting (Pty) Ltd, 2025).

The floral impact assessment focused on evaluating the potential for indirect and precautionary surface-related impacts associated with underground mining activities, specifically those that could arise from unlikely subsidence events. As no surface infrastructure, vegetation clearance, or direct disturbance is proposed, no direct floral impacts are anticipated. The impacts assessed below are therefore considered theoretical and are evaluated on a conservative, precautionary basis.

Following the completion of the proposed mining activities, the decommissioning, closure, and rehabilitation activities for the proposed project will be limited to the removal of underground infrastructure.

5.4.1 Impacts associated with the Mining Phase:

Table 8: Habitat loss and fragmentation as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of floral communities and fragmentation of intact natural areas. Such fragmentation isolates plant populations and reduces pollination, seed dispersal, and resilience.		
	Impact Rating *Without Mitigation*	**Impact Rating *With Mitigation***
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	Reversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape Plan and Rehabilitation plan developed by qualified specialists) to restore any impact to habitat integrity and condition.	
Irreplaceable loss of resources:	Yes	
Can impacts be enhanced:	Yes. Subsidence-related habitat loss and fragmentation are inherently negative, but early planning and well-designed mitigation can enhance ecological outcomes by improving connectivity, restoring *or creating habitats*, and strengthening ecosystem resilience.	
Residual impacts In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include:		

[18] A **pillar safety factor (PSF)** is the **ratio between the strength of a pillar and the load acting on it**:

- **PSF > 1.0** → pillar is theoretically stable
- **PSF < 1.0** → pillar failure is likely

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of floral communities and fragmentation of intact natural areas. Such fragmentation isolates plant populations and reduces pollination, seed dispersal, and resilience.
❖ Localised but irreversible loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs. ❖ Elevated management requirements post-closure. ❖ Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations). ❖ Loss of provincially protected floral species (FSNCO).
Mitigation measures ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ **Planning and mine design:** Adequate safety precautions and monitoring protocols be developed to lower the potential of subsidence and effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) to allow for immediate management of potential subsidence events. ❖ In areas where subsidence is anticipated a walkdown should take place to observe and mark any floral SCC for the possibility of loss in an event of subsidence. Should any SCC be anticipated to be lost a permit has to be obtained from the authorising governmental body. Where possible these species need to be relocated to a suitable area.

Table 9: Soil disruption and degradation as a potential impact from subsidence.

NATURE OF THE IMPACT: Soil disruption and degradation. Soil compaction and loss of topsoil, reduced soil fertility, and altered moisture regimes (e.g. surface cracking increases evaporation and changes in topography can lead to waterlogging in newly formed depressions). These changes can influence plant assemblages and reduce suitable habitat within the study area for native grassland species.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**Medium**	**Low**
Reversibility:	Moderately reversible with concurrent rehabilitation and a soil erosion plan to mitigate impacts.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	No	
Residual impacts ❖ Reduced nutrient cycling and soil water retention. ❖ Loss of topsoil, influencing establishment of plants. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs.		
Mitigation measures ❖ Bare areas are more susceptible to erosion, and these areas should be monitored closed to indicate any initial signs of subsidence. ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ **Concurrent rehabilitation** should be implemented. At the first signs of soil erosion the surface should be covered promptly with native plant species to prevent further loss of soil (where applicable) from wind and water erosion. Use erosion and sediment controls (e.g. contouring, mulching, silt barriers) in areas affected by surface cracking or deformation.		

Table 10: Increased incidence and proliferation of AIPs (due to habitat degradation associated with subsidence).

NATURE OF THE IMPACT: Increased incidence and proliferation of AIPs. Disturbed ground from subsidence (i.e., disruption in soil surface) provides disturbed areas in which AIPs can establish. Invasives plants often outcompete indigenous flora and become abundant in disturbed areas.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Short term
Magnitude	Minor	Minor
Probability	Possible	Possible
Calculated Significance Rating	**Medium**	**Low**
Reversibility:	Reversible with active AIP management.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Use the project as an opportunity to implement broader AIP control programs beyond the directly affected subsidence footprint. Since AIPs associated with the mining right area can invade nearby natural habitat (especially sensitive habitat within the study area-Vaal Vet Sandy Grassland and Freshwater ecosystems). Monitor post-subsidence vegetation composition and invasion trends.	
Residual impacts ❖ Lowered habitat integrity and floral diversity as a result of unmanaged AIP proliferation.		
Mitigation measures ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ **Concurrent rehabilitation** should be implemented. At the first signs of AIP proliferation and establishment within monitoring areas or operation areas AIP management must commence. Following an AIP Management and Control Plan associated with the mine. Any current or existing AIP control plans should be updated to include all additional proposed activities and be updated annually to incorporate any new information.		

Table 11: Loss of significant biodiversity features as a potential impact associated with subsidence.

NATURE OF THE IMPACT: Loss of significant biodiversity features. Important biodiversity areas such as CBA 1, ESA 1, ESA 2 and loss of threatened vegetation type (EN Vaal Vet Sandy Grassland) associated with subsidence.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Regional	Local
Duration	Long term	Short term
Magnitude	Major	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility:	Irreversible	
Irreplaceable loss of resources:	Yes	
Can impacts be enhanced:	Yes. Should subsidence affect important biodiversity areas restoring ecosystem structure and function (species composition, soil profiles, hydrology) rather than simple revegetation should be prioritised. Enhance and rehabilitate ecological corridors connecting CBAs and ESAs to reduce fragmentation caused by subsidence.	
Residual impacts ❖ Reduced representation of threatened vegetation types. ❖ Disruption of ecological corridors identified in provincial biodiversity plans (e.g. CBA and ESA). ❖ Reduced ecological integrity at a regional scale. Challenges in meeting national biodiversity targets. ❖ Loss of habitat contributing to ecological services and functioning (i.e., watercourses and intact grasslands).		

NATURE OF THE IMPACT: Loss of significant biodiversity features. Important biodiversity areas such as CBA 1, ESA 1, ESA 2 and loss of threatened vegetation type (EN Vaal Vet Sandy Grassland) associated with subsidence.
Mitigation measures ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ Offset strategies will need to be considered (and discussed with local authorities) should a significant subsidence event result in the loss of threatened vegetation types (EN Vaal Vet Sandy Grassland), CBA 1 and ESA 1&2.

5.4.2 Impacts associated with the Decommissioning Phase:

Following the completion of the proposed mining activities, the decommissioning, closure, and rehabilitation activities for the proposed project will be limited to the removal of underground infrastructure.

Table 12: Habitat loss and fragmentation from potential subsidence post mine closure.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of floral communities and fragmentation of intact natural areas. Such fragmentation isolates plant populations and reduces pollination, seed dispersal, and resilience.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Regional	Local
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility:	Reversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Should subsidence become evident after mine closure ecological management intervention through active rehabilitation should to be implemented.	
Residual impacts ❖ Localised but irreversible loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs. ❖ Elevated management requirements post-closure. ❖ Lower habitat resilience (i.e., capacity of ecosystems to recover from drought, fire, or extreme weather events) as a result of affected genetic variability within populations).		
Mitigation measures ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Safety protocols should be adhered to during decommission phase (to reduce the risk of surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts. ❖ Monitoring post mine closure and decommission should take place for at least 5-year post closure to ensure no delayed subsidence has occurred.		

5.5 Discussion and Recommendations

The proposed underground mining activities are not anticipated to impact on any habitats and since all infrastructure required for the proposed project will be located within the existing Harmony Target Mine mining right area and no new infrastructure is planned within the project area no impacts are anticipated for the study area. The risk of subsidence is considered unlikely (given the design and safety factor of the proposed underground mine). Therefore, the anticipated risks to floral diversity and terrestrial biodiversity are considered **low post mitigation** (given all mitigation measures are implemented).

5.5.1 Impacts on Floral Diversity and Habitat Integrity

Given the low likelihood of a subsidence event, impacts on floral habitat and species diversity is considered to be low. However, should an unlikely subsidence event occurs, the study area comprises a mosaic of habitats ranging in integrity and species diversity. The Vaal Vet Grassland, Modified Grassland and Freshwater Ecosystems (especially the wetlands) have a moderately high species diversity. Even minor subsidence can result in reduced species diversity and habitat degradation, since disturbed areas often become proliferated with AIPs (that can outcompete native flora), resulting in only localised loss of floral resources.

Habitat within the study area that are ecologically intact are isolated and relatively small in extent. Therefore, the levels of habitat and species loss are considered acceptable and will not lead to any significant negative residual impacts on floral resources.

5.5.2 Impacts on Floral SCC: FSNCO-protected species

Two FSNCO-protected species were recorded during the site assessment, namely *Helichrysum rugulosum* and *Helichrysum dregeanum*, however these species are very common grassland species and are well represented in surrounding areas. Some additional species from the FSNCO can likely occur within the study area (see Appendix C).

While no development is anticipated on the surface, possible impact associated with subsidence can impact of provincially protected floral. Therefore, in areas showing signs of minor subsidence a walkdown of the site will be required and if necessary, a permit will be required to relocated identified protected floral species.

5.5.3 Impact on CBAs, ESAs, Threatened Vegetation and Protected Areas

Since no surface infrastructure is planned, the direct risk to important biodiversity areas (CBA, ESA and threatened vegetation) is considered to be low. Additionally, the risk of subsidence, which is considered to be unlikely after mitigation, poses little risk to these important biodiversity features. However, in order to ensure low risk to important areas such as CBA,

ESA and threatened vegetation (Vaal Vet Sandy Grassland) pre-mining mitigation should include adequate mine design with recommended safety factors to reduce possible subsidence.

Should any subsidence occur and significantly impact CBA, ESA or threatened vegetation areas discussion with governmental authorities regarding the possible offset preparation will need to be considered.

5.5.4 Probable Residual Impacts

No significant negative residual impacts on terrestrial biodiversity have been identified for the proposed project. However, residual impacts on the receiving floral ecological environment are possible. The following points highlight the key residual impacts that have been identified:

- Localised edge effects such as AIP proliferation and soil erosion;
- Localised and potentially permanent loss of and altered floral species diversity (in case on subsidence); and
- Reduced ecological recovery where disturbed areas not rehabilitated to an ecologically functioning state during concurrent rehabilitation and mine closure, resulting in possible loss of floral habitat, species diversity, and protected floral species.

5.5.5 Cumulative Impacts

For the assessment of potential cumulative impacts to vegetation and plant species associated with the proposed activities, consideration was given to past, present, and future (known) projects and natural drivers that affect these aspects. Two areas of concern were identified:

- Habitat fragmentation: Remaining intact and connected portions of natural vegetation will be fragmented. Resulting in isolated natural areas that are no longer connected to functioning corridors (leading to a decrease in ecosystem functioning and ecosystems services);
- Spread of AIPs: Potential poor AIP management and additional disturbances from edge effects associated with the proposed activities (and future surrounding activities e.g., Tailings Storage Facility) may contribute to the introduction and spread of AIPs with a consequent cumulative decrease in habitat integrity within the surrounding natural areas which include a sensitive habitat (i.e., watercourses); and
- Additional developments: The probability of additional or new developments in the area is highly likely based on the setting and location of the study area (close proximity to other mining operations). The surrounding development will have cumulative impacts

on habitat loss and residual impacts (such as AIP proliferation and soil erosion) on the remaining natural to semi-natural habitat.

Given the available information, the proposed project is unlikely to have significant cumulative impacts on floral ecology.

Table 13: Cumulative impacts associated with the proposed underground mining project.

NATURE OF THE CUMULATIVE IMPACT: Habitat fragmentation, spread of AIPs (resulting in habitat degradation) and additional development resulting in loss of floral communities and potential floral SCC (provincially protected).		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Regional	Local
Duration	Long term	Medium term
Magnitude	Moderate	Minor
Probability	Possible	Possible
Calculated Significance Rating	**High**	**Low**
Reversibility:	Reversible. With adequate assessment of direct and cumulative risk assessment of current and future project the cumulative risk of this (and future) project can reduced.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: *(Yes or No)*		
Residual impacts ❖ Loss of natural vegetation and native floral species. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs. ❖ Elevated management requirements post-closure. ❖ Lower habitat resilience (i.e., capacity of ecosystems to recover from drought, fire, or extreme weather events) as a result of affected genetic variability within populations).		

6 CONCLUSION AND RECOMMENDATIONS

The proposed project activities are not expected to have a significant impact on important or sensitive floral resources, since no surface developments are associated with this project. The risk of significant impacts such as subsidence are considered to be of low risk and given the mitigations provided the impact to floral and terrestrial receptors are considered low. In terms of both the Plant Species Theme there is no impacts anticipated for threatened floral SCC and for the Terrestrial Biodiversity Theme, the impact is expected to be low.

Consequently, the specialist believes that, provided strict implementation of mitigation measures occurs together with sound environmental procedures, the project can be considered for approval strictly from a botanical and terrestrial biodiversity standpoint.

This study provides the relevant information necessary to implement Integrated Environmental Management (IEM) and ensure the optimal long-term use of ecological resources in the study area, in support of the principle of sustainable development. The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.

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APPENDIX A: Floral Method of Assessment

The methods outlined in this document are aligned with the assessment guidelines provided by the South African National Biodiversity Institute (SANBI) (SANBI, 2020). SANBI is the regulatory body within South Africa that is responsible for ensuring sustainable development through facilitating access to biodiversity data, generating information and knowledge, building capacity, providing policy advise, and showcasing and conserving biodiversity in respective botanical and zoological gardens.

As the regulatory body for biological data, SANBI provides assessment and reporting protocols. These protocols provide a minimum set of assessment and reporting criteria that must form the basis of specialist investigations required for many of the country's environmental processes. As such, the proposed methodology, as described below, is in accordance with in-country standardised field assessment methodologies.

Vegetation Surveys

Various field sampling methods are available for the purpose of collecting floristic data. Generally, the selection of chosen field methods is dependent on serval factors, including the size of the area to be assessed, the heterogeneity of the vegetation/habitat present, time and budget allocated for field assessments, the scale and magnitude of potential project impacts, and the scope of work to be assessed.

When planning the timing of a floristic survey, it is important to remember that the primary objective is not an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring species of conservation concern (SCC) (SANBI, 2020). An understanding of the location and extent of vegetation types of increased sensitivity, and the location of areas of increased importance for various species of SCC, will focus efforts for the identification and marking of SCC during detailed pre-construction walkdown efforts.

Given the restricted time frames in which the proposed field surveys need to be conducted and the combined objective of accurately demarcating sensitive habitats within the area of interest, the method chosen needs to allow for:

I. Rapid, accurate data collection; and
II. The optimisation of time spent in habitats that are likely to sustain SCC.

Several survey methods, known as rapid biological assessments (Larsen, 2016)[19], can be employed. Example of rapid biological assessments include plot-based assessments or transect-based assessments. SANBI (2020) recommends the use of a transect-based approach, namely timed-meander searches (TMS; Goff et al., 1982[20]). The vegetation surveys presented below are a modified version of the TMS methods (hereafter referred to as modified-meander searches (MMS)). The TMS and MMS are subjective sampling methods which employs techniques where the specialist chooses specific sample sites within the area of interest, based on their professional experience in the area and background research done prior to the site visit. This allows representative recordings of floral communities and optimal detection of SCC.

The difference in the TMS and MMS is that the MMS is not timed. The below list presents the reasons for selection of a modified approach:

- Time, access, and safety constraints are often unpredictable and cannot be planned for prior to a site assessment, especially within remote areas and areas where local communities may not provide consent to specialist to survey their lands. As such, a timed approach may result in disproportionate efforts in some pre-defined habitats.

[19] Larsen, T.H. ed., 2016. Core standardized methods for rapid biological field assessment. Conservation International.
[20] Goff, F.G., Dawson, G.A. and Rochow, J.J., 1982. Site examination for threatened and endangered plant species. Environmental Management, 6(4), pp.307-316.

- Vegetation surveys are conducted at the same time as the SCC assessments which limits the potential for timed assessments as SCC often occur either sporadically, or are difficult to detect and hence, longer surveys in certain areas are necessary (skewing the timed approach). Micro habitats where SCC are often found, are often difficult to detect on digital satellite imagery. As such, timing the surveys according to unverified field data will increase the risk of overlooking importance SCC data or habitat integrity features.
- Subjective decisions need to be made on-site that would otherwise interfere with a times-meander approach.

The employment of the presented field methods is beneficial because they allow for rapid data collection and subjective placement (based on professional experience and previous fieldwork knowledge) of the MMSs in habitats that have a higher likelihood of sustaining SCC. Furthermore, this method allows for extensive coverage of the subject property, thus increasing the probability of SCC and micro habitat detection. Extensive coverage of the area of interest will also be advantageous where properties are of large extents that need to be assessed.

Based on the broad habitat units delineated before going to site and the pre-identified points of interest, which is updated based on on-site observations and access constraints, the selected sample areas are surveyed on foot, following the subjective MMT, to identify the occurrence of the dominant plant species and habitat diversities, but also to detect SCC which tend to be sparsely distributed. Photographs are taken of each vegetation community that is representative of typical vegetation structure of that community, as well as photos of all detected SCC (sensitive species will not be presented in the report).

Vegetation structure has been described following the guideline in Edwards (1983). Refer to Figure A1 below:

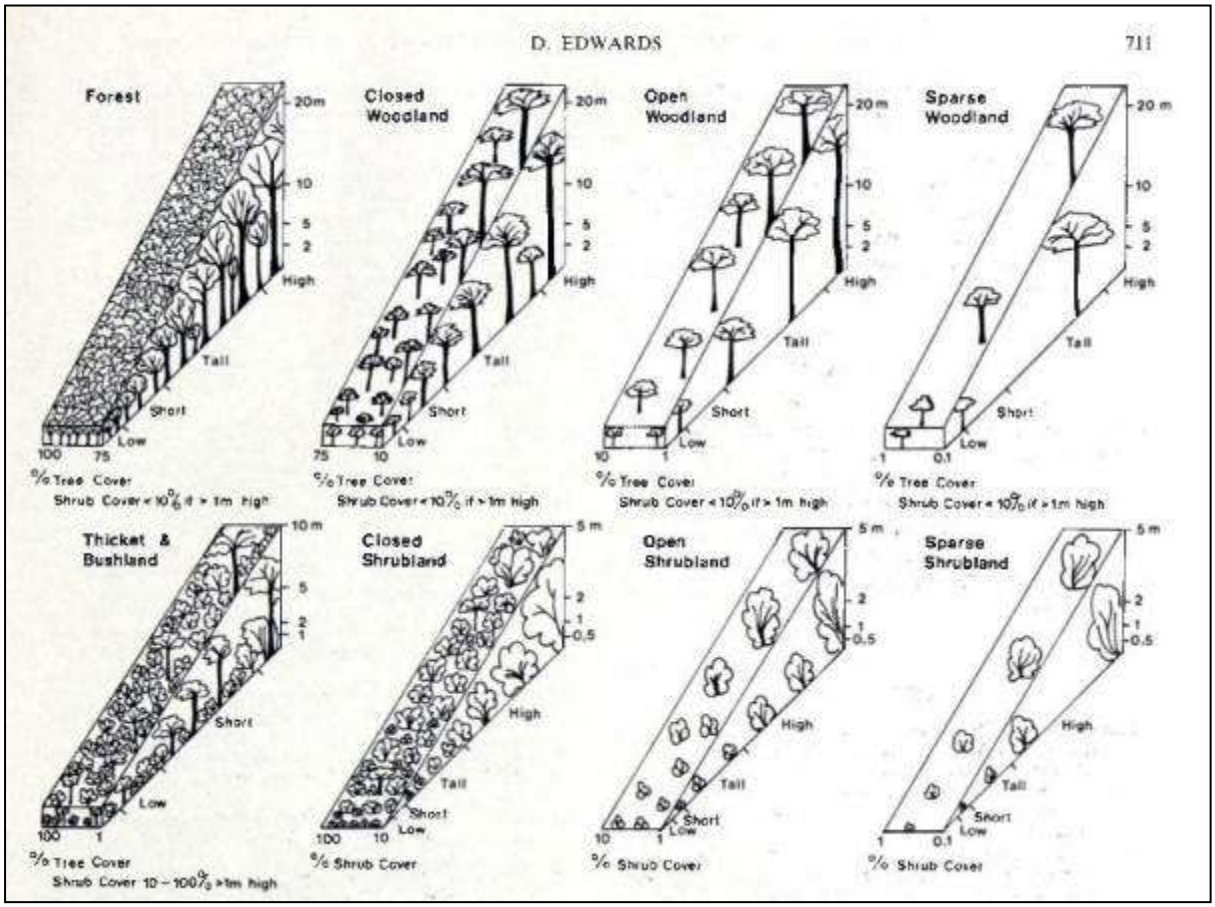


Figure A1: Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

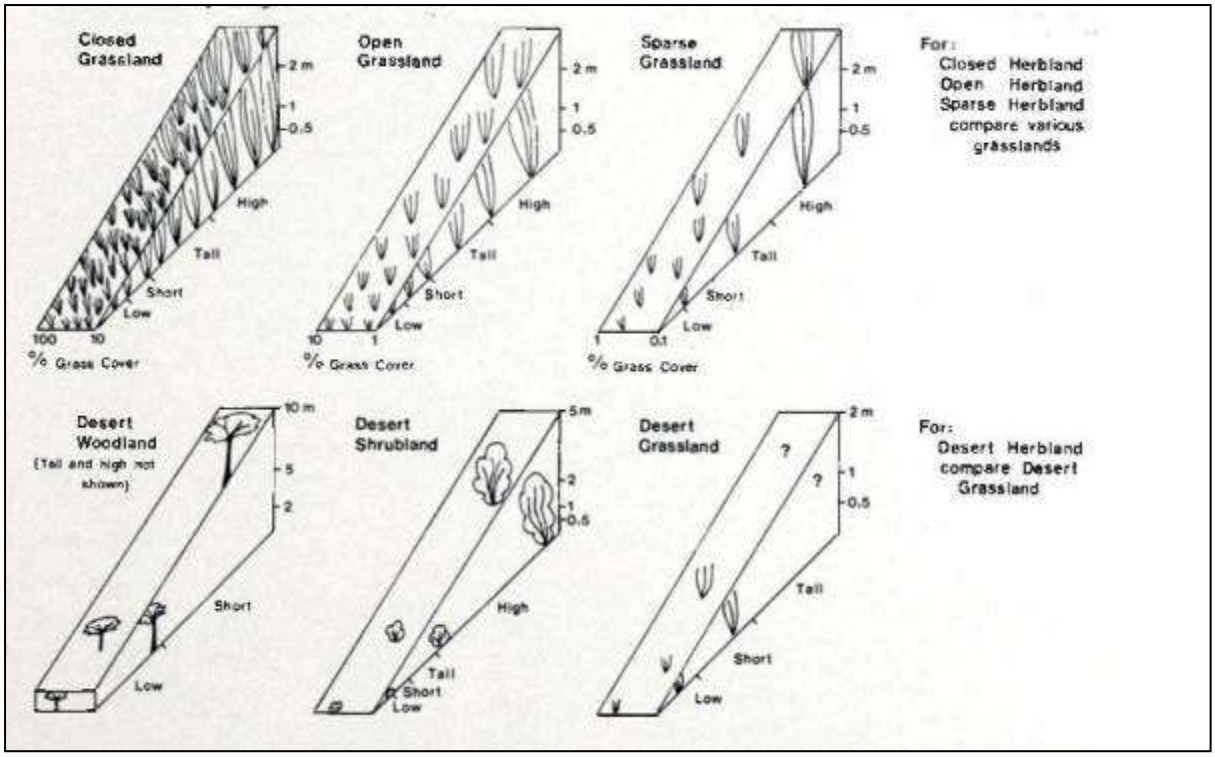


Figure A1 (continued): Diagrammatic representation of structural groups and formation classes. Only dominant growth forms are shown.

Floral Species of Conservational Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the study area, which includes consulting the National Web-based Environmental Screening Tool. Because not all SCC have been included in the Screening Tool layers (e.g., near-threatened (NT) and Data Deficient (DD) taxa), it remains important for the specialist to be on the lookout for additional SCC. For this study, two several sources were consulted and are described below.

The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the study area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, "*low*," "*medium*," "*high*" and "*very high*" sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g., for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below[21]:

- **Very High**: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 square kilometres (km^2) are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa's National Red

[21] More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:
- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- The National Web based Environmental Screening Tool website: https://screening.environment.gov.za/screeningtool/#/pages/welcome

List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.

- **High**: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 metre (m) with segments of remaining natural habitat.
- **Medium**: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75 percent (%) for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
- **Low**: Areas where no SCC are known or expected to occur.

IUCN RED LIST OF THREATENED SPECIES

The IUCN Red List of Threatened Species (IUCN, 2024), the world's most comprehensive information source on the global conservation status of animal, fungi and plant species, was accessed to obtain a list of all SCCs previously recorded in the area. Using the advanced search option, a list of known SCCs for the area was generated. The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. It divides species into nine categories: Not Evaluated (NE), Data Deficient (DD), Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX).

iNATURALIST

iNaturalist, a crowdsourced species identification system and an organism occurrence recording tool, was utilised to determine whether any SCCs were recorded within and/or surrounding the study area and to gauge the habitat types in which such species were previously recorded (primarily used before the site assessment as part of field preparation).

NEMBA TOPS SPECIES

The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Gazette [GN] 29657, as amended in GN R1187 in Government Gazette 30568 of 2007.

LIST OF PROTECTED TREE SPECIES (GOVERNMENT GAZETTE NO. 41887, NOTICE 536 OF 2018) LIST OF PROTECTED TREE SPECIES (GOVERNMENT GAZETTE NO. 41887, NOTICE 536 OF 2018) UNDER THE NATIONAL FORESTS ACT, 1998 (ACT NO. 84 OF 1998) (NFA)

In terms of section 15(1) of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. As these species are considered important, listed trees formed part of the SCC assessment.

SPECIALLY PROTECTED AND PROTECTED SPECIES

Species that are deemed important from a provincial biodiversity perspective include, e.g., species listed in the Free State Nature Conservation Ordinance 1969 (No 8 of 1969) (FSNCO) includes provincially protected plants under Schedule 6 (Protected Plants). Permits for removing, harming, or destroying species on the FSNCO list will require permits from the authorising governmental institution.

Determining the likelihood of a species occurring within the assessment area

Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species.

The Probability of Occurrence (POC) for each floral SCC is described:

- "**Confirmed'**: if observed during the survey;
- "**High**": if within the species' known distribution range and suitable habitat is available;
- "**Medium**": if either within the known distribution range of the species or if suitable habitat is present; or
- "**Low**": if the habitat is not suitable and falls outside the distribution range of the species.

Low POC	Medium POC	High POC	Confirmed

The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Consideration and application of the precautionary approach

The precautionary principle is defined by Tickner & Raffensperger (1999) as follows:

"*When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established scientifically*".

Given time and resource constraints within the field, it is not always feasible to definitively state the presence or absence of particular Species of Conservation Concern (SCC) or sensitive habitats. In such instances, the precautionary principle should be applied (SANBI, 2020). By applying such principles, preventative action is taken in the face of uncertainty. Furthermore, for cryptic species that are often difficult to detect, it is not always easy to provide undeniable proof that a species occurs within a particular area within a subject property. As such, if a suitable habitat is identified within the subject property and there is potential evidence to suggest the species did or can occur within the subject property (i.e., confirmed sightings in adjacent properties), then the precautionary principle will be to assume that the species does indeed occur within the area of interest. Appropriate mitigation and management efforts would then need to follow accordingly.

Floral Site Ecological Importance (SEI)

SEI is considered to be a function of the biodiversity importance (BI) of the receptor (e.g., Species of Conservation Concern, the vegetation/fauna community or habitat type present on the site[22]) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

SEI can be derived from a simple matrix of BI and RR as follows:

Table A1: Matrix of CI and FI to determine BI.

Site Ecological Importance (SEI)		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

[22] Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.

Interpretation of the SEI in the context of the proposed development is provided below.

Table A2: Guidelines for interpreting SEI in the context of the proposed development activities.

Site ecological importance	Interpretation in relation to proposed development activities
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

BI = CI + FI

BI can be derived from a simple matrix of CI and FI as follows:

Table A3: Matrix of CI and FI to determine BI.

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional Integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN [2016]).

Conservation importance is defined here as:

'The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.'

These criteria are defined as follows:

- IUCN threatened and Near Threatened species (CR, EN, VU and NT) are defined as either the global or national assessments of the risk of extinction as evaluated by a dedicated panel of species specialists according to the criteria of the International Union for The Conservation of Nature (www.iucnredlist.org). Where the global and national assessments differ for the same taxon, the national evaluation of status[23] should be used in calculating SEI unless the global assessment is both more recent and of a more threatened category. It is important to note that the specialist is required to have a firm understanding of the IUCN Red List Categories and Criteria (IUCN 2012) in order to appropriately apply these for the evaluation of SEI. This

[23] http://speciesstatus.sanbi.org/. For mammals: https://www.ewt.org.za/wp-content/uploads/2020/04/2020-updated-2016-Red-List-of-Mammals-of-South- Africa-Lesotho-Swaziland-Summary-Listings.xlsx; for plants: http://redlist.sanbi.org.

criterion can be assessed using confirmed occurrences of species or the suitability of the habitat to support these species. Rare species are those included on South Africa's National Red List as Rare or Critically Rare or Extremely Rare. These are highly restricted species that are currently not declining. However, should any development impact on a population of these species they will immediately qualify under one of the IUCN categories of threat. y Range-restricted species – the presence of terrestrial flora, vertebrate and invertebrate fauna with a global population extent of occurrence (EOO) of 10 000 km^2 or less.

- Globally significant populations of congregatory species – a roughly estimated proportion (%) of the global population of a fauna species that congregate for breeding/feeding/hibernation/other reasons. y Significant areas of threatened vegetation types – this is a function of both the area (size) being considered in relation to the total extent of that vegetation type (i.e., proportion) and how threatened (CR, EN, VU) the vegetation types are.
- Natural processes – natural unmanaged areas with low levels of ecological disturbance have largely intact natural processes such as pollination, seed dispersal and migration, and thus have greater intrinsic conservation importance than those that are modified through ecological disturbance.

While most of the features that will be included in the CI will be provided by the screening tool, it is important to note that CI is evaluated at a much finer spatial scale and based on fieldwork data collection and comprehensive desktop analyses performed by the specialist during the EA process. As a minimum requirement, CI needs to be determined for each identified habitat within the project footprint, but best practice recommendation is that it should be determined for all habitats within the entire PAOI[24].

Fulfilling criteria to evaluate CI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation, providing a more robust evaluation of CI (Table A4). Furthermore, while CI is most likely to be assessed based on data collected during the fieldwork survey, it can also be an assessment of the suitability of the receptor to support populations conforming to the fulfilling criteria. As can be seen from the worked example below, each of these evaluations of the fulfilling criteria demand necessary justification.

Table A4: Conservation importance (CI) criteria.

Conservation importance	Fulfilling criteria
Very high	- Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[25] or Critically Rare[26] species that have a global EOO of < 10 km^2. - Any area of natural habitat[27] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[28]) of natural habitat of EN ecosystem type. - Globally significant populations of congregatory species (> 10% of global population).
High	- Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. - Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. - Presence of Rare species.

[24] Because CI needs to be assigned to a receptor (e.g., the vegetation/fauna community or habitat type), it is customary to use the flora community delineation developed for a PAOI by a botanical specialist. However, such delineation is often too fine scaled to define fauna-specific habitats, which are generally more structural than phytosociological in nature. Where this is the case, the fauna specialist should merge two or more relevant floral communities to correlate with the specific fauna habitat type that is characteristic of a particular taxon assemblage. In certain cases, the faunal specialist will have to demarcate habitats that have not been classified by the botanical specialist; a pertinent example is the presence of cliffs, which are frequently important breeding habitat for some bird SCC.

[25] For butterflies, as per Armstrong *et al*. (2013).

[26] For plants, as per Raimondo *et al*. (2009).

[27] This excludes areas of transformed habitat within a defined ecosystem even if these are partially restored, e.g., Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.

[28] This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: http://bgis.sanbi. org/Projects/Detail/49).

Conservation importance	Fulfilling criteria
	- Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	- Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. - Any area of natural habitat of threatened ecosystem type with status of VU. - Presence of range-restricted species. - > 50% of receptor contains natural habitat with potential to support SCC.
Low	- No confirmed or highly likely populations of SCC. - No confirmed or highly likely populations of range-restricted species. - < 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	- No confirmed and highly unlikely populations of SCC. - No confirmed and highly unlikely populations of range-restricted species. - No natural habitat remaining.

Functional integrity (FI) of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions. Simply stated, FI is:

'A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.'

These criteria can be defined as:

- Connectivity to other natural areas – connectivity, which can also be measured conversely as the degree of habitat fragmentation, refers to how connected habitat patches are to each other, which has a significant influence on numerous ecological processes, such as migration and dispersal opportunities of biota and therefore genetic exchange between populations. Connectivity to other similar habitats becomes more important as the remaining intact and functional area of a habitat decreases, mainly because population sizes decrease and are therefore at greater risk from ecological perturbations and inbreeding effects. The degree of connectivity between habitat patches varies greatly with the dispersal ability of the taxon or taxon group (e.g., fossorial reptiles) in question.
- Degree of current persistent negative ecological impacts – persistent negative impacts such as uncontrolled spread of alien and invasive flora effectively decreases both the remaining intact area and ecosystem functioning of a particular habitat. Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.
- Remaining intact and functional area – the proportion of the receptor that supports natural habitat with intact ecological processes – small areas are less likely to withstand ecological degradation compared to large areas, and the latter are therefore better able to maintain structure and function allowing for intact ecological processes.

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table A5) and will require justification by the specialist.

Table A5: Functional integrity (FI) criteria.

Functional integrity	Fulfilling criteria
Very high	- Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. - High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. - No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	- Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. - Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. - Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	- Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. - Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. - Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	- Small (> 1 ha but < 5 ha) area. - Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. - Several minor and major current negative ecological impacts.
Very low	- Very small (< 1 ha) area. - No habitat connectivity except for flying species or flora with wind-dispersed seeds. - Several major current negative ecological impacts.

Ecological processes can be considered to be mostly intact and functional if the receptor area has low levels of current ecological disruptors, has good connectivity to other areas and is a relatively large area. As for CI, the fulfilling criteria to evaluate FI do not rely on a single specific threshold for each of the above defining characteristics but can act in combination or in isolation (Table 8.2) and will require justification by the specialist (see worked example below).

Receptor resilience (RR) is defined here as:

'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.'

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor (Table A4) and will require justification by the specialist. The specialist needs to bear in mind that resilience will often be linked to a particular disturbance or impact, or even time of year, and needs to be described in relation to these factors. For example, large birds of prey have different levels of resilience to noise disturbance depending on whether they are breeding or not; these species would have low resilience to noise disturbance such as construction of a road adjacent to a nest site during the breeding season but a higher resilience to lodge construction in an area with limited breeding habitat outside of the breeding season.

Receptor resilience needs to be evaluated by the specialist and justification for each evaluation must be provided in the report (see worked example below). Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows:

SEI should be described in the above manner for each impact receptor within the area of influence and clearly mapped in relation to the proposed development activities and infrastructure. Interpretation of SEI in the context of the proposed development activities (Table A1) must be provided by the specialist. **It is very important to note that SEI is specific to the proposed development activities and cannot be meaningfully compared between different proposed projects with different associated**

activities on the same spatial location. However, SEI for the same proposed development with multiple alternative layouts and/or locations may be compared within the same study.

Table A6: Resilience criteria.

Resilience	Fulfilling criteria
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%[28] of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

APPENDIX B: Floral Species List

Table B1: Floral species encountered during the field assessment. Species protected under the TNCO, NFA, TOPS, or that are threatened are emboldened in the table below. NL= Not listed.

Habit	Species Name	AIP	Vaal Vet Sandy Grassland	Modified Grassland	Seep & Depression wetland	Anthropogenic Impoundments	Transformed Habitat
GRAMINOID	*Afroscirpoides dioeca*				x	x	
	Aristida congesta				x		
	Cymbopogon pospischilii		x				
	Cynodon dactylon			x			x
	Cyperus congestus				x		
	Cyperus laevigatus				x		
	Cyperus marginatus				x		
	Digitaria eriantha		x	x			
	Enneapogon scoparius		x	x			
	Eragrostis lehmanniana			x			
	Eragrostis plana		x	x			
	Eragrostis superba		x	x			
	Hyparrhenia hirta		x	x	x	x	x
	Imperata cylindrica				x	x	
	Juncus rigidus				x	x	
	Kyllinga alba				x		
	Megathyrsus maximus			x			
	Melinis repens		x	x			x
	Panicum coloratum			x			
	Phragmites australis				x	x	
	Setaria sphacelata			x			
	Sporobolus africanus				x	x	
	Themeda triandra		x				
	Triraphis andropogonoides		x				
	Typha capensis				x	x	
HERBACEOUS	*Argemone mexicana*	x		x	x	x	x
	Argemone ochroleuca subsp. *ochroleuca*	x		x		x	x
	Bidens pilosa	x	x	x			x
	Campuloclinium macrocephalum	x		x			
	Cirsium vulgare	x	x	x	x		x
	Conyza bonariensis	x					

Habit	Species Name	AIP	Vaal Vet Sandy Grassland	Modified Grassland	Seep & Depression wetland	Anthropogenic Impoundments	Transformed Habitat
	Richardia brasiliensis	x	x	x			
	Tagetes minuta	x		x			x
	Taraxacum officinale	x		x			x
	Verbena aristigera	x		x			x
	Verbena bonariensis	x	x	x	x		x
	Xanthium strumarium	x			x		
	Arctotis venusta		x				
	Barleria macrostegia		x				
	Bulbine narcissifolia		x				
	Chlorophytum cooperi		x				
	Chlorophytum cooperi			x			
	Commelina africana		x	x			
	Conyza bonariensis			x	x		x
	Denekia capensis						x
	Dipcadi viride		x				
	Drimia elata		x				x
	Felicia muricata		x	x			
	Geigeria aspera var. aspera		x				
	Gnaphalium declinatum			x			
	Helichrysum dregeanum		x				
	Helichrysum rugulosum			x			
	Hibiscus pusillus		x				
	Ipomoea ommanneyi		x				
	Kohautia amatymbica			x			
	Ledebouria luteola		x	x			
	Ledebouria marginata		x				
	Lobelia erinus						x
	Monsonia angustifolia						x
	Monsonia burkeana		x				
	Nidorella microcephala			x			
	Oxalis depressa			x			
	Pentzia incana			x			
	Plantago lanceolata				x		
	Salvia stenophylla			x			
	Scabiosa columbaria				x		

Habit	Species Name	AIP	Vaal Vet Sandy Grassland	Modified Grassland	Seep & Depression wetland	Anthropogenic Impoundments	Transformed Habitat
	Selago densiflora		x				
	Senecio coronatus						x
	Tagetes minuta			x			
	Wahlenbergia undulata		x				
SUCCULENT	*Agave americana*	x		x	x	x	
	Opuntia ficus-indica	x	x	x			
WOODY	*Asparagus laricinus*			x	x	x	
	Cupressus sempervirens	x		x			
	Datura stramonium	x		x			x
	Gomphocarpus fruticosus		x	x	x		x
	Lantana camara	x		x			
	Melia azedarach	x		x		x	
	Phoenix canariensis	x					
	Pinus pinaster	x	x				
	Searsia lancea				x		x
	Searsia pyroides			x			
	Tamarix ramosissima	x		x	x	x	
	Tecoma stans	x					
	Vachellia karroo			x			x

APPENDIX C: Floral SCC

South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. Due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. Because the Red List of South African plants is used widely in South African conservation practices such as systematic conservation planning or protected area expansion, we use an amended system of categories designed to highlight those species that are at low risk of extinction but of conservation concern.

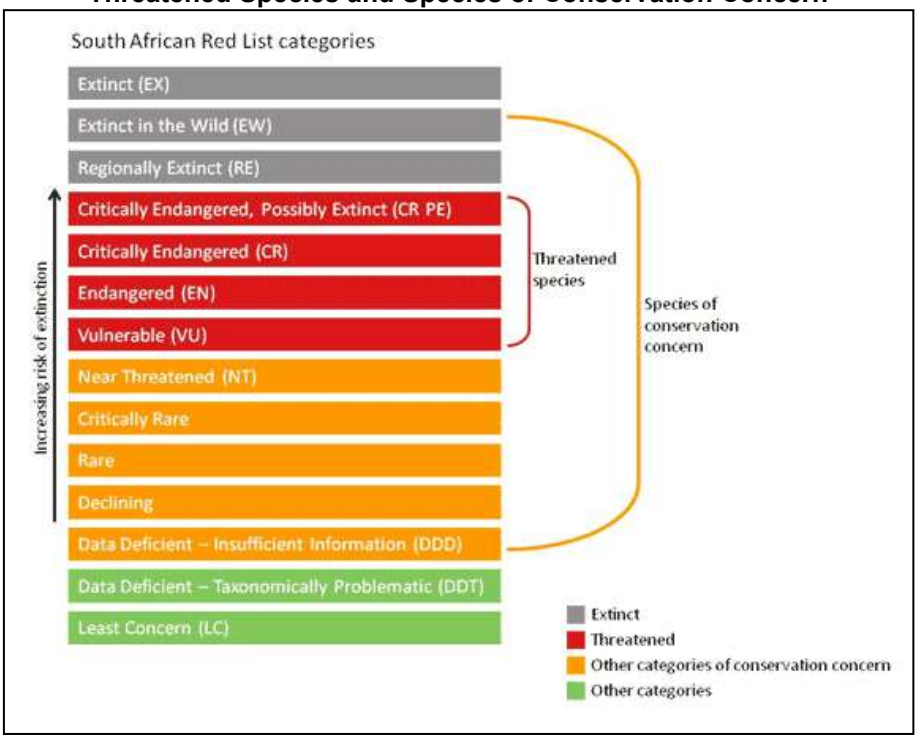
Definitions of the national Red List categories

Categories marked with ^{N} are non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

- **Extinct** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- ^{N}**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- ^{N}**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km^2, OR
  - Habitat specialist: Species is restricted to a specialised microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km^2, OR
  - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
  - Small global population: Less than 10 000 mature individuals.
- **Least Concern (LC)** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.

- **Data Deficient - Insufficient Information (DDD)** A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
- **Data Deficient - Taxonomically Problematic (DDT)** A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
- **Not Evaluated** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in Plants of southern Africa: an online checklist are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.

Threatened Species and Species of Conservation Concern



NEMBA TOPS List for South Africa[29]

Table C2: TOPS list for South Africa – plant species.

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Adenia wilmsii	No common name	**Low**	Provincial distribution: Mpumalanga Range: Lydenburg to Waterval Boven Description: Dolerite outcrops or red loam soil, in open woodland, 1300-1500 m.	**EN; P**
Adenium swazicum	Swaziland Impala Lily	**Low**	Range: Kruger National Park to Swaziland along the Lebombo Mountains and adjacent areas in south-western Mozambique.	**VU**
Adenium swazicum	Swaziland Impala Lily	**Low**	Provincial distribution: Mpumalanga	**VU**
Aloe albida	Grass Aloe	**Low**	Provincial distribution: Mpumalanga Range: Aloe albida has a restricted range in the mountains south of Barberton, Mpumalanga, extending to Malolotja in north-western Swaziland.	**NT**
***Aloe pillansii* (now *Aloidendron pillansii*)**	False Quiver Tree	**Low**	Provincial distribution: Northern Cape Range: Richtersveld and southern Namibia.	**EN**
Aloe simii	No common name	**Low**	Provincial distribution: Mpumalanga Range: This species is endemic to a small area in the transition area between the Mpumalanga Lowveld and Escarpment, where it occurs from Sabie southwards to White River and around Nelspruit. Description: It occurs along drainage lines and in wetlands in open woodland and grassland, 600-1100 m.	**EN; P**
Clivia mirabilis	"Oorlogskloof 'Bush Lily	**Low**	Provincial distribution: Northern Cape, Western Cape	**VU; P**
Diaphananthe millarii	Tree Orchid	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal Range: East London and Durban.	**VU**
Disa macrostachya	No common name	**Low**	Provincial distribution: Northern Cape	**EN; P**
Disa nubigena	No common name	**Low**	Provincial distribution: Western Cape	**Rare; P**
Disa physodes	No common name	**Low**	Provincial distribution: Western Cape	**CR; P**
Disa procera	No common name	**Low**	Provincial distribution: Western Cape	**EN; P**
Disa sabulosa	No common name	**Low**	Provincial distribution: Western Cape	**EN; P**
Encephalartos aemulans	Ngotshe Cycad	**Low**	Provincial distribution: KwaZulu-Natal	**CR**
Encephalartos altensteinii	Bread Palm	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal	**VU; P**
Encephalartos arenarius	Dune Cycad	**Low**	Provincial distribution: Eastern Cape	**EN**
Encephalartos brevifoliolatus	Escarpment Cycad	**Low**	Provincial distribution: Limpopo	**EW**
Encephalartos caffer	Breadfruit Tree	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal	**NT; P**

[29] National Environmental Management: Biodiversity Act 10 of 2004 - Threatened or Protected Species Regulations, 2007. Government Notice R152 in Government Gazette 29657 dated 23 February 2007. Commencement date: 1 June 2007 [GN R150, Gazette no. 29657], as amended.

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
Encephalartos cerinus	Waxen Cycad	**Low**	Provincial distribution: KwaZulu-Natal	**CR**
Encephalartos cupidus	Blyde River Cycad	**Low**	Provincial distribution: Limpopo, Mpumalanga Description: Grassland, on steep, rocky slopes, or cliffs and sometimes near seepage areas bordering gallery forests.	**CR**
Encephalartos dolomiticus	Wolkberg Cycad	**Low**	Provincial distribution: Limpopo	**CR**
Encephalartos dyerianus	Lowveld Cycad	**Low**	Provincial distribution: Limpopo	**CR; P**
Encephalartos eugene-maraisii	Waterberg Cycad	**Low**	Provincial distribution: Limpopo	**EN**
Encephalartos friderici-guilielmi	No common name	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal	**NT; P**
Encephalartos ghellinckii	No common name	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal	**VU; P**
Encephalartos heenanii	Woolly Cycad	**Low**	Provincial distribution: Mpumalanga Description: Open areas of montane grasslands amidst scarp forest in deep valleys and ravines.	**CR**
Encephalartos hirsutus	Venda Cycad	**Low**	Provincial distribution: Limpopo	**CR**
Encephalartos horridus	Eastern Cape Blue Cycad	**Low**	Provincial distribution: Eastern Cape	**EN**
Encephalartos humilis	No common name	**Low**	Provincial distribution: Mpumalanga Description: Montane and mistbelt grassland, rocky sandstone slopes.	**VU; P**
Encephalartos inopinus	Lydenburg Cycad	**Low**	Provincial distribution: Limpopo	**CR**
Encephalartos laevifolius	Kaapsehoop Cycad	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga Description: Steep, rocky slopes in mistbelt grassland, 1300-1500 m.	**CR**
Encephalartos lanatus	No common name	**Low**	Provincial distribution: Gauteng and western Mpumalanga Description: Sheltered, wooded ravines in sandstone ridges, 1200-1500 m.	**NT; P**
Encephalartos latifrons	Albany Cycad	**Low**	Provincial distribution: Eastern Cape	**CR**
Encephalartos lebomboensis	Lebombo Cycad	**Low**	Provincial distribution: KwaZulu-Natal, Mpumalanga Description: Cliffs and rocky ravines in the savanna and the grassland.	**EN**
Encephalartos lehmannii	No common name	**Low**	Provincial distribution: Eastern Cape	**NT; P**
Encephalartos longifolius	No common name	**Low**	Provincial distribution: Eastern Cape	**NT; P**
Encephalartos middelburgensis	Middelburg Cycad	**Low**	Provincial distribution: Gauteng, Mpumalanga Description: Open grasslands and in sheltered valleys.	**CR**
Encephalartos msinganus	Msinga, Cycad	**Low**	Provincial distribution: KwaZulu-Natal	**CR**
Encephalartos natalensis	Natal Giant Cycad	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal	**NT; P**
Encephalartos ngoyanus	Ngoye Dwarf Cycad	**Low**	Provincial distribution: KwaZulu-Natal	**VU**
Encephalartos nubimontanus	Blue Cycad	**Low**	Provincial distribution: Limpopo	**EW**
Encephalartos paucidentatus	No common name	**Low**	Provincial distribution: Mpumalanga	**VU; P**

NEMBA TOPS LIST (PLANT SPECIES)				
Scientific Name	**Common Name**	**POC**	**Provincial Distribution**	**Conservation Status**
			Description: Forest, occurs on steep rocky slopes and alongside streams in deep gorges.	
Encephalartos princeps	No common name	**Low**	Provincial distribution: Eastern Cape	**VU; P**
Encephalartos senticosus	No common name	**Low**	Provincial distribution: KwaZulu-Natal	**VU; P**
Encephalartos transvenosus	Modjadje Cycad	**Low**	Provincial distribution: Limpopo	**LC; P**
Encephalartos trispinosus	No common name	**Low**	Provincial distribution: Eastern Cape	**VU; P**
Encephalartos woodii	Wood's Cycad	**Low**	Provincial distribution: KwaZulu-Natal	**EW**
Euphorbia clivicola	No common name	**Low**	Provincial distribution: Limpopo	**CR; P**
Euphorbia meloformis	No common name	**Low**	Provincial distribution: Eastern Cape	**NT; P**
Euphorbia obesa	No common name	**Low**	Provincial distribution: Eastern Cape	**EN; P**
Harpagophytum procumbens	Devil's Claw	**Low**	Provincial distribution: Free State, Limpopo, Northern Cape, North West	**LC; P**
Harpagophytum zeyherii	Devil's Claw	**Low**	Provincial distribution: Gauteng, Limpopo, Mpumalanga, North West	**LC; P**
Hoodia currorii	Ghaap	**Low**	Provincial distribution: Limpopo	**P**
Hoodia gordonii	Ghaap	**Low**	Provincial distribution: Free State, Northern Cape, Western Cape	**DDD; P**
Jubaeopsis caffra	Pondoland Coconut	**Low**	Provincial distribution: Eastern Cape	**EN**
Merwilla plumbea	Blue Squill	**Low**	Provincial distribution: KwaZulu-Natal, Mpumalanga Major habitats: Grassland Description: Montane mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes. 300-2500 m.	**NT**
Newtonia hildebrandtii* var. *hildebrandtii	Lebombo Wattle	**Low**	Provincial distribution: KwaZulu-Natal	**Now LC**
Protea odorata	Swartland Sugarbush	**Low**	Provincial distribution: Western Cape	**CR; P**
Siphonochilus aethiopicus	Wild Ginger	**Low**	Provincial distribution: KwaZulu-Natal, Limpopo, Mpumalanga Range: Sporadically from the Letaba catchment in the Limpopo Lowveld to Swaziland. Extinct in KwaZulu-Natal. Widespread elsewhere in Africa. Description: Tall open or closed woodland, wooded grassland, or bushveld.	**CR**
Stangeria eriopus	No common name	**Low**	Provincial distribution: Eastern Cape, KwaZulu-Natal	**VU; P**
Warburgia salutaris	Pepper-bark Tree	**Low**	Provincial distribution: KwaZulu-Natal, Limpopo, Mpumalanga Range: North-eastern KwaZulu-Natal, Mpumalanga, and Limpopo Province. Also occurs in Swaziland, Mozambique, Zimbabwe, and Malawi. Description: Variable, including coastal, riverine, dune and montane forest as well as open woodland and thickets.	**EN**
Zantedeschia jucunda	Yellow Arum Lilly	**Low**	Provincial distribution: Limpopo	**VU**

CR = Critically Endangered, EN = Endangered, EW = Extinct in the Wild, NT = Near Threatened, VU = Vulnerable, P = Protected, POC = Probability of Occurrence.

FSNCO-protected Species

Table C2: POC assessment results for Schedule 6 provincially protected floral species. **Protected Plants as per the Free State Nature Conservation Ordinance, 8 of 1969 (FSNCO).

COMMON NAME	SCIENTIFIC NAME	POC
Tree-fern	*Alsophila dregei* (=*Cyathea dregei*)	Low
All species of Cycads	Genus *Encephalartos*	Low
All species of yellowwoods	Genus *Podocarpus*	Low
All species of arum lilies	Genus *Zantedeschia*	Medium
All species of red-hot pokers	Genus *Kniphofia*	Medium
All species of aloes	Genus *Aloe*	Medium
kleinkanniedood	*Haworthia nervosa* subsp. *recurva* (= *Haworthia tessellata*)	Low
All species of agapanthus	Genus *Agapanthus*	Low
All species of berg lilies	Genus *Galtonia*	Low
All species of wild squill	Genus *Scilla*	Low
All species of pineapple flower	Genus *Eucomis*	Low
All species of paint brushes and blood flowers	Genus *Haemanthus*	High
All species of poison bulbs or century plants	Genus *Boophone*	Medium
All species of nerines	Genus *Nerine*	Medium
All species of brunsvigia	Genus *Brunsvigia*	Low
All species of kukumakrankas	Genus *Gethyllis*	Low
All species of crinum	Genus *Crinum*	Low
ground lily	*Ammocharis coranica*	Low
All species of fire lilies	Genus *Cyrtanthus*	Low
All species of elephant's foot or wild yam	Genus *Dioscorea*	Low
river lily, vlei lily	*Schizostylis coccinea*	Low
All species of fairy-bells, hair-bells or flowering grass	Genus *Dierama*	Low
All species of tritonia	Genus *Tritonia*	Low
All species of gladioli	Genus *Gladiolus*	High
All species of watsonias	Genus *Watsonia*	Medium
All species of freesias	Genus *Freesia*	Low
All species of orchids	Family Orchidaceae	Medium
the protea species of the O.F.S	*Protea caffra, P. roupelliae* and *P. subvestita*	Low
All species of stone faces or stone plants	Genus *Lithops*	Low
Neohenricia vygie	*Neohenricia sibbettii*	Low
All species of pleiospilos	Genus *Plesiopilos*	Low
sheep's tongue	*Titanopsis calcarea*	Low
All species of anacampseros	Genus *Anacampseros*	Low
All species of sundew	Genus *Drosera*	Low
"ploegbreker" or "tamboekwiewortel"	*Erythrina zeyheri*	High
All species of "vingerpol, voetangel, noorsdoring, melkbol" or "melkpol"	Genus *Euphorbia*	Low
wild begonia	*Begonia sutherlandii*	Low
All species of Cabbage trees	Genus *Cussonia*	Low

COMMON NAME	SCIENTIFIC NAME	POC
All species of heath	Genus *Erica*	Low
wild olive tree	*Olea europaea* subsp. *africana*	Low
All species of pachypodiums	Genus *Pachypodium*	Low
All species of the stapeliae, ceropegias and trichocaulons	Family Asclepiadaceae	Low
All species of everlastings	Genus *Helichrysum*	Confirmed



SCIENTIFIC TERRESTRIAL SERVICES

Terrestrial Biodiversity Assessment

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE JELANI EXPLORATION JOINT VENTURE AREA UNDERGROUND MINING PROJECT, FREE STATE PROVINCE.

Part C: Faunal Assessment

Prepared for: Kongiwe Environmental (Pty) Ltd
Report author: Justin Jacobs
Report reviewers: J. Potgieter (Pr. Sci. Nat.)
C. Lamb (Cand. Sci. Nat.)

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Part of the SAS Environmental Group of Companies

DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Biodiversity** as published in Government Gazette 43110 dated 20 March 2020, and 2) Government Notice No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Animal Species** as published in Government Gazette 43855 dated 30 October 2020.

Theme-Specific Requirements as per Government Notice No. 1150 Animal Biodiversity Theme – Very High and High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**The section in report/Notes**
1.	**General Information**	
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "very high" or "high" sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report.	**Part C:** Faunal Assessment
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "medium sensitivity" for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.	**Part C:** Section 3
1.3	The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.	**Part C:** Faunal Assessment
1.4	Where the nature of the activity is expected to have an impact on Species of Conservation Concern (SCC) beyond boundary of the preferred site, the project areas of influence must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the project areas of influence, as determined.	Not Applicable
2	**Animal Species Specialist Assessment**	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP) within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	**Part A – C:** Cover Page **Part A:** Appendix E
2.2	**The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline[1] and must:**	
2.2.1	Identify the SCC which were found, observed or are likely to occur within the study area;	**Part C**: Section 3 **Part C**: Appendix B & C
2.2.2	Provide evidence (photographs or sound recordings) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);	**Part C:** Section 3
2.2.3	Identify the distribution, location, viability[2] and detailed description of population size of the SCC identified within the study area;	**Part C**: Section 3 **Part C**: Appendix B & C
2.2.4	Identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area;	**Part C:** Section 5
2.2.5	Determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN (International Union for Conservation of Nature and Natural Resources) Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;	**Part C**: Section 3 & 5 **Part C**: Appendix B

[1] Available at https://bgis.sanbi.org/
[2] the ability to survive and reproduce in the long term

2.2.6	Determine the potential impact of the proposed development on the habitat of the SCC located within the study area;	**Part C:** Section 5
2.2.7	Include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;	**Part C**: Section 3 **Part C**: Appendix B
2.2.8	Identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;	**Part C:** Section 5
2.2.9	Identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified SCC and its long term viability;	**Part C:** Section 5
2.2.10	Determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC	**Not Applicable to this report**
2.2.11	Discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species; or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity.	**Part C:** Section 5
2.2.12	Identify any alternative development footprints within the preferred development site which would be of "low" sensitivity" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification	**Part C:** Section 4
2.3	The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report.	**Part C:** Faunal Assessment
3.	**Animal Species Specialist Assessment Report. This report must include as a minimum the following information:**	
3.1.1	Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	**Part A:** Appendix E
3.1.2	A signed statement of independence by the specialist;	**Part A:** Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**Part C:** Section 3
3.1.4	A description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;	**Part C:** Appendix A
3.1.5	A description of the mean density of observations/number of sample sites per unit area and the site inspection observations;	Not applicable to this report
3.1.6	A description of the assumptions made and any uncertainties or gaps in knowledge or data	**Part C:** Section 1
3.1.7	Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	**Part C:** Section 3 **Part C:** Appendix B
3.1.8	The online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area	**Part C:** Section 3 **Part C:** Appendix B
3.1.9	The location of areas not suitable for development and to be avoided during construction where relevant;	**Part C:** Section 4
3.1.10	A discussion on the cumulative impacts;	**Part C:** Section 5
3.1.11	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr)	**Part C:** Section 5
3.1.12	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant.	Executive summary **Part C:** Section 6
3.1.13	A motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" terrestrial animal species sensitivity and were not considered appropriate.	**Part C:** Section 1
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	**Part A**: Appendix E
4	**Medium Sensitivity Species of Conservation Concern Confirmation**	

4.1	Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling.	**Part C:** Section 3
4.2	The presence or likely presence of the SCC identified by the screening tool, must be confirmed through a site inspection by a specialist registered with the South African Council for Natural Scientific Professions in a field of practice relevant to the taxonomic group ("taxa") for which the assessment is being undertaken.	**Part C:** Section 3 **Part C:** Appendix B
4.3	The assessment must be undertaken within the study area.	**Part C:** Section 1
4.4	The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guideline.	**Part C:** Section 2
4.5	The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC within the site identified as "medium" sensitivity by the screening tool.	**Part C:** Appendix B
4.6	Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol.	**Part C:** Section 3 **Part C:** Appendix B
4.7	Conversely, where no SCC are found on site during the investigation or if the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted.	Not applicable to this report

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ACRONYMS

AIP/AIPs	Alien Invasive Plant/Alien Invasive Plants
BGIS	Biodiversity Geographic Information Systems
BI	Biodiversity Importance
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DD	Data Deficient
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EN	Endangered
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
FI	Functional Integrity
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
Ha	Hectares
IBA	Important Bird Area
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature and Natural Resources
LC	Least Concern
NA	Not Applicable
NBA	National Biodiversity Assessment
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NT	Near Threatened
NYBA	Not yet been assessed
P	Protected, according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List. December 2007
PES	Present Ecological State
POC	Probability of Occurrence
QDS	Quarter Degree Square
RDL	Red Data Listed
R	Rare
RLE	Red List of Ecosystems
RE	Regionally Extinct
RR	Receptor Resilience
RSA	Republic of South Africa
SABAP 2	Southern African Bird Atlas Project 2
SANBI	South Africa National Biodiversity Institute
SEI	Site Ecological Importance
SP	Specially Protected
STS	Scientific Terrestrial Services
SCC	Species of Conservation Concern
sp and spp	The "**sp**." is an abbreviation for species. It is used when the actual species name cannot or need not or is not specified. The plural form of this abbreviation is "spp." and indicates "several species. Example: *Chrysoperla* **sp**. (when referring to a single species) and *Chrysoperla* spp.
TOPS	Threatened Or Protected Species (list of 2007) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004):
VU	Vulnerable

GLOSSARY OF TERMS

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Baseline information (IEM Series)	Information derived from data that: • records the existing elements and trends in the environment; and • records the characteristics of a given project proposal.
Biological diversity or Biodiversity (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems.
Carrying Capacity	The maximum population size of a biological species that can be sustained by that specific environment, given the food, habitat, water, and other resources available.
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Critical Biodiversity Area (CBA)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
Critically Endangered (CR) (IUCN[3] Red List category)	**Applied to both species/taxa and ecosystems**: A species is CR when the best available evidence indicates that it meets at least one of the five IUCN criteria for CR, indicating that the species is facing an extremely high risk of extinction. CR ecosystem types are at an extremely high risk of collapse. Most of the ecosystem type has been severely or moderately modified from its natural state. The ecosystem type is likely to have lost much of its natural structure and functioning, and species associated with the ecosystem may have been lost. CR species are those considered to be at extremely high risk of extinction.
Development footprint (as per the NEMA definition)	"in respect of land, means any evidence of its physical transformation as a result of the undertaking of any activity"
Degradation	The many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Diversity	Abundance and species richness of faunal classes
Driver (ecological)	A driver is any natural or human-induced factor that directly or indirectly causes a change in ecosystem. A direct driver clearly influences ecosystem processes, where indirect driver influences ecosystem processes through altering one or more direct drivers.
Ecological processes	The functions and processes that operate to maintain and generate biodiversity. In order to include ecological processes in a biodiversity plan, their spatial components need to be identified and mapped.
Ecological Support Area (ESA)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
Endangered (EN) (IUCN Red List category)	**Applied to both species/taxa and ecosystems**: A species is EN when the best available evidence indicates that it meets at least one of the five IUCN criteria for EN, indicating that the species is facing a very high risk of extinction. EN ecosystem types are at a very high risk of collapse. EN species are those considered to be at very high risk of extinction.

[3] International Union for Conservation of Nature (IUCN)

Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
Fatal flaw (IEM Series)	Any problem, issue or conflict (real or perceived) that could result in proposals being rejected or stopped.
Faunal Class	In biological classification, class (Latin: classis) is a taxonomic rank, as well as a taxonomic unit. Class specifically refers to major groups, namely: mammals, avifauna (birds), reptiles and invertebrates.
Ground-truth	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
Habitat (As per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Habitat loss	Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change in the composition, structure and functional characteristics of the ecosystem concerned.
Impact (IEM Series, draft Offset policy, and NEMA)	The positive or negative effects on human well-being and/or on the environment. Impact-related terminology: ➢ Cumulative impact: Past, current and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. ➢ Impact Significant/significance: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., intensity, duration, and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social and economic). Such judgement reflects the political reality of impact assessment in which significance is translated into public acceptability of impacts. ➢ Residual negative impacts: Negative impacts that remain after the proponent has made all reasonable and practicable changes to the location, siting, scale, layout, technology and design of the proposed development, in consultation with the environmental assessment practitioner and specialists (including a biodiversity specialist), in order to avoid and minimise negative impacts, and/or rehabilitate and/or restore impacted areas within 30 years (*It is acknowledged that the time it takes for full restoration differs from ecosystem type to ecosystem type, as well as the local conditions. Given that there is no readily accessible information on the recovery times of the different ecosystem types in South Africa, a general timeframe had to be used. The 30-year general timeframe in the definition of "residual impact" reflects that the difficulty in restoring South African ecosystems once they have been disturbed. It is based on the risk-averse and cautious approach.*). ➢ Significant impact: An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds, or targets.
Important Bird and Biodiversity Area (IBA)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation (As per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.

Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed invasive species	All alien species that are regulated in South Africa under the NEMBA, Alien and Invasive Species Regulations, 2020.
Least Concern (LC)	Unlikely to become extinct in the near future. A least-concern species is a species that has been categorized by the International Union for Conservation of Nature (IUCN) as evaluated as not being a focus of species conservation. They do not qualify as threatened, near threatened, or (before 2001) conservation dependent.
Least Threatened	Least threatened ecosystems are still largely intact.
Native species (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
Near Threatened (according to IUCN)	Close to being at high risk of extinction in the near future.
Niche (ecological)	The role and position a species have in its environment; how it meets its needs for food and shelter, how it survives, and how it reproduces. A species' niche includes all of its interactions with the biotic and abiotic factors of its environment.
Protected	Species of high conservation value or national importance that require protection, according to TOPS 2007 and NEMBA.
Red Data Listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), CR, EN, Vulnerable (VU) categories of ecological status.
Refugia (ecological)	Refugium (plural: refugia) is a location which supports an isolated or relict population of a once more widespread species. This isolation can be caused by climatic changes, geography, or human activities such as deforestation and overhunting.
Resource (ecological)	A resource is a substance or object in the environment required by an organism for normal growth, maintenance, and reproduction. Resources can be consumed by one organism and, as a result, become unavailable to another organism.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as provincially and nationally protected species of relevance to the project.
Termitaria	Colonies of termites, typically within a tall mound of cemented earth.
Threatened species	A species that has been classified as CR, EN or VU, based on a conservation assessment (Red List), using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.
Trophic (ecological)	Refers to feeding and nutrition.
Vulnerable (VU)	**Applied to both species/taxa and ecosystems**: A species is VU when the best available evidence indicates that it meets at least one of the five IUCN criteria for VU, indicating that the species is facing a high risk of extinction. An ecosystem type is VU when the best available evidence indicates that it meets any of the criteria A to E for VU and is then considered to be at a high risk of collapse.

1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd. (STS) was appointed to conduct a terrestrial biodiversity assessment as part of the Environmental Authorisation (EA) application process for the Jelani Exploration Joint Venture (EJV) area underground mining project, Free State province (hereafter referred to as the "**study area**"). The locality of the study area is depicted in Figure 1 and 2 below.

The study area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11 kilometres (km) northwest of Odendaalsrus, 2.5 km west of Allanridge, and 22 km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

Please refer to Part A for a detailed project description and a depiction of the proposed infrastructure.

1.1 Scope of Work

The aim of this report (Part C) is to present a detailed account of the faunal baseline data for the study area and to identify areas of increased Ecological Importance and Sensitivity (EIS), as well as the mapping of such areas, and to describe the Present Ecological State (PES) of the study area with current data. The baseline data, and identified sensitivities, will highlight areas that could place constraints on planned development of underground (UG) mining activities and associated infrastructure. The primary objective of the faunal assessment is not to compile an exhaustive species list but rather to ensure that sufficient data are collected to describe all the faunal classes (mammals, avifauna, reptiles, amphibians and invertebrates) present in the study area, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

The purpose of this report is to define the faunal ecology of the proposed development as well as mapping and defining areas of increased EIS and to define the PES of the study area. The scope of work for this study is:

- To provide inventories of faunal species as encountered within the study area;
- To determine and describe habitat types, faunal communities and the ecological state of the sites associated with the study area and to rank each habitat type based on conservation importance and ecological sensitivity;

- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/ or any other special features;
- To conduct a RDL and SCC assessment of threatened fauna, including species as listed in the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (Government Notice R152 in Government Gazette 29657, dated 23 February 2007, as amended), and the overall potential for such species to occur within the areas associated with the proposed development;
- To verify the Department of Forestry, Fisheries, and the Environment's (DFFE) national environmental screening report for the animal theme (Screening Tool) for the study area;
- To provide detailed information as well as relevant mitigation measures that must be implemented to guide the proposed underground mining development activities associated with the proposed study area; and
- To ensure the ongoing functioning of the ecosystem in such a way as to support local and regional conservation requirements and the provision of ecological services in the local area.

1.2 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The faunal assessment is confined to the proposed study area but the immediate surroundings were however taken into consideration in terms of faunal habitat utilisation and movement patterns. The entire study area and immediate surroundings were included in the desktop analysis of which the results are presented in **Part A: Section 3**;
- This report will only focus on the activities associated with the study area, which are underground mining activities. Any other activities related to the Harmony Target mining right area (i.e., refurbishment of existing infrastructure) is not associated with the scope of work for this report;
- With ecology being dynamic and complex and the habits of many faunal species, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management;

- Due to the nature and habits of many faunal taxa, it is unlikely that all species or classes would have been observed during a field assessment. Therefore, site observations were compared with literature studies where necessary;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the footprint area may therefore have been missed during the assessment;
- For the faunal SCC assessment, the most recent *Regional Red Data Book of Birds of South Africa, Lesotho, and Eswatini* (Lee *et al.*, 2025) was consulted. However, as this publication is not yet reflected in the South Africa National Biodiversity Institute (SANBI) database, the precautionary principle was applied, and the highest conservation status from either source was used in this report;
- One site assessment was undertaken which took place on 10th of December 2025 (summer season). A more comprehensive assessment would require that assessments take place across several seasons of the year. However, given the largely transformed nature of the site, multiple assessments were not deemed necessary. Additionally, on-site data was augmented with all available desktop data and specialist experience in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the study area.

1.3 Indemnity and Terms of use of this Report

The findings, results, observations, conclusions, and recommendations presented in this report are based on available information and the author's best scientific and professional knowledge. The report is based on survey and assessment techniques that are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and STS and its staff reserve the right to, at their sole discretion, modify aspects of the report, including the recommendations, if and when new information may become available resulting from ongoing research, or further work in this field pertaining to this investigation.

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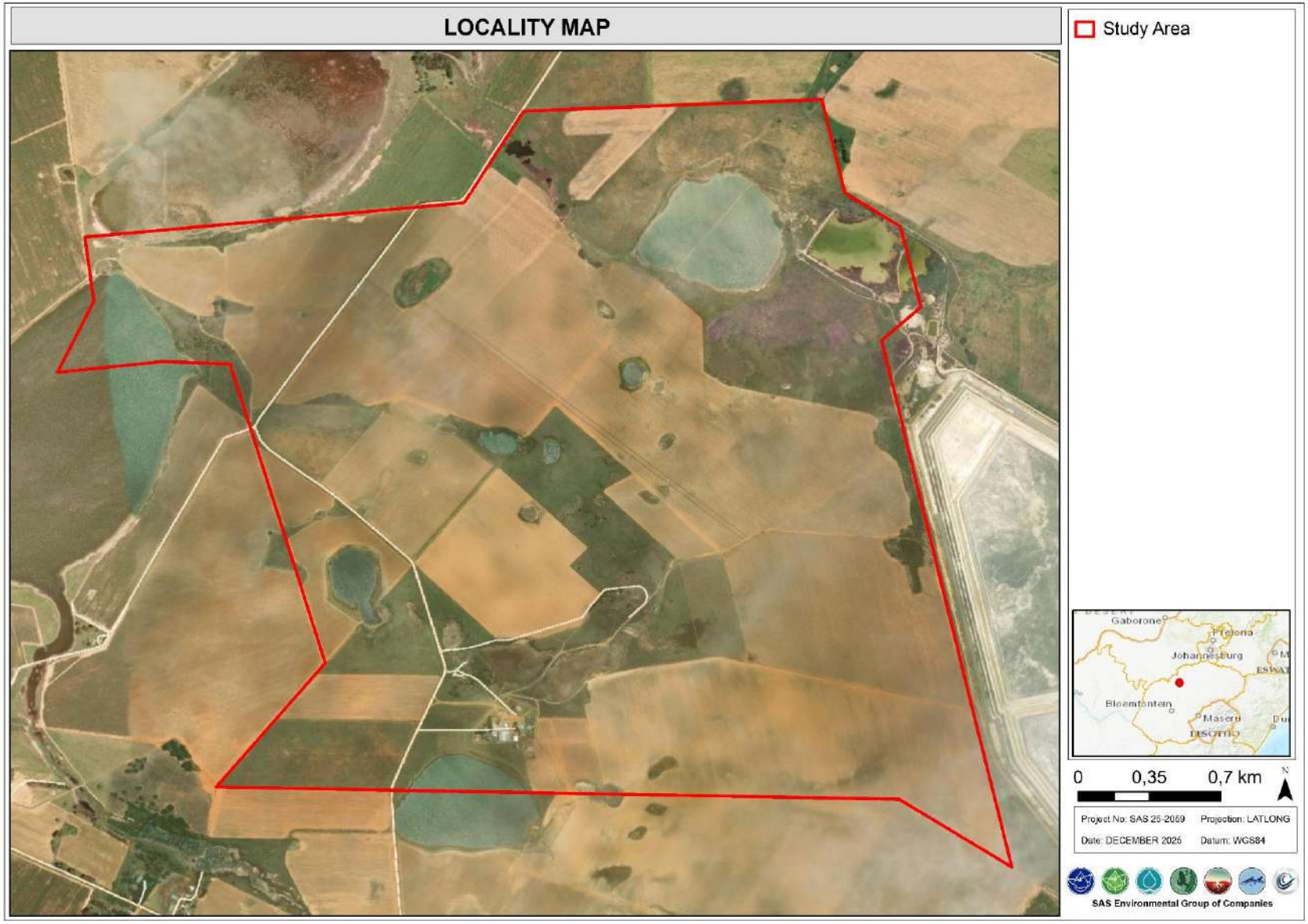


Figure 1: Digital satellite image depicting the locality of the study area in relation to the surrounding area.

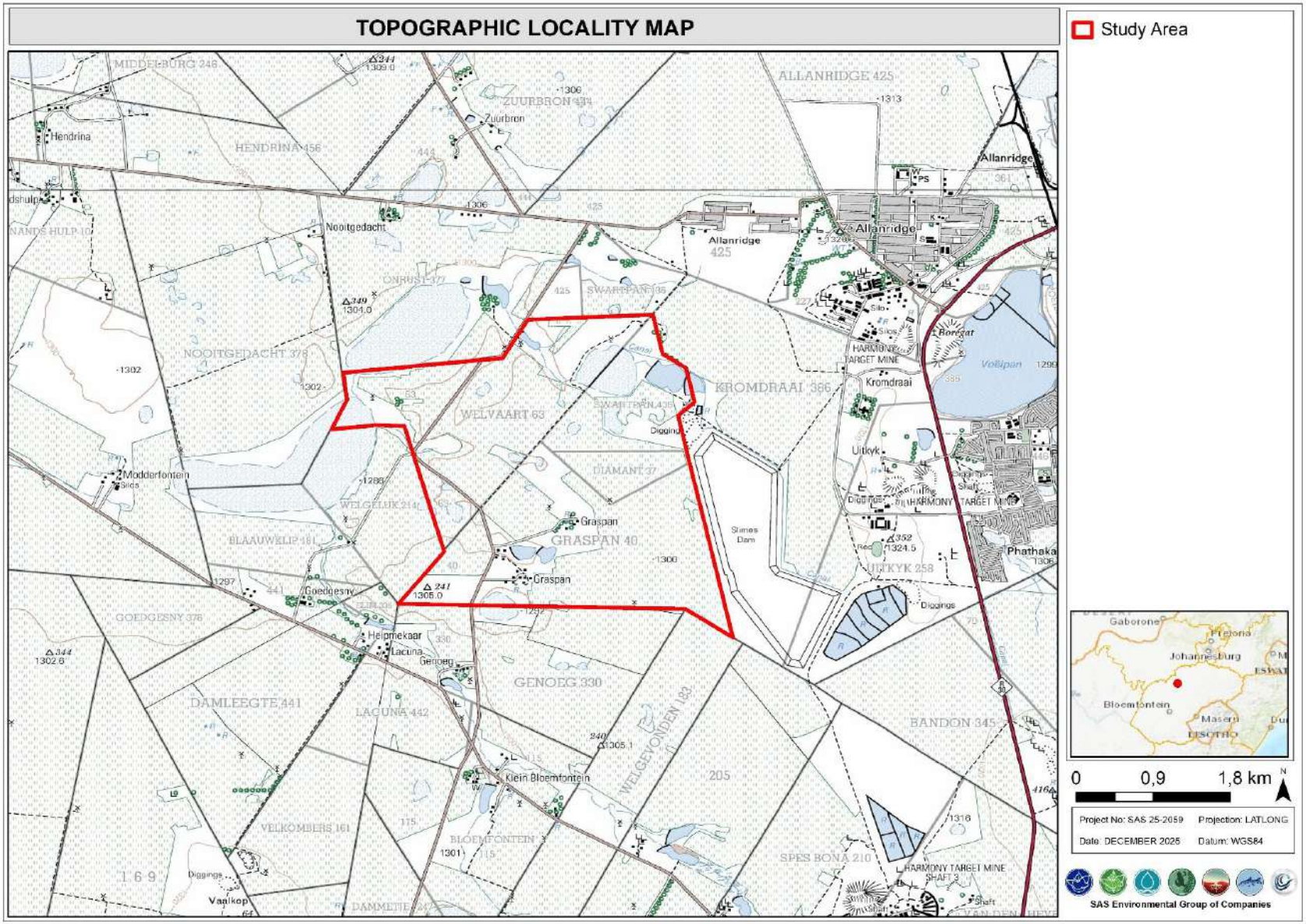


Figure 2: The study area depicted on a topographical map in relation to the surrounding area.

2 ASSESSMENT APPROACH

2.1 Reporting Protocol

The field assessments confirmed the medium and low animal species theme sensitivity (as identified by the Department of Forestry, Fisheries, and the Environment's (DFFE) National Web-based Screening Tool (hereafter "screening tool")) in some portions of the study area and disputed the low sensitivity and designated a medium instead in other portions. As such, the reporting protocol for the animal species theme follows the protocol for the medium sensitivity theme (refer to the document guide in this report).

For refined, ground-truthed / field-verified habitat sensitivities, please refer to the site ecological importance (SEI) breakdown in Section 4 of this report.

2.2 General approach

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The field assessment for the faunal specialist was undertaken on the 10th of December 2025 (summer season).

A reconnaissance 'walkabout' was initially undertaken to determine the general habitat types found throughout the study area. Following this, specific sites were selected that were considered representative of the habitats within the study area, with special emphasis placed on areas that may potentially support faunal SCC. Sites were investigated on foot to identify the occurrence of fauna within the study area.

A detailed explanation of the method of assessment is provided in Appendix A of this report. The faunal categories covered in this assessment are mammals, avifauna, reptiles, amphibians and invertebrates. For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to Appendix C of Part A of the study.
To accurately determine the PES of the study area and capture comprehensive data with respect to faunal taxa, the following methodology were applied:

- Maps and digital satellite images were consulted prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the study area was made in order to confirm the assumptions made during consultation of the digital satellite imagery;
- A literature review with respect to habitats, vegetation types and species distribution was conducted considering the larger study area. For a detailed description of the vegetation

types and habitats associated with the study area, please refer to the associated Terrestrial and Plant Species Report (Part B);

- Relevant databases considered during the assessment of the study area included online verified research grade species records from iNaturalist; The Endangered Wildlife Trust (EWT) Red List of Species (2021), the SANBI South African Red List of Species, Regional Red Data Book of Birds of South Africa, Lesotho, and Eswatini (Lee *et al.*, 2025), Important Bird and Biodiversity Areas (IBA, 2015), South African Bird Atlas Project 2 (SABAP2), International Union for Conservation of Nature (IUCN), the Screening Tool (2025) and the National Biodiversity Assessment (NBA, 2018);
- For the methodologies relating to the impact assessment and development of the mitigatory measures, please refer to Part A, Appendix C; and
- Specific methodologies for the assessment, in terms of field work and data analysis of faunal ecological assemblages are presented in Appendix A of this report.

2.3 Sensitivity Mapping

All the ecological features associated with the study area were considered and sensitive areas were delineated using a handheld Global Positioning System (GPS) unit. Geographic Information System (GIS) software was used to depict these features on satellite imagery. The various habitat types were assigned SEI categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes. Refer to Part A Appendix D for the breakdown of the methodology used to determine SEI and sensitivity.

2.4 Faunal Species of Conservational Concern Assessment

According to the SANBI Species Environmental Assessment Guidelines, faunal SCC are defined as any species that are threatened, range-restricted, or of particular ecological, cultural, or conservation significance, and which may be especially vulnerable to habitat loss, disturbance, or other anthropogenic pressures. SCC include taxa listed as threatened in terms of the IUCN Red List categories CR, EN, VU, NT or Data Deficient (DD)), species protected under national or provincial legislation, species that are rare or locally endemic with limited distributions, and those identified as requiring specific conservation attention due to declining populations or specialised habitat requirements.

Certain invertebrate taxa, including scorpion and spider species, as well as reptile, amphibian and mammal species, may be listed as protected under the TOPS regulations without being regarded as SCC in terms of the SANBI Species Environmental Assessment Guidelines. This distinction arises because many of these species are relatively widespread, occur across a broad range of habitats, and are not experiencing significant population declines or severe

habitat fragmentation. Their protected status is therefore precautionary and largely intended to regulate collection, trade, and handling rather than to address an immediate conservation threat. While compliance with TOPS permitting requirements may be necessary when these species are encountered during development, they are not typically considered threatened; however, they remain classified as protected species and are therefore, as a precautionary principle, included in the SCC assessment.

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) estimation is used, considering several factors to determine the probability of faunal SCC occurrence within the study area. Species listed in Appendix B whose known distribution ranges and habitat preferences include the proposed infrastructure development sites were taken into consideration. Faunal species likely to occur within the study area are indicated and briefly discussed within each of the relevant dashboards, along with their POC.

3 FAUNAL ASSESSMENT RESULTS

3.1 Sampling Effort

The site was surveyed on foot by means of extended transects (meanders) through the study area, where species were surveyed and habitat conditions noted; meanders were positioned within the various habitat types to ensure an adequate representation of faunal species from different classes (mammals, reptiles, amphibians, avifauna and invertebrates). Figure 3 presents the GPS tracks of the specialist in relation to the study area as an indication of the area covered.

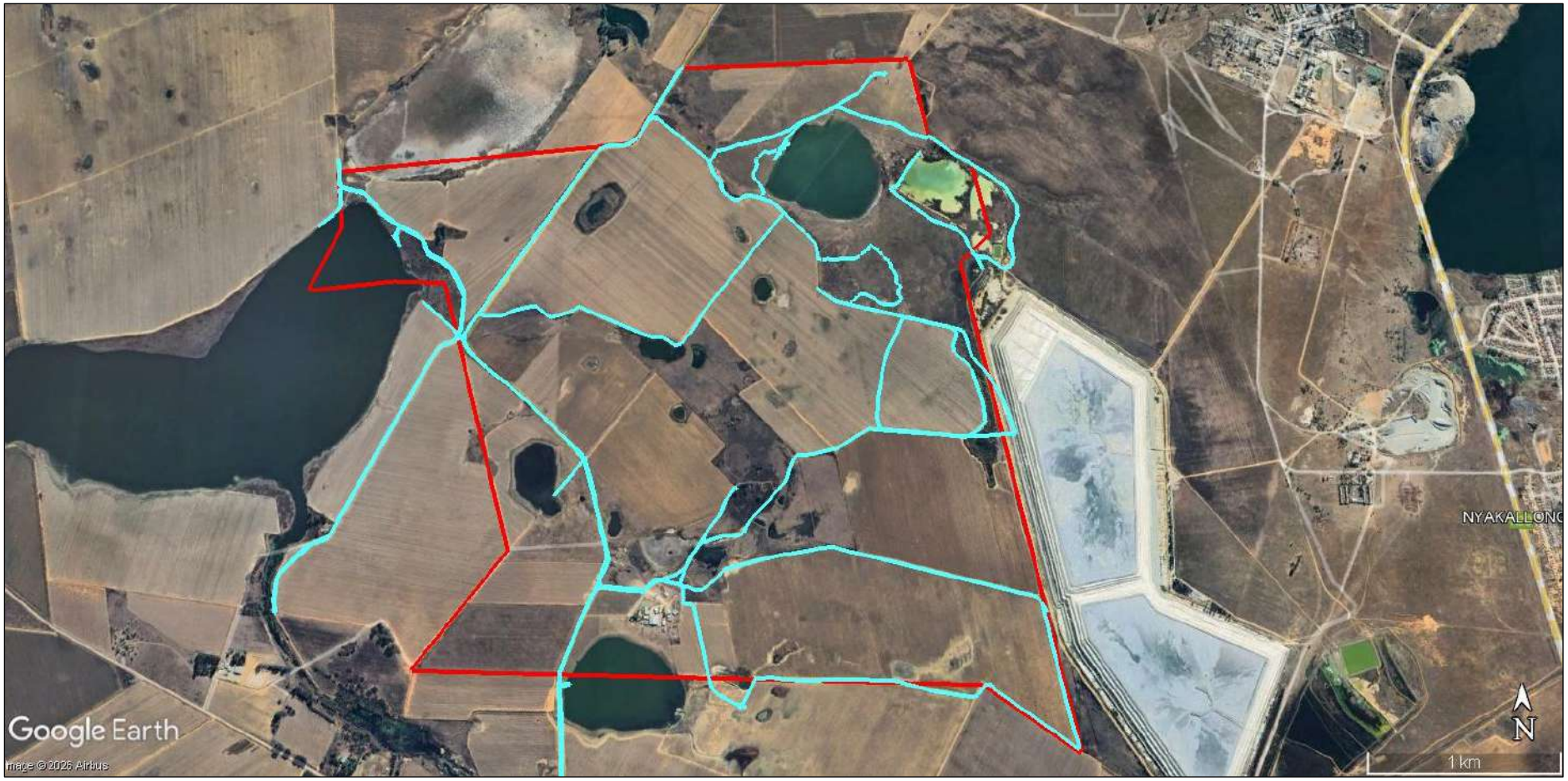


Figure 3: The study area (red outline) and the specialist's GPS tracks (blue lines) from the field assessment.

3.2 Existing Impacts

The study area has been impacted significantly by agricultural activities, such as cultivation and livestock grazing (e.g., cattle). Remaining natural habitat patches, although embedded within an agricultural matrix, are still classified as indigenous vegetation but are highly fragmented and structurally simplified. Within the study area a high diversity and abundance of Alien and Invasive Plant (AIP) species were observed, especially within the freshwater habitats. Natural grazing regimes have been significantly impacted (lost due to habitat transformation). Only small, isolated areas are still connected and utilised for domestic grazing and therefore these areas (often associated with the freshwater ecosystems) easily become overgrazed and trampled. Furthermore, bush encroachment can occur, especially with changes in fire regimes and low rainfall periods.

Collectively, these pressures have resulted in secondary impacts, including the proliferation of AIP species, modification of natural disturbance processes, and increased habitat fragmentation. These factors reduce habitat quality, limit resource availability, and constrain the study area's capacity to support diverse and stable faunal assemblages, particularly species sensitive to disturbance or requiring intact habitat connectivity.

3.3 Faunal Habitat

Following the site assessment, three (3) broad habitat units were distinguished within the study area. These habitat units are discussed briefly in terms of faunal utilisation and importance, and are visually depicted in Figure 4, including the current proposed layout. For a more detailed description and discussion of these habitat units please refer to the Part B: Floral Report. The study area consisted of large, cultivated areas (i.e., transformed habitat), grassland communities and various freshwater habitats. These habitat units are discussed in more detail below.

- **Grassland Habitat**: Consisting of the Vaal Vet Sandy Grasslands and Modified Grasslands communities. Most of the study area is modified by cultivation with only small portions of natural grassland likely present within the study area (see Part A and B).
    - The Vaal Vet Sandy Grassland is described as a tall, closed grassland and has a low abundance and diversity of AIPs. The vegetation cover may provide refuge for a number of faunal species, such as small mammals, which in turn could attract several predatory herpetofauna and avifauna; as well as house an abundance of pollinating invertebrate species. Good grazing is provided within this habitat, and this will likely support SCC as well as a great diversity and abundance of faunal species, particularly invertebrates.

- The Modified Grassland habitat has a higher abundance of woody plant species with various woody AIPs present. The vegetation structure of the Modified Grassland can be described as short, closed grassland. The plant species composition has diverged significantly due to AIP proliferation and historic land use. This habitat has a more heterogeneous vegetation layer that offers a variety of possible host plants, as well as foraging and nesting opportunities. However, species that are adapted to disturbance and that can utilise increased modified landscapes, such as more disturbance-tolerant and less sensitive common species, are more likely to be found in this area.

- **Transformed Habitat**: Including the cultivated areas and built-up areas (including farmhouses, old mining infrastructure and roads). This habitat includes areas where all vegetation has been either removed to erect buildings and roads or where habitat has been significantly modified. Most of the study area is currently utilised for agriculture where the native vegetation has been completely removed. Species that are adapted to disturbance and that can utilise increased transformed landscapes, such as reptiles and smaller-bodied mammals, are more likely to be found in the area; especially species which can utilise the food resources in the cultivated areas when crops are producing.

- **Freshwater Habitat**: Comprised of two subunits, namely:
  - Artificial impoundments within the study area provide persistent areas of open water and support a high abundance of faunal species, with avifauna being particularly prominent. Numerous bird species were recorded foraging on open water and along the water's edge, including several SCC. Although these impoundments are considered to be of low ecological value from other perspectives, due to their artificial origin and dominance of alien and invasive plant species, they nevertheless function as important faunal features. The availability of standing water within an otherwise transformed landscape attracts a wide range of water-associated fauna, making these impoundments focal points for feeding and temporary habitat use despite their limited botanical integrity.
  - Seep Wetlands and Depression Wetlands also supply open water and moist habitat conditions and similarly supported a high abundance of fauna, particularly water-dependent and water-associated avifauna. Several SCC were recorded utilising these wetlands, primarily for foraging and refuge. Unlike the artificial impoundments, these wetlands retain indigenous, graminoid-dominated vegetation that enhances habitat complexity and ecological functioning. The combination of open water, dense wetland vegetation, and elevated moisture

levels supports amphibians, invertebrates, and wetland-associated vertebrates, contributing to the overall faunal importance of these habitats within the study area.

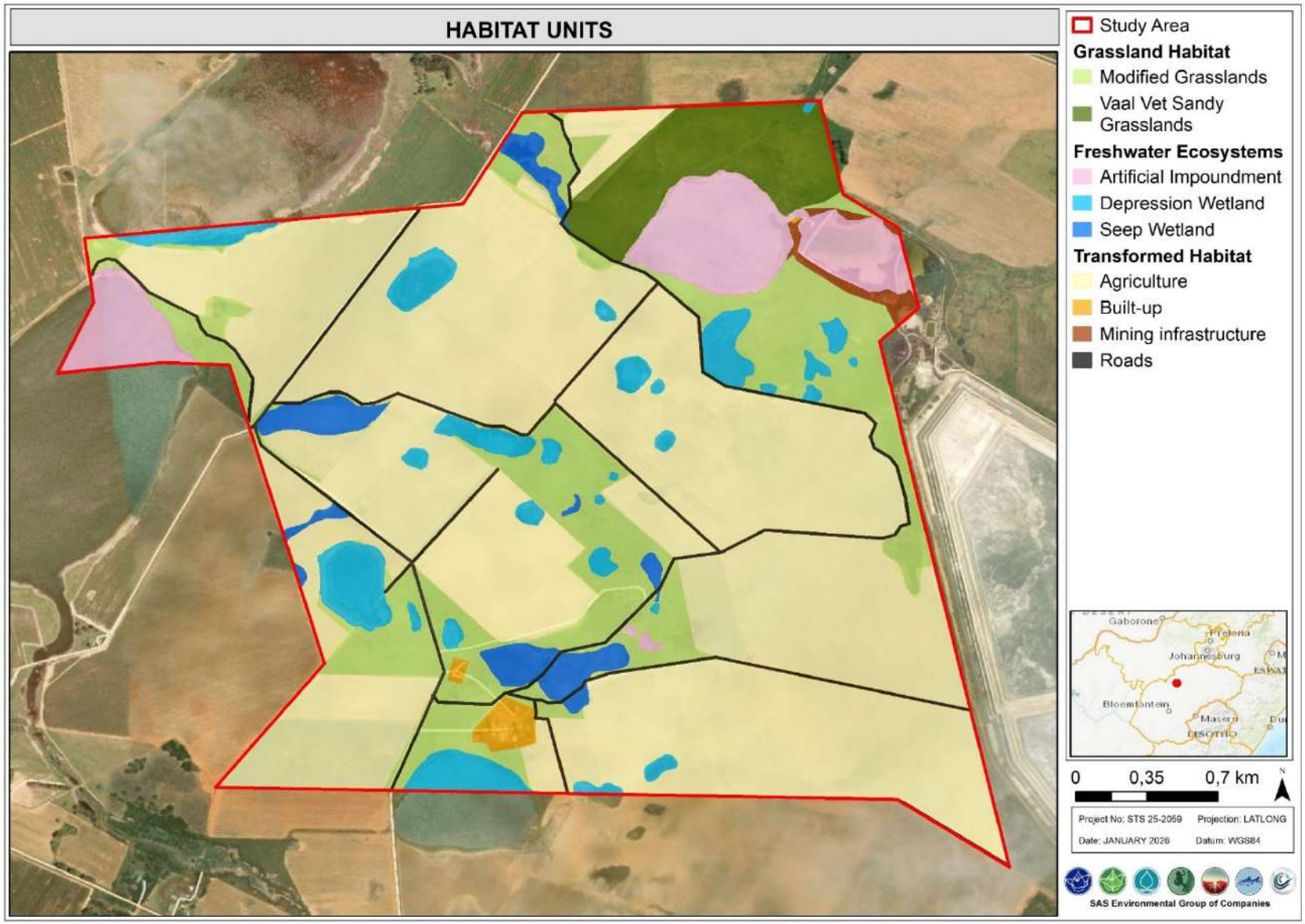


Figure 4: Habitat units associated with the study area.

3.4 Ecological functioning within the landscape

The study area is surrounded by large open areas. Although not specifically important suitable habitat conditions for faunal species, movement through these areas is still possible and enables species to access adjacent areas. It is however, noted that historical and current anthropogenic activities have led to the displacement of many faunal species which would have once occurred in this area. Mostly common faunal species adapted to live in habitats of increased disturbance are expected to occur within the study area. It is noted however that the study area and surrounding region will be utilised as part of several larger mammal and birds of prey species' home ranges and foraging grounds, though they are unlikely to centralise or permanently reside within or adjacent the study area.

3.5 Mammals

Table 1: Field assessment results pertaining to mammal species within the study area.

Photographs:



a.) *Geosciurus inauris*, (South African Ground Squirrel, LC); b.) *Cynictis penicillata*, (Yellow Mongoose, LC); c.) *Raphicerus campestris*, (Steenbok, LC); d) Domestic livestock (i.e. cattle and sheep) in the region.

Mammal SCC

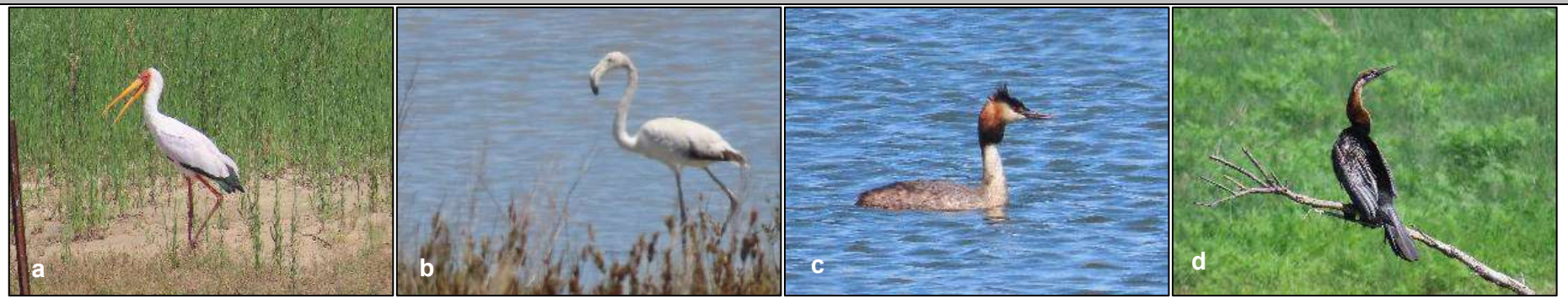
Species	Habitat and Resources in the Sites	Status	POC
Hydrictis maculicollis (Spotted-necked Otter)	This species primarily inhabits undisturbed and unpolluted freshwater systems, with a preference for shallow waters surrounded by dense reed beds, which provide an ideal environment for their preferred prey, such as crabs and fish. They require dense vegetation near water for breeding and shelter. On land, these otters seek refuge in underground burrows, beneath rocks, roots, or within thick vegetation. There have been no observations of the species on iNaturalist in the surrounding area. However, the Artificial impoundments in the Freshwater Habitat provides sufficient shallow water habitat with nearby dense vegetation, providing suitable habitat for this, resulting in a medium POC.	VU	Medum
Aonyx capensis (Cape Clawless Otter)	The Cape Clawless Otters inhabit a variety of freshwater habitats as well as estuaries and coastal areas. This species occupies areas with dense vegetation along the water's edge, as well as rocky or sandy riverbanks, which provide cover and places to rest. Cape Clawless Otters are opportunistic feeders and will eat a wide variety of prey depending on the availability, ranging from fish and crustaceans to invertebrates and small reptiles. In some parts of their range, their habitat has been either drastically changed or lost, following bush clearing, deforestation, overgrazing, siltation, expansion of human settlements, draining of wetlands, water extraction or denudation of riparian vegetation. There have been no observations of the species on iNaturalist in the surrounding area. However, the Artificial impoundments in the Freshwater Habitat provides sufficient habitat with nearby dense vegetation, providing suitable habitat for this, resulting in a medium POC.	NT	Medium

Mammal Discussion
There was a reduced abundance and diversity of observed mammal assemblage and activity in the study area. Smaller-bodied species that are adapted to disturbance, which were observed on site include: *Geosciurus inauris*, (South African Ground Squirrel, LC), *Cynictis penicillata*, (Yellow Mongoose, LC), and *Raphicerus campestris*, (Steenbok, LC). During the field assessments, no SCC or signs thereof were observed, however, two species have a medium POC due to potential suitable habitat. These species: *Aonyx capensis* (Cape Clawless Otter, NT) and *Hydrictis maculicollis* (Spotted-necked Otter, VU) are likely to utilise the site only occasionally as temporary foraging grounds or as a movement corridor. Freshwater habitats within the study area provide important resources for mammal species, particularly for drinking, foraging, and movement, although many species are equally likely to forage within adjacent grassland habitats. More disturbance-tolerant mammals may also utilise Transformed Habitats, such as common rodent species occurring around cultivated fields and farmsteads. The overall low abundance and diversity of mammals within the study area are largely attributable to long-term agricultural practices, which have reduced habitat connectivity, simplified vegetation structure, and increased levels of human disturbance and persecution. Consequently, mammal assemblages are dominated by widespread, adaptable species capable of utilising modified landscapes. Given this context, anticipated impacts on mammal species are expected to be low, as habitat loss will predominantly affect already transformed or sub-optimal habitats and is unlikely to result in significant reductions in mammal abundance or diversity.

3.6 Avifauna

Table 2: Field assessment results pertaining to avifaunal species within the study area.

Photographs



a) *Mycteria ibis* (Yellow-billed Stork, VU); b.) *Phoenicopterus roseus* (Greater Flamingo, NT); c.) *Podiceps cristatus* (Great Crested Grebe, VU); d.) *Anhinga rufa* (African Darter, NT).

Avifaunal SCC

Species	Habitat and Resources in the Sites	Status	POC
Hydroprogne caspia (Caspian Tern)	The Caspian Tern breeds at coastal sites as well as at larger inland water bodies. Its diet primarily consists of small fish. There have been no recordings of this species on iNaturalist and SABAP 2 in the surrounding area or pentads. The open water in the Freshwater Habitat was deemed suitable for this species and therefore given a medium POC.	VU	Medium
Anas undulata (Yellow-billed Duck)	This species is a common resident breeder found in southern and eastern Africa. While it is not migratory, it may wander during the dry season in search of suitable water sources. Outside of the breeding season, this duck often forms large flocks. It inhabits freshwater environments in relatively open areas and primarily feeds by dabbling for plant material, typically in the evening or at night. The duck nests on the ground in dense vegetation located near water. This species was found in the Freshwater Habitat.	NT	Confirmed
Anhinga rufa (African Darter)	This diving bird requires close proximity to freshwater and brackish environments of shallow lakes, swamps, lagoons as well as slow-moving rivers bordered by trees, reeds, or mangroves that are suitable for roosting. It stays away from fast flowing rivers, areas with thick floating plants, and is rare in open sea. The African Darter is a solitary feeder and mainly feed on fish, although they also eat crustaceans, frogs, insects and occasionally molluscs, small terrapins and aquatic snakes. This species roosts nightly in groups in trees, bushes, or reedbeds. This species was found in the Freshwater Habitat.	NT	Confirmed
Mycteria ibis (Yellow-billed Stork)	Yellow-billed Storks forage in a variety of permanent and seasonal wetland habitats characterised by open, shallow water that is typically devoid of vegetation. Their diet consists of frogs, small fish, and other small aquatic prey. This species was found in the Freshwater Habitat and seen flying over the Vaal Vet Sandy Grassland.	VU	Confirmed
Spatula smithii (Cape Shoveler)	The species occurs virtually entirely within southern Africa, most abundant in the lowlands. Cape Shoveler prefers shallow, plankton-rich wetlands and dams, but it also occurs on tidal estuaries, saltpans, saline lagoons, and in the shallow bays and upper reaches of large dams. They feed primarily on insects, crustaceans, molluscs, tadpoles, and planktonic invertebrates. This species was found in the Freshwater Habitat.	NT	Confirmed

Podiceps cristatus (Great Crested Grebe)	Great Crested Grebe prefers large inland wetlands, lakes, and pans usually fringed with emergent vegetation. May occasionally be found on saltpans and rarely seen in the sea. Mostly restricted to deep permanent water. This species requires clean water so it can be considered as an indicator for water quality. The primary food source for the Great Crested Grebe consists mainly of sizable fish, complemented by aquatic insects, crustaceans like crayfish and shrimps, amphibians and tadpoles. This species was found in the Freshwater Habitat.	VU	Confirmed
Phoenicopterus roseus (Greater Flamingo)	This species is typically found in estuaries, salt pans, dams, and wetlands. Flamingos are filter feeders, primarily consuming aquatic plants and small aquatic animals, such as crustaceans, molluscs, and worms. This species was found in the Freshwater Habitat.	NT	Confirmed
Anas erythrorhyncha (Red-billed Teal)	The Red-billed Teal is found across much of South Africa, although it is sparse or absent in arid regions. The largest populations are located on the Highveld and in the Western Cape. This species prefers shallow, permanent or temporary eutrophic freshwater wetlands, such as dams, sewage ponds, and other artificial wetlands, which typically have submerged, floating, and peripheral vegetation. Their diet mainly consists of plant materials, particularly the seeds of various grasses and aquatic plants, as well as the stems of these plants. This species was found in the Freshwater Habitat.	NT	Confirmed
Sarkidiornis melanotos (Knob-billed Duck)	This species uses various wetlands such as rivers, freshwater swamps, lakes, rice fields, and artificial ones such as dams but not for breeding. The nest is built in a cavity in a tree, (often a dead tree that has been hollowed out by insects), occasionally on the ground in a cavity. Diet is primarily vegetable matter, particularly seeds of grasses, sedges, and aquatic plants. It also consumes grains and supplements its diet with terrestrial and aquatic invertebrates, such as insects and molluscs. This species was found in the Freshwater Habitat.	NT	Confirmed
Phoeniconaias minor (Lesser Flamingo)	This species occurs within open, shallow, alkaline and saline wetlands (e.g., saltpans). They feed on diatoms and cyanobacteria when wading through shallow water. There have been observations of this species on iNaturalist in the surrounding area, and with confirmed sightings of a similar species, the *Phoenicopterus roseus* (Greater Flamingo), this species is given a high POC. This species will likely be found in the Freshwater Habitat.	NT	High
Oxyura maccoa (Maccoa Duck)	The Maccoa Duck, despite its extensive distribution across Africa, is a localized and relatively scarce species. It prefers shallow, nutrient-rich freshwater habitats during the breeding season but relocates to larger, deeper water bodies outside of this period. Its diet consists of aquatic plants, seeds, roots, and aquatic insects. The Freshwater Habitat provides suitable habitat; and observations in the study area's pentad on SABAP 2, and in the surrounding area on iNaturalist, give this species a high POC.	NT	High
Elanus caeruleus (Black-winged Kite)	The black-winged kite is a species primarily of open land and semi-deserts in sub-Saharan Africa and tropical Asia, but it has a foothold within Europe, Spain and Portugal. Their prey includes grasshoppers, crickets and other large insects, lizards, and rodents. Injured birds, small snakes and frogs have also been reported. This species can occur in more transformed habitats where they can use current anthropogenic infrastructure. The Grassland and Transformed Habitat provide suitable habitat; and a high recording rate in the study area's pentad on SABAP 2 give this species a high POC.	NT	High
Nycticorax nycticorax (Black-crowned Night Heron)	It is widespread in Southern African but typically absent from dry regions such as Northern Cape. They inhabit wetlands, rivers, lakes, swamps, marshes, estuaries as well as dams and ponds where they have a wide tolerance for water conditions. A generalist feeder, known to eat a wide variety of shoreline and aquatic species such as fish, frogs, tadpoles, turtles, snakes, lizards, adult and larval insects etc. The Freshwater Habitat provides suitable habitat; and a high recording rate in the study area's pentad on SABAP 2 give this species a high POC.	NT	High
Dendrocygna bicolor (Fulvous Whistling-Duck)	The Fulvous Whistling Duck typically inhabits shallow freshwater or brackish wetlands characterized by tall grasses. These habitats include freshwater lakes, seasonal pools, slow-flowing streams, marshy areas, swamps in open flat terrain, and flooded grasslands. During periods of molting, when it is flightless and vulnerable, the Fulvous Whistling Duck seeks refuge in densely vegetated wetlands. While its diet mainly consists of plant material, it occasionally supplements this with small aquatic insects. This species has no recording in the study area's pentad on SABAP 2 but has been recorded on iNaturalist in the surrounding area. With the existence of suitable habitat in the Freshwater Habitat, this species is given a high POC.	NT	High

Asio capensis (Marsh Owl)	The Marsh Owl's habitat preference is open grassland, marshlands and short scrub, typically near marshy grounds, vleis or dams. Marsh Owls are typically found singly or in pairs. They are usually crepuscular; sometimes active during early morning and late afternoon. The marsh owl typically feeds on small rodents, insects and other small vertebrates. This species has no recording in the study area's pentad on SABAP 2 but has been recorded on iNaturalist in the surrounding area. With the existence of suitable habitat in the Vaal Vet Sandy Grassland Habitat adjacent the Freshwater Habitat, this species is given a high POC.	NT	High
Circus ranivorus (African Marsh Harrier)	This species relies on permanent wetlands, both inland and coastal, for breeding, feeding, and roosting. It also hunts over drier floodplains, grasslands, croplands, and Fynbos, primarily preying on small rodents, as well as birds, reptiles, frogs, and insects. Nests are typically situated in reedbeds over water, although breeding has also been observed in adjacent sedges, Fynbos, scrub, and agricultural fields, though such occurrences are considered rare. This species requires expansive and ecologically connected wetlands, which is not available even when combining the Vaal Vet Sandy Grassland Habitat and Freshwater Habitat. This species has no observations on iNaturalist in the surrounding area but has been recorded in the study area's pentad on SABAP 2. Therefore, this species is unlikely to utilise this habitat extensively and may only forage briefly and thus is given a medium POC.	EN	Medium
Sagittarius serpentarius (Secretarybird)	This species prefers open grasslands and savannahs with scattered trees for nesting sites. As a carnivore, its diet consists primarily of insects and reptiles, including snakes and lizards. This species has no recording in the surrounding area's pentad on SABAP 2 and on iNaturalist. However, the Vaal Vet Sandy Grassland Habitat provides suitable habitat giving the species a medium POC since this species is unlikely to utilise this habitat extensively.	EN	Medium
Calidris ferruginea (Curlew Sandpiper)	Curlew Sandpiper is found at coastal lagoons, estuaries, and sheltered shorelines with abundant stranded algae. Inland, it inhabits wetlands with muddy edges and areas where water levels are receding. Curlew Sandpiper primarily feeds on insects. This species has no recording in the surrounding area's pentad on SABAP 2 and on iNaturalist. However, the Freshwater Habitat provides suitable habitat giving the species a medium POC since this species is unlikely to utilise this habitat extensively.	VU	Medium

Avifauna Discussion

Data from the SABAP2 Pentad 2745_2635 was consulted to provide insight into the bird assemblages potentially present within the study area as part of the avifaunal assessment. The study area has experienced some transformation from development, and current and historical cultivation. However, habitat within the study area remains suitable for several avifaunal species.

Freshwater habitats within the study area provide suitable foraging and resting habitat for waterfowl and a wide range of other avifaunal species, including several SCC. In contrast, Transformed Habitats primarily support common, disturbance-tolerant bird species capable of utilising modified landscapes. Modified grasslands containing scattered trees further enhance avifaunal habitat value by providing roosting and perching opportunities, including vantage points for hunting raptors and temporary refuge for birds moving between adjacent habitats.

During field surveys, commonly observed bird species included *Streptopelia capicola* (Ring-necked Dove, LC), *Bostrychia hagedash* (Hadeda Ibis, LC), *Ploceus velatus* (Southern Masked Weaver, LC), *Afrotis afraoides* (Northern Black Korhaan, LC), and *Scleroptila gutturalis (Orange River Francolin, LC)*, amongst others. A comprehensive list of observed avifaunal species is provided in Appendix C.

Eight avifaunal SCC was observed during the field assessment in the Freshwater Habitat: *Anas undulata* (Yellow-billed Duck, NT), *Anhinga rufa* (African Darter, NT), *Mycteria ibis* (Yellow-billed Stork, VU), *Spatula smithii* (Cape Shoveler, NT), *Podiceps cristatus* (Great Crested Grebe, VU), *Phoenicopterus roseus* (Greater Flamingo, NT), *Anas erythrorhyncha* (Red-billed Teal, NT) and *Sarkidiornis melanotos* (Knob-billed Duck, NT). For additional avifaunal SCC with an increased POC, suitable foraging and, in some cases, breeding habitat is present within the study area. These species are therefore likely to occur as either resident or regular visitors, with the site being utilised on an ongoing or opportunistic basis depending on seasonal conditions. These include species with a high POC such as: *Phoeniconaias minor* (Lesser Flamingo, NT), *Oxyura maccoa* (Maccoa Duck, NT), *Elanus caeruleus* (Black-winged Kite, NT), *Dendrocygna bicolor* (Fulvous Whistling-Duck, NT), *Asio capensis* (Marsh Owl, NT) and *Nycticorax nycticorax* (Black-crowned Night Heron, NT). Three species have been assigned a medium POC, due to the existence of suitable habitat but historically do not have a high recording rate; *Hydroprogne caspia* (Caspian Tern, VU), *Circus ranivorus* (African Marsh Harrier, EN), *Sagittarius serpentarius* (Secretarybird, EN), and *Calidris ferruginea* (Curlew Sandpiper, VU).

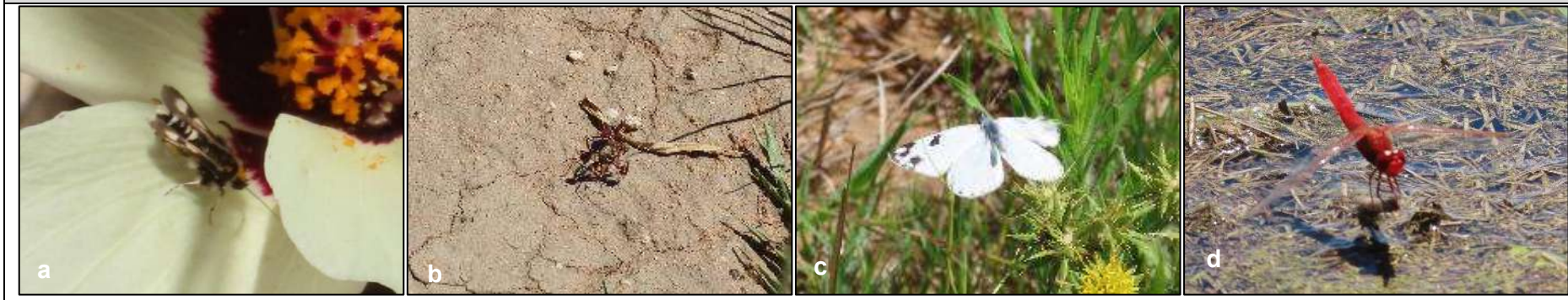
3.7 Herpetofauna

Table 3: Field assessment results pertaining to herpetofaunal species within the study area.

Photographs
 **a and b.) The Grassland Habitat provides rocky features that offer suitable basking sites for reptiles, as well as areas of softer soils that facilitate burrowing and refuge; c.) The increased moisture levels in the Freshwater Habitat will be suitable for amphibians; d.) The agricultural land in the Transformed Habitat may attract pest species such as certain small mammals, which may attract predatory snake species.**
Herpetofauna SCC
No amphibian or reptile SCC are anticipated for the study area.
Herpetofauna discussion
Amphibians and reptiles pose a challenge in sampling due to their elusive behaviours, habitual avoidance of predators, and, in the case of amphibians, their different life stages. This might explain the low abundance and diversity of herpetofauna observed during the site visit. Reptiles are inherently adaptable and capable of surviving in and utilising transformed and degraded habitats. Common resilient species may still be found in these areas of increased disturbance, but low abundances are expected. It is likely that snakes and some other reptiles will be able to move into and utilise areas of the study area, but larger reptiles are likely to face levels of persecution here from people in and outside the study area. Amphibian diversity and abundance are expected to increase closer to the suitable Freshwater Habitats, where there are elevated moisture levels and open water, as most species require a temporary or permanent water source for breeding and foraging. The Grassland Habitat will likely support the greatest abundance and diversity of reptiles within the study area as it provides basking opportunities for reptiles and food resources due to the likelihood of small mammals and invertebrates, which act as food resources for many herpetofauna species. Considering the adaptability of reptiles, it is improbable that reptile species associated with the study area will experience significant impact unless directly killed. Conversely, certain species may thrive, as the structures will offer suitable refuge areas and new potential foraging grounds. No amphibian or reptile SCC were observed during the assessment; or are expected to occur on site. No species were observed during the field assessment, however, common herpetofauna species are expected to occur on site such as *Rhinotyphlops lalandei* (Delalande's Beaked Blind Snake, LC), *Afrotyphlops bibronii* (Bibron's Blind Snake, LC), and *Panaspis wahlbergii* (Wahlberg's Snake-eyed Skink, LC), amongst others. Fragments of suitable habitat are interspersed throughout the study area, however, no SCC have a medium or high POC within the study area, due to the lack of distribution overlaps. Natural habitat for amphibians and reptiles is unlikely to be disturbed, ensuring that the proposed mining activities are unlikely to impact on herpetofauna abundance and diversity in the region.

3.8 Invertebrates (Insects and Arachnids)

Table 4: Field assessment results pertaining to invertebrate species within the study area.

Photographs

a.) **A Clearwing Moth from the Family Sesiidae; b.)** ***Anoplolepis custodiens*** **(Large Pugnacious Ant, NYBA); c.)** ***Pontia helice*** **(African Meadow White, LC); d.)** ***Crocothemis erythraea*** **(Broad Scarlet, LC)**
Invertebrate SCC
No Invertebrate SCC are anticipated for the study area.
Invertebrate Discussion
In terrestrial landscapes, insects typically represent the most abundant macro-organisms and play a critical role in ecosystem functioning. They provide essential ecosystem services, including pollination, decomposition of plant and animal material, predation on pest species, parasitism, and the removal of dung and scat from larger mammals. As such, insect abundance and diversity are often used as indicators of ecosystem health. Flowering plants, including AIP species, can provide important seasonal food resources for insects, while insects in turn contribute to pollination processes across both indigenous and non-indigenous flora. Insects also constitute a key food resource for many vertebrate species, and substantial declines in insect populations may have cascading ecological effects. Although insect communities can be relatively resilient to disturbance, this resilience is contingent on the continued availability of suitable habitat and food resources. Within the study area, insect and arachnid observations were lower than expected. This reduced observed abundance can be attributed to historical and ongoing disturbances that have degraded habitat quality and simplified vegetation structure, thereby limiting insect diversity and activity. To address these limitations, observational data were supplemented with available database records and findings from previous studies conducted in the broader area. Arachnid abundance was similarly low in field observations; however, this is likely influenced by their cryptic behaviour and predominantly nocturnal activity, which reduces detectability during standard daytime surveys, rather than indicating true absence. There is expected to be a higher insect diversity and abundance in and around the Freshwater Habitat due to the number of micro-habitats providing refuge and important nutrients. The increased moister levels are also often an important factor in many insect life cycles. No insect SCC were observed in the study area or may potentially occur within the study area, as their known distribution ranges do not intersect with the study area. Species observed during the field assessment include a Clearwing Moth from the Family Sesiidae, *Anoplolepis custodiens* (Large Pugnacious Ant, NYBA), *Pontia helice* (African Meadow White, LC), and *Crocothemis erythraea* (Broad Scarlet, LC). Other common invertebrate species that are expected to occur on site are *Rhyothemis semihyalina* (Phantom Flutterer, LC) and *Conchyloctenia punctata* (African Spotted Tortoise Beetle, NYBA).

4 SITE ECOLOGICAL IMPORTANCE (SEI) AND AREAS OF CONCERN

This section aims to (1) present the sensitivity of the receptors identified within the study area (e.g., SCC, the vegetation/fauna community or habitat type present on the site), and (2) clearly define and map areas where avoidance mitigation is strongly recommended if significant, negative residual impacts are to be avoided (and to prevent potential fatal flaws).

Based on the criteria provided in Appendix A of this report, all habitats within the study area were allocated an importance category, i.e., SEI category. The SEI is a function of the biodiversity importance (BI) of the receptor and its resilience to impacts (receptor resilience [RR]). The BI, in turn, is a function of conservation importance (CI) and the functional integrity (FI) of the receptor. The criteria for SEI can be found in Appendix A.

Table 5 below indicates the individual SEI scoring for each habitat unit. Figure 5 indicates the SEI for the study area.

Table 5: Faunal SEI importance for the different habitat units within the study area.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Vaal Vet Sandy Grassland	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	**High** Large (> 20 ha but < 100 ha) intact area of EN ecosystem types. Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High	**Avoidance mitigation wherever possible. Minimisation mitigation** – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Modified Grassland	**Low** No confirmed or highly likely populations of threatened SCC. (< 50% of receptor contains natural habitat with limited potential to support SCC).	**Medium** Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Low	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor. Species in this habitat have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	Low	**Minimisation and restoration mitigation –** development activities of medium to high impact acceptable followed by appropriate restoration activities.
Freshwater Ecosystems: Artificial impoundments, Seep wetland and Depression wetland	**High** Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.	**Medium** Only narrow corridors of good habitat connectivity between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	**Low** Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	High	**Avoidance mitigation wherever possible. Minimisation mitigation** – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

Habitat Unit	CI	FI	BI	RR	SEI	Development Constraints
Transformed Habitat	**Very Low** No confirmed and highly unlikely populations of SCC. No natural habitat remaining.	**Very Low** Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.	Very Low	**Very High** Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	Very Low	**Minimisation mitigation –** development activities of medium to high impact acceptable and restoration activities may not be required.

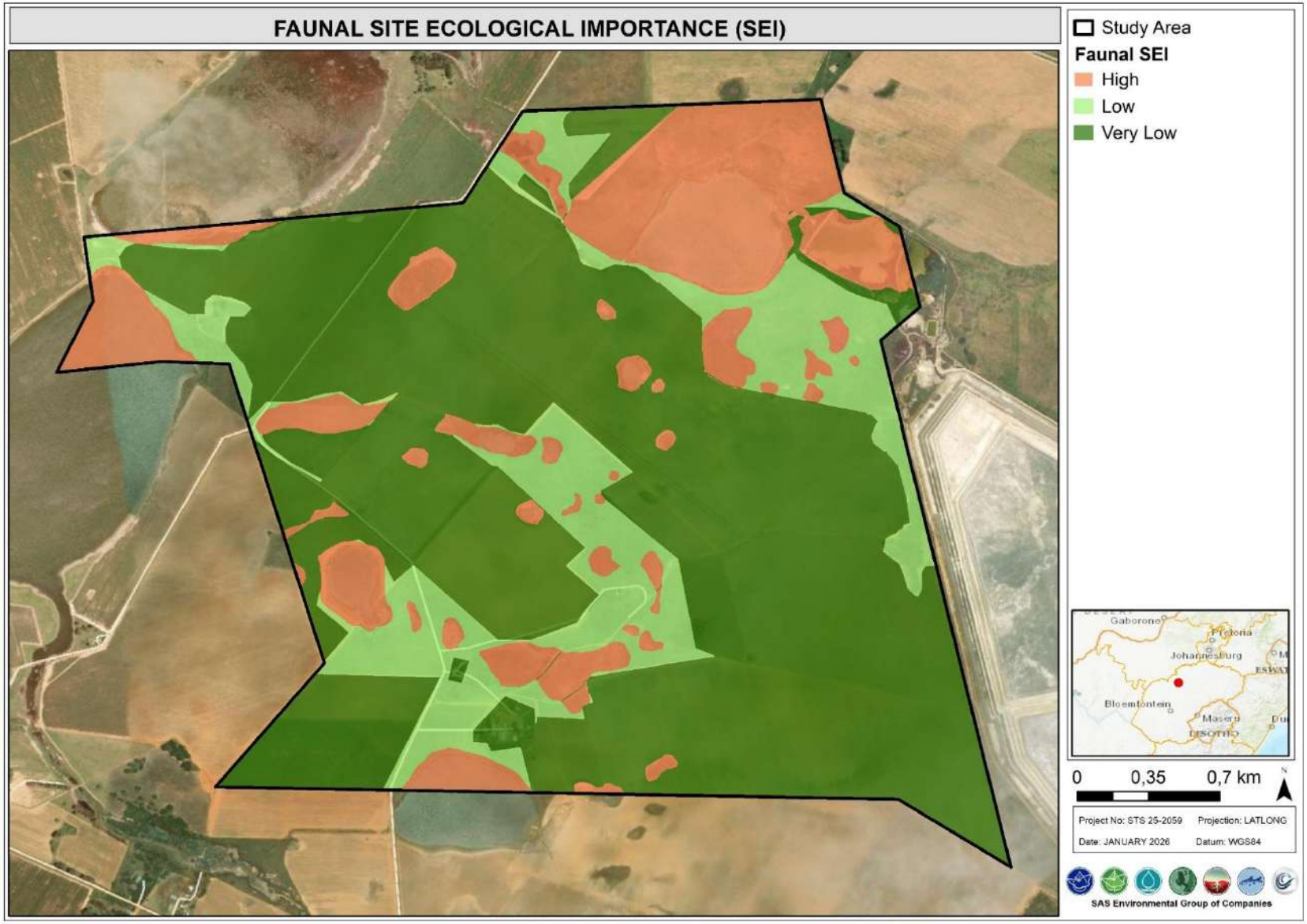


Figure 5. Faunal habitat sensitivity map for the study area.

5 IMPACT ASSESSMENT

Existing underground access (shafts and level access), within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR), will be refurbished and re-equipped. **No new surface infrastructure** is planned within the study area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right. The Life of the Mine (LOM) is 14 years. However, this report only focuses on the risks and mitigation with regard to underground mining associated with the study area.

Given the underground nature of the proposed mining activities, and the existence of current surrounding mining activity; no direct surface disturbance, vegetation clearance, or habitat loss is anticipated. Accordingly, this impact assessment focusses on the theoretical potential for indirect or secondary effects associated with underground mining. This includes possible edge effects, greater than anticipated noise disturbance due to the mining activities not being deep enough, or subsidence-related processes. These include in detail:

- The potential loss of Faunal Habitat and Diversity as an impact should subsidence or surface expression occur. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to a loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity and resilience.
- The potential loss of Faunal SCC as an impact from subsidence, should it occur, which may result in a loss of sensitive faunal habitat, suitable as foraging or breeding grounds for SCC.
- Faunal displacement and disturbance as a potential impact from underground mining, such as the noise generated from equipment and vibrations felt from explosions.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage).

An impact discussion and assessment of all potential i) Mining Phase (construction and operational phase) and (ii) Decommissioning Phase (closure, and rehabilitation activities) impacts are provided in Sections 5.1 and 5.2. All mitigatory measures required to minimise the calculated impacts are presented in Section 5.1.

5.1 Faunal Impact Assessment Results

Sections 5.1.1 – 5.1.2 indicate the perceived risks to the faunal ecology associated with all phases of the proposed mining activities.

The below tables (Table 6 - 11) indicate the perceived risks to the faunal ecology (Habitat, Diversity and SCC) associated with all phases of the proposed activities. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. Key integrated mitigation measures that are applicable to the proposed project are also presented in each table and are required to suitably manage, minimise and where possible, mitigate the ecological impacts that are associated with all phases of the proposed activities. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

The faunal impact assessment focused on evaluating the potential for indirect and precautionary surface-related impacts associated with underground mining activities, specifically those that could arise from unlikely subsidence events. As no surface infrastructure, vegetation clearance, or direct disturbance is proposed, no direct faunal impacts are anticipated. The impacts assessed below are therefore considered theoretical and are evaluated on a conservative, precautionary basis.

The impact assessment is divided between impacts on **1)** faunal habitat and diversity, **2)** threatened faunal SCCs and their associated habitat and **3)** disturbance to fauna due to underground noise and vibration.

Following the completion of the proposed mining activities, the decommissioning, closure, and rehabilitation activities for the proposed project will be limited to the removal of underground infrastructure. An impact to fauna due to the disturbance from underground noise and vibration was not deemed sufficient during the decommissioning phase due the anticipated activities.

The post-closure rehabilitation goal was not provided at the time of assessment. As such, it will be recommended that the post-closure landscape should attempt to reinstate, as far as is feasible, a wilderness landscape resembling the surrounding areas and comprising indigenous vegetation from the reference state.

5.1.1 Mining Phase (construction and operational phase) impacts

Table 6: Faunal Habitat and Diversity loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating *Without Mitigation*	**Impact Rating *With Mitigation***
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	Reversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape Plan and Rehabilitation plan developed by qualified specialists) to restore any impact to habitat integrity and condition.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Subsidence-related habitat loss and fragmentation are inherently negative, but early planning and well-designed mitigation can enhance ecological outcomes by improving connectivity, restoring *or creating habitats*, and strengthening ecosystem resilience.	

Residual impacts

In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include:

- Localised loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation.
- Disturbed and fragmented habitats remain susceptible to invasion by AIPs.
- Elevated management requirements post-closure.
- Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations).
- Loss of faunal diversity.
- Disruption of ecological corridors
- Altered flow patterns and hydrological cycles impacting water-dependent faunal species.
- Spillage/leakage of chemicals, fuel and oils from equipment leading to hydrocarbon ingress into the soils affecting plant growth (faunal habitat and food resources) and soil organisms.

Mitigation measures

- **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence.
- **Planning and Mine Design:** Adequate safety precautions and monitoring protocols must be developed to lower the potential of subsidence. Effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) allows for immediate management of potential subsidence events.
- At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase).

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.
❖ All infrastructure is to be regularly inspected for erosion or environmental risks.

Table 7: Faunal SCC loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating *Without Mitigation*	**Impact Rating *With Mitigation***
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Major	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	Reversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape Plan and Rehabilitation plan developed by qualified specialists) to restore any impact to habitat integrity and condition.	
Irreplaceable loss of resources:	Yes	
Can impacts be enhanced:	Yes. Subsidence-related habitat loss and fragmentation are inherently negative, but early planning and well-designed mitigation can enhance ecological outcomes by improving connectivity, restoring or creating habitats, and strengthening ecosystem resilience.	
Residual impacts In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include: ❖ Localised loss of essential natural vegetation for SCC, particularly where subsidence causes sinkholes or persistent ground deformation. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs, which will reduce the habitat quality for SCC. ❖ Elevated management requirements post-closure. ❖ Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations). ❖ Loss of faunal SCC diversity. ❖ Altered flow patterns and hydrological cycles impacting water-dependent faunal SCC species.		
Mitigation measures ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ **Planning and Mine Design:** Adequate safety precautions and monitoring protocols must be developed to lower the potential of subsidence. Effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) allows for immediate management of potential subsidence events. ❖ Bare areas are more susceptible to erosion, and these areas should be monitored closed to indicate any initial signs of subsidence. ❖ At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase). ❖ All infrastructure is to be regularly inspected for erosion or environmental risks.		

Table 8: Faunal displacement and disturbance as a potential impact from underground mining.

NATURE OF THE IMPACT: Displacement of species or disruption of natural processes. Noises can be heard and vibrations felt by highly sensory acute species. These anthropogenic disturbances could startle species, displacing them from the area, or interfere with their communication or ability to perceive natural threats.		
	Impact Rating *Without Mitigation*	**Impact Rating *With Mitigation***
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Short term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**Medium**	**Low**
Reversibility: *(Reversible or Irreversible)*	Irreversible: Once the disturbance has been perceived by the receiving environment it cannot be reversed.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	No. Anthropogenic disturbances, such as noise, are not beneficial to the environment or will not encourage faunal species to establish in the study area.	
Residual impacts ❖ Increased ambient noise from operational activities and facilities may drown out calls / communication of faunal species nearby. Increased ambient noise may lead to decreased breeding success or failure to hear nearby predators. ❖ Elevated management requirements post-closure. ❖ Loss of faunal diversity and abundance. ❖ Noise produced through mining activities and equipment will impact fauna by displacing them into surrounding habitats away from the study area.		
Mitigation measures ❖ At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase). ❖ External noise should be kept to a minimum to limit the impacts on faunal species surrounding the mine, and ❖ Mining activities, such as blasting, should aim to be done deep enough as to minimise disturbance to surface faunal species.		

5.1.2 Decommissioning Phase (closure, and rehabilitation activities) impacts

Table 9: Faunal Habitat and Diversity loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating *Without Mitigation*	**Impact Rating *With Mitigation***
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Moderate	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	Reversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Should subsidence become evident after mine closure ecological management intervention through active rehabilitation should to be implemented.	
Residual impacts In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include: ❖ Localised loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs. ❖ Elevated management requirements post-closure. ❖ Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations). ❖ Permanent loss of faunal habitat and faunal diversity due to loss of favourable habitat. Inability to reinstate faunal species assemblages similar to that of pre-mining conditions. ❖ Failure to break down and remove all mining structures and rehabilitating the footprints to a pre-mining state leading to long term and potentially permanent habitat degradation and species diversity loss.		
Mitigation measures ❖ **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. ❖ A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts. ❖ Implement all recommendations as per the mine closure plan. ❖ Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.		

Table 10: Faunal SCC loss as a potential impact from subsidence.

NATURE OF THE IMPACT: Habitat loss and fragmentation. Subsidence can lead to altered surface topography, sinkholes, fissures, and uneven land. The risk of direct habitat loss can lead to loss of suitable habitat and fragmentation of natural areas. Such fragmentation isolates populations and reduces connectivity, and resilience.		
	Impact Rating *Without Mitigation*	**Impact Rating *With Mitigation***
Impact Status:	**Negative**	**Negative**
Extent	Regional	Site
Duration	Long term	Short term
Magnitude	Major	Minor
Probability	Possible	Unlikely
Calculated Significance Rating	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	Reversible.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced:	Yes. Should subsidence become evident after mine closure ecological management intervention through active rehabilitation should to be implemented. .	

Residual impacts

In the unlikely event of subsidence, localised and temporary disturbance to surface vegetation may occur. Disturbed areas could require targeted rehabilitation and monitoring. Potential impacts include:

- Localised but irreversible loss of natural vegetation, particularly where subsidence causes sinkholes or persistent ground deformation.
- Disturbed and fragmented habitats remain susceptible to invasion by AIPs.
- Elevated management requirements post-closure.
- Lower capacity of ecosystems to recover from drought, fire, or extreme weather events (affected genetic variability within populations).
- Permanent loss of faunal SCC due to loss of favourable habitat. Inability to reinstate faunal species assemblages similar to that of pre-mining conditions
- Failure to break down and remove all mining structures and rehabilitating the footprints to a pre-mining state leading to long term and potentially permanent habitat degradation and faunal SCC loss.

Mitigation measures

- **Adaptive Subsidence Management:** Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence.
- A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts.
- Implement all recommendations as per the mine closure plan.
- Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area

5.2 Impact Discussion

The sections below provide the significance of perceived impacts arising from the proposed mining activities. The below sections break down the various impacts anticipated for the different aspects of the proposed mining development.

The proposed underground mining activities are not anticipated to directly impact on any faunal habitats and since all infrastructure required for the proposed project will be located within the existing Harmony Target Mine mining right area and no new infrastructure is planned within the study area, no significant impacts are anticipated for the study area. The risk of subsidence is considered unlikely (given the design and safety factor of the proposed underground mine). Therefore, the anticipated risks to faunal biodiversity are considered low, post mitigation if all mitigation measures are implemented.

5.2.1 Impacts on Faunal Habitat and Diversity

Given the low likelihood of a subsidence event, impacts on fauna are considered to be low. However, should an unlikely subsidence event occur, then impact significance will increase dependent on which habitat within the study area is affected. Large parts of the proposed layout fall within the Transformed and Modified Grassland habitat which is of reduced faunal SEI and most likely will only impact commonly occurring species. Some, however, fall within habitat of higher SEI (Vaal Vet Sandy Grassland and Freshwater Habitat) and may potentially impact on SCC which may or do utilise these sections for foraging or breeding. However, the potential for a subsidence event and for large-scale impacts on faunal ecology are unlikely if the recommended mitigatory measures, as stipulated in Section 5, are adhered to. The below sections provide a discussion of the impact assessment outcome in more detail.

5.2.2 Impacts on Faunal SCC

The online screening tool animal species theme indicated that the study area is of low and medium sensitivity. The medium sensitivity is triggered by *Hydroprogne caspia* (Caspian Tern, VU) and *Hydrictis maculicollis* (Spotted-necked Otter, VU) which both have a verified medium POC as they may be found in the study area but are unlikely to permanently depend on it due to historic and current anthropogenic impacts. In some areas the low sensitivity is disputed and a medium sensitivity verified instead. The medium sensitivity is verified and in the remaining areas the low sensitivity is verified.

During the site visit eight (8) faunal SCC were observed within the Freshwater Habitat in the study area; namely the *Anas undulata* (Yellow-billed Duck, NT), *Anhinga rufa* (African Darter,

NT), *Mycteria ibis* (Yellow-billed Stork, VU), *Spatula smithii* (Cape Shoveler, NT), *Podiceps cristatus* (Great Crested Grebe, VU), *Phoenicopterus roseus* (Greater Flamingo, NT), *Anas erythrorhyncha* (Red-billed Teal, NT), *Sarkidiornis melanotos* (Knob-billed Duck, NT).

Six (6) other SCC have a high POC for the study area; *Phoeniconaias minor* (Lesser Flamingo, NT), *Asio capensis* (Marsh Owl, NT), *Oxyura maccoa* (Maccoa Duck, NT), *Elanus caeruleus* (Black-winged Kite, NT), *Dendrocygna bicolor* (Fulvous Whistling-Duck, NT), *Nycticorax nycticorax* (Black-crowned Night Heron, NT) (Sections 3.5 – 3.8), whilst five (5) faunal SCCs have a medium POC - which may potentially be encountered within the study area. It is noted that these species are not likely dependent on the study area for survival, and the area may only be a part of their larger home ranges or foraging areas. While no development is anticipated on the surface, possible impact associated with subsidence and underground mining can impact SCC. If all mitigation measures are put into effect, the potential impacts on faunal SCC are expected to be controllable and not detrimental to the SCC

5.2.3 Probable Residual Impacts

No significant negative residual impacts have been identified for the proposed project. However, residual impacts on the receiving faunal ecological environment are possible. The following points highlight the key residual impacts that have been identified:

- Localised and potentially permanent loss of and altered faunal species diversity (in case of subsidence);
- Edge effects such as further habitat fragmentation and AIP proliferation; and
- Reduced ecological recovery where disturbed areas are not rehabilitated to an ecologically functioning state during concurrent rehabilitation and mine closure, resulting in possible loss of faunal habitat and species diversity in the long term.

5.2.4 Cumulative Impacts

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The local area around the study area has already been subjected to impacts as a result of historic mining activities, agriculture, and vegetation clearing for development activities. This has already negatively impacted faunal diversity, habitat and abundance within the region, forcing fauna into the remaining natural habitat. These fragmented habitats have become important hotspots for faunal diversity in a largely disturbed environment. Remaining intact and connected portions of natural vegetation will be fragmented. Cumulative impacts will result

in isolated natural areas that are no longer connected to functioning corridors (leading to a decrease in ecosystem functioning and ecosystems services).

The probability of additional or new developments in the area is likely based on the setting and location of the study area (close proximity to other mining operations) and the current agricultural practices. The surrounding development will have cumulative impacts on habitat loss and residual impacts (such as AIP proliferation and soil erosion) on the remaining natural to semi-natural habitat.

AIP proliferation has already impacted on large parts of the study area and is suspected to further reduce habitat condition in the future unless mitigated, since AIPs associated with the mining right area can invade nearby natural habitat. The proposed mining activities may however have a positive cumulative impact on remaining natural habitats in the region, improving the quality of natural habitat for faunal species. By following an AIP Management and Control Plan, habitat quality can be improved encouraging the immigration of fauna from outside the study area.

Table 11: Cumulative impacts associated with the proposed underground mining project.

NATURE OF THE CUMULATIVE IMPACT: Habitat fragmentation, spread of AIPs (resulting in habitat degradation) and additional development resulting in loss of faunal communities and potential faunal SCC.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Regional	Local
Duration	Long term	Medium term
Magnitude	Major	Minor
Probability	Possible	Possible
Calculated Significance Rating	**High**	**Low**
Reversibility:	Reversible. With adequate assessment of direct and cumulative risk assessment of current and future project the cumulative risk of this (and future) project can reduced.	
Irreplaceable loss of resources:	No.	
Can impacts be enhanced: *(Yes or No)*	No.	
Residual impacts ❖ Loss of natural vegetation and native faunal species. ❖ Disturbed and fragmented habitats remain susceptible to invasion by AIPs. ❖ Elevated management requirements post-closure. ❖ Lower habitat resilience (i.e., capacity of ecosystems to recover from drought, fire, or extreme weather events) as a result of affected genetic variability within populations), and ❖ Cumulative noise and vibrational disturbance accompanying the ongoing surrounding mining activity.		

6 CONCLUSION AND RECOMMENDATIONS

The impact assessment was undertaken on all aspects of faunal ecology deemed likely to be affected. The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information.

The proposed project activities are not expected to have a significant impact on important or sensitive faunal resources. This is because no surface development is associated with the project and no direct impacts are anticipated. The risk of significant impacts such as subsidence is considered low, and with the mitigations measures outlined in this report, potential impacts on faunal receptors are expected to be minimal. The proposed mining is not expected to have a significant impact on the faunal assemblages, provided the proponent carries out all the recommend mitigation measures.

It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.

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APPENDIX A: Faunal Method of Assessment

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of anthropogenic activities associated with the study area may have an impact on faunal behaviour and in turn the rate of observations.

Mammals

Mammal species were recorded during the field assessment with the use of visual identification by actively searching/listening for individuals or the presence of spoor, calls and dung. Specific attention was given to mammal SCC listed on a regional and national level, as well as those identified by the Screening Tool. Desktop analysis of the study area was used to determine areas of higher value to mammal species and focus was placed within these areas during the field survey. Transects were walked throughout the study area to cover maximum ground within the given timeframe.

Avifauna

The Southern African Bird Atlas Project 2 database (http://sabap2.adu.org.za/) was compared with the recent field survey of avifaunal species identified in the study area. Field surveys were undertaken utilising direct observation and bird call identification techniques to accurately identify avifaunal species. Specific attention was given to avifaunal SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Reptiles

Reptiles were identified during the field survey. Suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected, and all reptiles encountered were identified. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur in the study area. Specific attention was given to reptile SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Amphibians

Identifying amphibian species is done by the use of direct visual identification along with call identification technique. Amphibian species flourish in and around wetland, riparian, and moist grassland areas. It is unlikely that all amphibian species will have been recorded during the site assessment, due to their cryptic nature and habits, varied stages of life cycles and seasonal and temporal fluctuations within the environment. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which amphibian species are likely to occur within the study area as well as the surrounding area. Specific attention was given to amphibian SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Invertebrates

Whilst conducting transects through the study area, all insect species visually observed were identified, and where possible photographs were taken.

It must be noted however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the study area at the time of the survey. Specific attention was given to insect SCC listed on a regional and national level, as well as those identified by the Screening Tool.

Suitable applicable habitat areas (rocky outcrops, sandy areas and fallen dead trees) where spiders and scorpions are likely to reside were searched. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for Mygalomorphae arachnids (Trapdoor and Baboon spiders) as well as potential SCC scorpions within the study area.

Faunal Species of Conservation Concern Assessment

The Probability of Occurrence (POC) for each faunal SCC was determined using the following four parameters:

- Species distribution;
- Habitat availability;
- Food availability; and
- Habitat disturbance.

The Probability of Occurrence (POC) for each faunal SCC is described:

- "**Confirmed'**: if observed during the survey;
- "**High**": if within the species' known distribution range and suitable habitat is available;
- "**Medium**": if either within the known distribution range of the species or if suitable habitat is present; or
- "**Low**": if the habitat is not suitable and falls outside the distribution range of the species.

The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Faunal Site Ecological Importance (SEI)

SEI is a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site[4]) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

SEI can be derived from a simple matrix of BI and RR as follows:

Table A1: Matrix of CI and FI to determine BI.

Site Ecological Importance (SEI)		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed development is provided below.

Table A2: Guidelines for interpreting SEI in the context of the proposed development activities.

Site ecological importance	Interpretation in relation to proposed development activities
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

[4] Note that the habitat type may be independent of the vegetation community and that it may even be artificial, e.g., excavated rock quarries that provide crucial breeding habitat for cliff-nesting species such as Bald Ibis.

APPENDIX B: Faunal SCC

Table B1: NEMBA: TOPS list (2007) of all faunal SCC that require a permit should they need to be relocated as a result of the proposed mining development and activities and its activities.

Scientific Name	Common Name
CRITICALLY ENDANGERED SPECIES	
REPTILIA	
Caretta caretta	Loggerhead Sea Turtle
Dermochelys coriacea	Leatherback Sea Turtle
Eretmochelys imbricate	Hawksbill Sea Turtle
AVES	
Grus carunculatus	Wattled Crane
Hirundo atrocaerulea	Blue Swallow
Neophron percnopterus	Egyptian Vulture
Poicephalus robustus	Cape Parrot
MAMMALIA	
Bunolagus monticularis	Riverine Rabbit
Chrysospalax	Rough-haired Golden Mole
ENDANGERED SPECIES	
REPTILIA	
Chelonia mydas	Green Turtle
Cordylus giganteus	Giant Girdled Lizard
Lepidochelys olivacea	Olive Ridley Turtle
Psammobates geometricus	Geometric Tortoise
AVIFAUNA	
Anthropoides paradiseus	Blue Crane
Balearica regulorum	Grey Crowned Crane
Ephippiorhynchus senegalensis	Saddle-billed Stork
Gypaetus barbatus	Bearded Vulture
Gyps africanus	White-backed Vulture
Gyps coprotheres	Cape Vulture
Necrosyrtes	Hooded Vulture
Pelecanus rufescens	Pink-backed Pelican
Scotopelia peli	Pel's Fishing Owl
Torgos tracheliotus	Lappet-faced Vulture
MAMMALIA	
Amblysomus robustus	Robust Golden Mole
Damaliscus tunatus	Tsessebe
Diceros bicornis	Black Rhinoceros
Equus zebra	Mountain Zebra
Lycaon pictus	African Wild Dog
Neamblysomus gunningi	Gunning's Golden Mole
Ourebia ourebi ourebi	Oribi
Paraxerus palliatus	Red Squirrel
Petrodromus tetradactylus	Four-toed Elephant-shrew
INVERTEBRATA	
Colophon spp - species	Stag Beetles
VULNERABLE SPECIES	
AVES	
Trigonoceps occipitalis	White-headed Vulture
Aquila rapax	Tawny Eagle
Ardeotis kori	Kori Bustard
Ciconia nigra	Black Stork
Circaetus fasciolatus	Southern Banded Snake Eagle

Scientific Name	Common Name
Eupodotis caerulescens	Blue Korhaan
Falco fasciinucha	Falcon
Falco naumanni	Lesser Kestrel
Falco peregrinus	Peregrine Falcon
Geronticus calvus	Bald Ibis
Neotis ludwidii	Ludwig's Bustard
Polemaetus bellicosus	Martial Eagle
Terathopius ecaudatus	Bateleur
Tyto capensis	Grass Owl
MAMMALIA	
Acinonyx jubatus	Cheetah
Chrysospalax trevelyani	Giant Golden Mole
Cricetomys gambianus	Giant Rat
Damaliscus pyrgorgus pygargus	Bontebok
Dendrohyrax arboreus	Tree Hyrax
Hippotragus equinus	Roan Antelope
Pholidota temminckii	Pangolin
Neamblysomus julianae	Juliana's Golden Mole
Neotragus moschatus	Suni
Panthera leo	Lion
Panthera pardus	Leopard
Philantomba monticola	Blue Duiker
INVERTEBRATA	
Peripatopsis alba	White Cave Velvet Worm
PROTECTED SPECIES	
AMPHIBIA	
Pyxicephalus adspersus	Giant Bullfrog
Pyxicephalus edulis	Afiican Bullfrog
REPTILIA	
Bitis gabonica	Gaboon Adder
Bitis schneideri	Namaqua Dwarf Adder
Bradypodion taeniabronchum	Smith's Dwarf Chameleon
Cordylus cataphractus	Girdled Lizard
Crocodylus niloticus	Nile crocodile
Python natalensis	African Rock Python
AVES	
Bucowus leadeateri	Southern Ground-Hornbill
Circus ranivorus	African Marsh Harrier
Neotis denhami	Denham's Bustard
Spheniscus	Jackass Penguin
MAMMALIA	
Atelerix frontalis	South African Hedgehog
Ceratotherium simum	White Rhinoceros
Connochaetes	Black Wildebeest
Crocuta crocuta	Spotted Hyaena
Felis nigripes	Black-footed Cat
Parahyaena brunnea	Brown Hyaena
Leptailurus serval	Serval
Loxodonta africana	African elephant
Lutra maculicollis	Spotted-necked Otter
Millivora capensis	Honey Badger
Raphicerus sharpei	Sharpe's Grysbok
Redunca	Reedbuck
Vulpes chama	Cape Fox

Scientific Name	Common Name
INVERTEBRATA	
Aloeides clarki	Coega Copper Butterfly
Ceratogyrus spp - All species	Horned Baboon Spiders
Echinodiscus bisperforatus	Pansy Shell
Dromica spp - All species	Tiger Beetles
Graphipterus assimilis	Velvet Ground Beetle
Hadogenes spp -species	Flat Rock Scorpions
Haliotis midae	South African Abalone
Harpactira spp - All species	Common Baboon Spiders
Ichnestoma - Aspecies	Fruit Chafer Beetles
Manticora spp - Aspecies	Monster Tiger Beetles
Megacephala asperata	Tiger Beetle
Megacephala regalis	Tiger Beetle
Nigidius auriculatus	Stag beetle
Oonotus adspersus	Stag Beetle
Oonotus interioris	Stag Beetle
Oonotus rex	Stag Beetle
Oonotus sericeus	Stag Beetle
Opisthacanthus spp - All species	Creeping Scorpions
Opistophthalmus spp - All species	Burrowing Scorpions
Platychile pallida	Tiger Beetle
Prosopocoilus petitclerci	Stag Beetle
Prothyma guttipennis	Tiger Beetle
Pterinochilus spp - All species	Golden Baboon Spiders

NL= Not Listed; EN= Endangered; CR= Critically Endangered; VU= Vulnerable; P = Protected (TOPS 2007); NT = Near Threatened

Table B2: Faunal SCC that may occur in the study area according to the DFFE screening tool

Scientific Name	Common Name	Status	Sensitivity	POC
Hydroprogne caspia	Caspian Tern	VU	Medium	Medium
Hydrictis maculicollis	Spotted-Necked Otter	VU	Medium	Medium

VU = Vulnerable

Table B3: Avifaunal Species for the pentad encompassing the study area.

Pentads	Link to pentad summary on the South African Bird Atlas Project 2 web page
2745_2635	https://sabap2.birdmap.africa/coverage/pentad/2745_2635

APPENDIX C: Faunal Species List

Table C1: Mammal species or signs recorded during the field assessment.

Scientific Name	Common Name	National Red List Status
Herpestes sanguineus	Common Slender Mongoose	LC
Cynictis penicillata	Yellow Mongoose	LC
Raphicerus campestris	Steenbok	LC
Geosciurus inauris	South African Ground Squirrel	LC

LC = Least concerned.

Table C2: Avifaunal species recorded during the field assessment. For a more comprehensive list of all potentially occurring bird species in the vicinity of the study area, please refer to the SABAP 2 pentad links.

Scientific Name	Common Name	National Red List Status
Afrotis afraoides	Northern Black Korhaan	LC
Scleroptila gutturalis	Orange River Francolin	LC
Vanellus armatus	Blacksmith Lapwing	LC
Columba guinea	Speckled Pigeon	LC
Ploceus velatus	Southern Masked Weaver	LC
Streptopelia capicola	Cape Turtle-Dove	LC
Plectropterus gambensis	Spur-winged Goose	LC
Fulica cristata	Red Knobbed Coot	LC
Anas erythrorhyncha	Red-billed Teal	NT
Euplectes orix	Southern Red Bishop	LC
Myrmecocichla formicivora	Ant-eating Chat	LC
Sarkidiornis melanotos	Knob-billed Duck	NT
Anas undulata	Yellow-billed Duck	NT
Lamprotornis nitens	Cape Starling	LC
Anhinga rufa	African Darter	NT
Microcarbo africanus	Reed Cormorant	LC
Alopochen aegyptiaca	Egyptian Goose	LC
Euplectes progne	Long-tailed Widowbird	LC
Himantopus Himantopus	Black-winged Stilt	LC
Egretta garzetta	Little Egret	LC
Mycteria ibis	Yellow-billed Stork	VU
Euplectes afer	Yellow-crowned Bishop	LC
Threskiornis aethiopicus	African Sacred Ibis	LC
Phoenicopterus roseus	Greater Flamingo	NT
Spatula smithii	Cape Shoveler	NT
Spatula hottentota	Blue-billed Teal	LC
Platalea alba	African Spoonbill	LC
Tadorna cana	South African Shelduck	LC
Chlidonias hybrida	Whiskered Tern	LC
Podiceps cristatus	Great Crested Grebe	VU
Ardeola ralloides	Squacco Heron	LC
Anthus leucophrys	Plain-backed Pipit	LC
Recurvirostra avosetta	Pied Avocet	LC
Bostrychia hagedash	Hadeda	LC
Streptopelia senegalensis	Laughing Dove	LC

LC = Least concerned; VU = Vulnerable; NT = Near Threatened

Table C3. Reptile species expected to be on site, due to historic observations, are marked with a *.

Scientific name	Common name	National Red List Status
**Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	LC
**Afrotyphlops bibronii*	Bibron's Blind Snake	LC
**Panaspis wahlbergii*	Wahlberg's Snake-eyed Skink	LC

LC = Least Concern

Table C4. Amphibians expected to be on site, due to historic observations, marked with a *.

Scientific Name	Common Name	National Red List Status
**Amietia delalandii*	Common River Frog	LC
**Sclerophrys capensis*	Raucous Toad	LC
**Cacosternum boettgeri*	Boettger's Dainty Frog	LC
**Schismaderma carens*	African Red Toad	LC

LC = Least Concern

Table C5: Invertebrates recorded during the field assessment.

Scientific Name	Common Name	National Red List Status
Family Sesiidae	Clearwing Moths	
Hodotermes mossambicus	Northern Harvester Termite	LC
Crocothemis erythraea	Broad Scarlet	LC
Pontia helice	African Meadow White	LC
Anoplolepis custodiens	Large Pugnacious Ant	NYBA

LC = Least Concern

Appendix D4 - Freshwater and Aquatic Assessment

SCIENTIFIC AQUATIC SERVICES

Freshwater and Aquatic Assessments

AS PART OF THE ENVIRONMENTAL AND WATER USE AUTHORISATION PROCESSES FOR THE PROPOSED UNDERGROUND MINING ACTIVITIES IN THE ALLENRIDGE AREA, FREE STATE PROVINCE.

Prepared for:	Kongiwe Environmental (Pty) Ltd
Report authors:	C. De Freitas
	Dr. A. Kock (Pr.Sci.Nat)
Report reviewers:	K. Coertze (Pri.Sci.Nat)
	S. van Staden (Pri.Sci.Nat)
Report Reference:	SAS 25-0190
Report Date:	August 2026

Part of the SAS Environmental Group of Companies

Website: http://www.sasenvironmental.co.za

EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed to conduct freshwater and aquatic assessments as part of the Environmental Authorisation (EA) and Water Use Authorisation (WUA) processes for the proposed Jelani Joint Venture (JV) area underground mining project, near Allenridge in the Free State Province (hereafter referred to as the "study area").

The freshwater assessment for the study area was undertaken in December 2025. Six seep wetlands and 26 depression wetlands were identified within the study area, as well as a Channelled Valley Bottom (CVB) wetland southwest of the study area. Only the seep and depression wetlands were assessed in this report due to the potential impacts on these systems as a result of the proposed activities. Due to the significant invasion of alien vegetation and modification of the hydraulic regime of the various systems, the wetlands were assessed to be in moderately to largely modified (Category C/D) ecological conditions, respectively, and of moderate ecological importance and sensitivity. The ecological service provisioning was assessed as low/very low. This is largely due to the modified ecological condition of the wetlands, however, the wetlands provide isolated habitats for important fauna thus providing moderate service provision in terms of biodiversity maintenance.

Following the freshwater ecosystem assessment, the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2023) was applied to determine the significance of impacts of the proposed underground mining activities on the wetlands. As no surface infrastructure is proposed (only underground activities) to encroach within the wetlands or within the General Notice (GN) 4167 500 m Zone of Regulation (ZoR) of the systems and provided that all mitigation measures outlined in this report are adhered to throughout the life of the proposed underground mining operation, the perceived impact significance is considered to be "Low".

The outcome of the impact assessment [provided by the Environmental Assessment Practitioner (EAP)] states that the operational and closure phase activities associated with the proposed project are medium without the implementation of mitigation measures and low with the implementation of mitigation measures.

The assessment of potential impacts to groundwater was not part of the scope of this report but was considered, at a high level, as the potential for decant relates to surface freshwater resource management. As such, the mitigation measures as outlined in the Technical Report (Bara Consulting, 2025) to mitigate against potential subsidence, creation of a groundwater pollution plume, that poses a risk to surface water resources, and possible decant must be implemented and strictly adhered to in order to ensure a low impact significance. It is also recommended that the pillar safety factor under the wetlands be included as an additional margin of safety to ensure that no subsidence of the wetlands takes place.

Thus, it is the opinion of the specialist that the proposed undermining of the wetlands associated with the proposed Jelani EJV is considered acceptable and can be authorised by means of a Water Use Authorisation process in terms of Government Notice (GN) 4167 as it relates to the National Water Act (NWA) and is acceptable for Environmental Authorisation (EA).

MANAGEMENT SUMMARY

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed to conduct freshwater and aquatic assessments as part of the Environmental Authorisation (EA) and Water Use Authorisation (WUA) processes for the proposed Jelani Joint Venture (JV) area underground mining project (hereafter referred to as the 'proposed underground mining operation'), near Allenridge in the Free State Province (referred to as the "study area").

The purpose of this report is to define the ecology of the freshwater ecosystems associated with the proposed underground mining operation and the associated investigation area (defined as a 500 m radius around the study area), in line with Government Notice (GN) 4167 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA), in terms of freshwater characteristics, including mapping of the freshwater ecosystems, defining areas of increased Ecological Importance and Sensitivity (EIS) and defining the Present Ecological State (PES) of the freshwater ecosystems associated with the proposed underground mining operation. The report also aims to define the socio-cultural and ecological service provision of the freshwater ecosystems and additionally outlines the Recommended Ecological Category (REC), Recommended Management Objective (RMO) and Best Attainable State (BAS) for the freshwater ecosystems.

The assessment took the following approach:

- A desktop study was conducted, in which possible freshwater ecosystems were identified for on-site investigation, and relevant national and provincial databases were consulted;
- The field assessment was undertaken on the 10th of December 2025 to ground truth the freshwater ecosystems associated with the study area. Multiple natural seep and depression wetlands were identified within the study area and associated investigation area, as well as a channelled valley-bottom (CVB) wetland in the southwestern corner of the investigation area; and
- The characteristics of the wetlands were defined, including the PES, EIS, REC, RMO and BAS.

The results of the field assessment are presented in Section 4 of this report, and are summarised in table A below:

Table A: Summary of results of the field assessment as discussed in Section 4.

Freshwater ecosystems	PES	Ecoservices importance	EIS	REC / RMO / BAS
Seep Wetlands	PES Category C (Moderately Modified)	Very low to Moderate	Moderate	REC Category: C BAS Category: C RMO: Maintain
Depression Wetlands	PES Category D (Largely Modified)			REC Category: D BAS Category: D RMO: Maintain
Extent of modification anticipated.	**Low** Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a "Low" risk to the ongoing functionality of the systems. Key mitigation measures include: ➢ Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and ➢ It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.			

Following the freshwater ecosystem assessment, the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2023) was applied to determine the significance of impacts of the proposed undermining of the wetlands. Provided that all mitigation measures outlined in this report are adhered to throughout the life of the proposed underground mining operation, the perceived impact significance is "Low" provided that the mitigation measures as outlined in this report are strictly adhered to.

The assessment of potential impacts to groundwater was not part of the scope of this report but was considered, at a high level, as the potential for decant relates to surface freshwater resource management. As such, the mitigation measures as outlined in the Technical Report (Bara Consulting, 2025) to mitigate against potential subsidence, creation of a groundwater pollution plume, that poses a risk to surface water resources, and possible decant must be implemented and strictly adhered to in order to ensure a low impact significance. It is also recommended that the pillar safety factor under the wetlands be included as an additional margin of safety to ensure that no subsidence of the wetlands takes place.

A summary of the DWS Risk Assessment is provided in Table B below.

Table B: Summary of DWS Risk Assessment applied to the freshwater ecosystems associated with the proposed underground mining operation.

Phase	No.	Activity	Impact	Risk Rating
Operational	1	Operation of the underground mining area related to the undermining of the freshwater ecosystems.	• Potential creation of a cone of depression, which may drain water from the wetlands, thus resulting in desiccation of the systems.	L
			• Potential destabilisation of the surrounding environment through the extraction of ore and subsequent potential subsidence of the land.	L
Closure/ Post Closure	2	Post-closure management activities. (Decant of contaminated water from the rehabilitated mine area into the receiving environment subject to confirmation by a suitably qualified geohydrologist).	• Contamination of water within the receiving environment, and subsequent reduction in water quality (increase in salts and specific contaminants of concern and reduced pH); • Post-operational subsidence; • Subsequent negative impacts on biota and vegetation; • Altered flow regimes (increased hydroperiod); and • Habitat degradation.	L

The outcome of the impact assessment [provided by the Environmental Assessment Practitioner (EAP)] states that the operational and closure phase activities associated with the proposed project are medium without the implementation of mitigation measures and low with the implementation of mitigation measures.

Given these findings, it is the opinion of the specialist that the proposed undermining of the wetlands associated with the proposed Jelani project is considered acceptable and can be authorised by means of a Water Use Authorisation process in terms of Government Notice (GN) 4167 as it relates to the National Water Act (NWA) and is acceptable for Environmental Authorisation (EA).

DOCUMENT GUIDE

The table below provides the specialist report requirements for the assessment and reporting of impacts on aquatic biodiversity in terms of Government Notice 320 as promulgated in Government Gazette 43110 of 20 March 2020 in line with the Department of Environmental Affairs screening tool requirements, as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

No.	Requirements	Section in report
2.1	Assessment must be undertaken by a suitably qualified SACNASP registered specialist	Appendix H
2.2	Description of the preferred development site, including the following aspects-	Section 1.1.1
2.2.1	a. Aquatic ecosystem type b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution and movement patterns	Section 4.4
2.2.2	Threat status, according to the national web based environmental screening tool of the species and ecosystems, including listed ecosystems as well as locally important habitat types identified	Section 3.1
2.2.3	National and Provincial priority status of the aquatic ecosystem (i.e. is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub- catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether or not they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status	Section 3.1
2.2.4	A description of the Ecological Importance and Sensitivity of the aquatic ecosystem including: a. The description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater)	Section 4.4
2.3	Identify any alternative development footprints within the preferred development site which would be of a “low” sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification	Section 5
2.4	Assessment of impacts – a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:	Section 7
2.4.1	Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Section 4.4 and Section 7
2.4.2	Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present?	Section 4.4
2.4.3	How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); b. Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment; c. The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). d. Assessment of the risks associated with water use/s and related activities.	Section 4.4
2.4.4	How will the development impact on the functionality of the aquatic feature including: a. Base flows (e.g. too little/too much water in terms of characteristics and requirements of system);	Section 4.4 and Section 7

	b. Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river); c. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland); d. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); and e. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal).	
2.4.5	How will the development impact on the functionality of the aquatic feature including: a. water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river) b. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland). c. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); d. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); e. The loss or degradation of all or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soil, etc.) associated with or within the aquatic ecosystem.	Section 4.4 and Section 7
2.4.6	How will the development impact on key ecosystem regulating and supporting services especially Flood attenuation; Streamflow regulation; Sediment trapping; Phosphate assimilation; Nitrate assimilation; Toxicant assimilation; Erosion control; and Carbon storage.	Section 4.4 and Section 7
2.4.7	How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	Section 4.4
2.4.9	A motivation must be provided if there were development footprints identified as per paragraph 2.3 above that were identified as having a “low” biodiversity sensitivity and were not considered appropriate.	Section 8
3.	The report must contain as a minimum the following information:	
3.1	Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise and their curriculum vitae;	Appendix H
3.2	A signed statement of independence by the specialist;	Appendix H
3.3	The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2 and 4.4
3.4	The methodology used to undertake the impact assessment and site inspection, including equipment and modelling used, where relevant;	Appendix C - E
3.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.3
3.6	Areas not suitable for development, to be avoided during construction and operation (where relevant);	Section 5
3.7	Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts;	Section 7.4
3.8	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted protocol;	Section 5
3.9	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;	Section 7
3.10	A motivation where the development footprint identified as per 2.3 were not considered stating reasons why these were not being considered; and	Section 8
3.11	A reasoned opinion, based on the finding of the specialist assessment, regarding the acceptability or not, of the development and if the development should receive approval, and any conditions to which the statement is subjected.	Section 8

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GLOSSARY OF TERMS

Alien vegetation:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome - usually international in origin.
Biodiversity:	The number and variety of living organisms on earth, the millions of plants, animals and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts.
Buffer:	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
Catchment:	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flows into a river, wetland, lake, and ocean or contributes to the groundwater system.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
Gleying:	A soil process resulting from prolonged soil saturation which is manifested by the presence of neutral grey, bluish or greenish colours in the soil matrix.
Groundwater:	Subsurface water in the saturated zone below the water table.
Hydromorphic soil:	A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soil).
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Mottles:	Soil with variegated colour patterns are described as being mottled, with the "background colour" referred to as the matrix and the spots or blotches of colour referred to as mottles.
Watercourse:	In terms of the definition contained within the National Water Act, a watercourse means: • A river or spring; • A natural channel which water flows regularly or intermittently; • A wetland, dam or lake into which, or from which, water flows; and • Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; • and a reference to a watercourse includes, where relevant, its bed and banks
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soil, which may in turn have an influence on the ecological characteristics and functioning of wetlands.

ACRONYMS

°C	Degrees Celcius
AIP	Alien and Invasive Plant
CVB	Channelled Valley Bottom
CR	Critically Endangered
BAS	Best Attainable State
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EI	Ecological Importance
EIS	Ecological Importance and Sensitivity
EPL	Ecosystem Protection Level
ES	Ecological Sensitivity
ESA	Ecological Support Area
ETS	Ecosystem Threat Status
FEPA	Freshwater Ecosystem Priority Areas
GA	General Authorisation
GDI	Generic Diatom Index
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
ha	Hectare
HGM	Hydrogeomorphic
JV	Joint Venture
km	Kilometre
LOM	Life of Mining
m	Metre
mm	Millimetre
m.a.m.s.l	Metres above mean sea level
MAP	Mean Annual Precipitation
MRA	Mining Right Area
mS/m	Millisiemens/metre
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
NP	Not Protected
NWA	National Water Act
PES	Present Ecological State
POC	Probability of Occurrence
PR	Prospecting Rights
%PTV	Percentage Pollution Tolerant Values
RAM	Risk Assessment Matrix
REC	Recommended Ecological Category
RMO	Resource Management Objective
RWQO	Resource Water Quality Objectives
SACNASP	South African Council for Natural Scientific Professions
SAS	Scientific Aquatic Services
SPI	Specific Pollution Sensitivity Index
SWSA	Strategic Water Source Area

SQR	Sub quaternary catchment reach
subWMA	Sub-Water Management Area
TDI	Trophic Diatom Index
TSF	Tailings Storage Facility
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WRE	White Rivers Exploration
WUA	Water Use Authorisation
ZoR	Zone of Regulation

1 INTRODUCTION

1.1 *Background*

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed to conduct freshwater and aquatic assessments as part of the Environmental Authorisation (EA) and Water Use Authorisation (WUA) processes for the proposed Jelani Joint Venture (JV) area underground mining project (hereafter referred to as the 'proposed underground mining operation'), near Allenridge in the Free State Province (referred to as the "study area"). (Figures 1 and 2).

The site visit for the freshwater assessment was undertaken on the 10th of December 2025 to establish baseline ecological conditions and the risk significance posed by the proposed activities, to guide the activities in relation to any potential freshwater ecosystems that may be affected directly or indirectly by the proposed underground mining operation. In order to identify all possible freshwater ecosystems that may potentially be impacted by the proposed underground mining operation, a 500 m "zone of investigation" around the study area, in accordance with Government Notice (GN) 4167 of 2023 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA), as amended was used as a guide in which to assess possible sensitivities of the receiving environment. This area – i.e. the 500 m zone of investigation around the study area – will henceforth be referred to as the "investigation area".

1.1.1 *Project Description*

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the JV area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area (hereafter referred to as the "study area").

The proposed development area is approximately (~) 956 hectares (ha) in extent, situated directly west of the Harmony Gold Target Mine and is ~ 2.5 kilometres (km) west of Allanridge, 11 km northwest of Odendaalsrus, and 22 km east of Wesselsbron, in the Free State Province of South Africa. The study area is within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.
Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mine's life, be used for the

movement of men, material and rock, depending on which phase the mine is in. All infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new infrastructure is planned within the project area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is ~ 69 Ha. This TSF is a separate project being undertaken by Harmony Gold, thus will not be discussed further in this report.

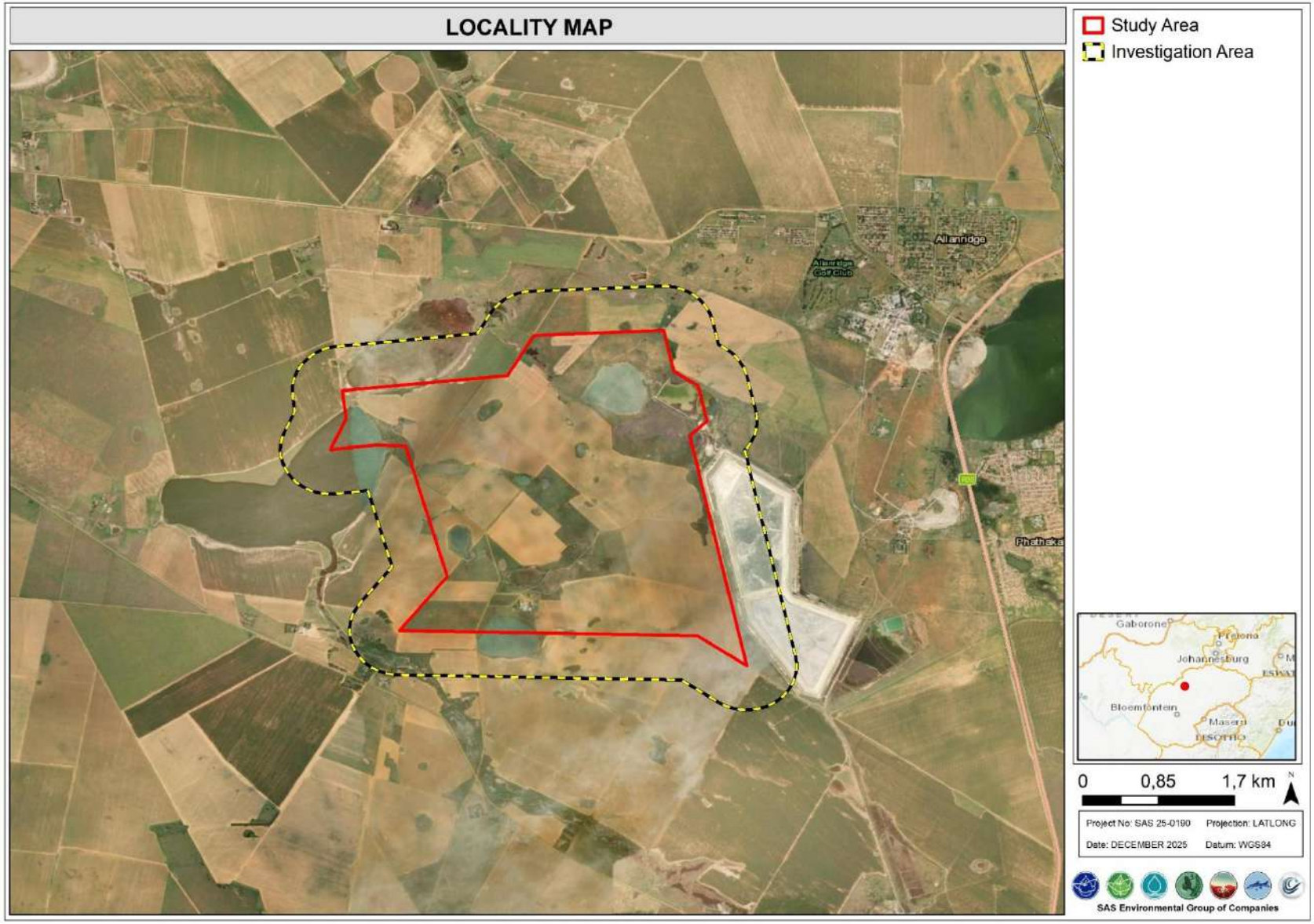


Figure 1: The study and associated investigation area depicted in relation to the surrounding area.

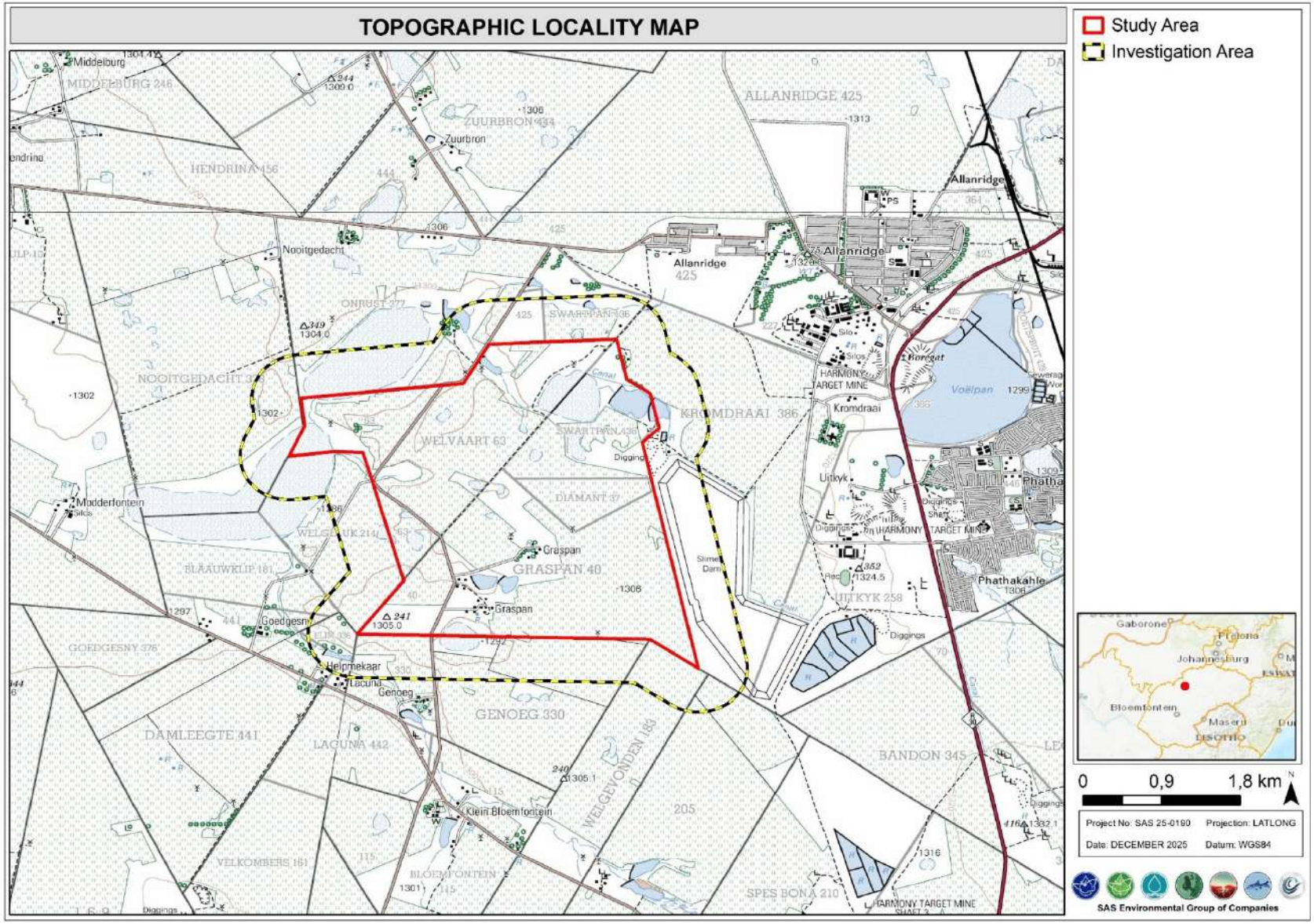


Figure 2: The study and associated investigation area, depicted on an ortho-topographic map.

1.2 *Scope of Work*

Specific outcomes in terms of this report are outlined below:

- A background study of relevant national, provincial and municipal datasets [such as the National Freshwater Ecosystem Priority Areas (NFEPA, 2011) database; the Department of Water and Sanitation Research Quality Information Services (DWS RQIS PES/EIS, 2014) database, National Biodiversity Assessment (NBA, 2018) database, and the Free State Biodiversity Plan (FSBP, 2019)], were undertaken to aid in defining the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the freshwater ecosystems;
- Freshwater ecosystems were field verified according to the Department of Water Affairs and Forestry (DWAF, 2008[1]): "A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones". Aspects such as soil, morphological characteristics, vegetation types and wetness were used to verify the freshwater ecosystems;
- The classification of the freshwater ecosystems was undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa: User Manual: Inland systems (Ollis *et al*., 2013);
- The PES of the freshwater ecosystems were determined according to the WET Health tool (Macfarlane *et al.,* 2008);
- The EIS of the freshwater ecosystems were determined according to the method described by Rountree and Kotze*,* (2013);
- The Ecoservices of the freshwater ecosystems were assessed according to "A technique for rapidly assessing ecosystem services supplied by wetlands" (Kotze *et al.,* 2020) (Version 2);
- Allocation of a suitable Recommended Management Objective (RMO), Recommended Ecological Category (REC) and Best Attainable State (BAS) to the freshwater ecosystems based on the results obtained from the PES and EIS assessment's;
- The freshwater ecosystem boundaries, and legislated zones of regulation were depicted for the freshwater ecosystems, where applicable;
- The Environmental Assessment Practitioner (EAP)-provided impact assessment method and the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2023) was applied to identify potential impacts that may affect the freshwater

[1] Even though an updated manual is available since 2008 (Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas), this is still considered a draft document currently under review.

ecosystems within the investigation area as a result of the proposed underground mining operation, and to aim to quantify the significance thereof; and

- To present management and mitigation measures which should be implemented during the proposed underground mining operation to assist in minimising the impact of the proposed activities on the receiving environment.

1.3 *Assumptions and Limitations*

The following assumptions and limitations are applicable to this report:

- The determination of the freshwater ecosystem boundaries and the assessment thereof, is confined to the reaches of the freshwater ecosystems that traverse the study area and associated investigation area;
- Delineations depicted in this report are largely based on a desktop analysis with limited site verification. As a result, the delineations within this report can only be used as part of the underground mining application, as it was assumed that the existing surface infrastructure would be used. If additional surface infrastructure is required, a more detailed site verification will need to be undertaken;
- The study and investigation areas and their immediate surrounds have undergone historical transformation including agriculture, urbanisation and current and historic mining activities. As a result, various areas within the study and associated investigation area displayed transformed topography, soil profiles and runoff patterns within the landscape. As such, these disturbances have likely resulted in alterations to the hydroperiod of the identified freshwater ecosystems;
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the study area at the scale required to inform the EA process. However, this information is considered to be useful as background information to the study;
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater ecosystems will need to be surveyed and pegged according to surveying principles and with surveying equipment;
- Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundaries may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results;

- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. It is, however, expected that the freshwater ecosystems that may be affected by the proposed underground mining operation have been accurately assessed and considered, based on the site observations undertaken in terms of freshwater ecosystem ecology; and
- To ensure that our turnaround time meets expectations diatom analysis and identification is done on "live" diatom samples. There are no limitations through the use of "live" samples with accurate analysis and identification of samples and as such results for the report are considered accurate. There is no substantial impact on the validity of the final conclusions drawn in this report.

2 ASSESSMENT APPROACH

2.1 *Freshwater Ecosystem Definition*

For the purposes of this investigation, the definitions of a watercourse, riparian and wetland habitat were taken as per that in the National Water Act, 1998 (Act No. 36 of 1998) as amended. The definitions are as follows:

A **watercourse** means:
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the *Gazette,* declare a watercourse.
*****and a reference to a watercourse includes where relevant, its bed and banks.

The National Water Act, 1998 (Act No. 36 of 1998) further provides definitions of wetland and riparian habitats as follows:

Wetland habitat is "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.

Thus, for the purposes of this investigation, the definition of a freshwater ecosystem is synonymous with the definition of a watercourse as per the National Water Act, 1998 (Act No. 36 of 1998), as amended and the terms may be used interchangeably in this report.

2.2 *Freshwater Ecosystem Field Verification*

A site verification and assessment was undertaken on the 10th of December 2025 (Free State Summer, wet period) during which the presence of any freshwater ecosystem characteristics as defined by Department of Water Affairs and Forestry (DWAF, 2008) and the National Water Act, 1998 (Act No. 36 of 1998), as amended were noted (please refer to Section 4 of this report). A detailed explanation of the methods of assessment undertaken is provided in **Appendix C** of this report.

The freshwater ecosystem delineation took place, as far as possible, according to the method presented in the "Updated manual for the identification and delineation of wetland and riparian resources" (DWAF, 2008). The foundation of the method, is based on the fact that freshwater ecosystems have several distinguishing factors including the following:

- Landscape position;
- The presence of water at or near the ground surface;
- Distinctive hydromorphic soils; and
- Vegetation adapted to saturated soils.

2.3 *Sensitivity Mapping*

All freshwater ecosystems associated with the study areas were delineated with the use of a GPS. Geographic Information System (GIS) software was used to project these features onto aerial imagery and topographic maps and are presented in Sections 3 and 4.

2.4 *Freshwater/Aquatic Ecological and Water Quality Assessment*

Best practice methods of assessment (detailed methods of assessment provided in Appendix C) were used to assess the aquatic ecological integrity of the site based on water quality, instream and riparian/wetland habitat condition and biological impacts and integrity. Factors investigated included the following:

- Visual conditions of the site, including an assessment of impacts on the wetlands;
- Delineation of the wetland habitats according to (DWAF) (2008);
- Water quality (physico-chemical) variables were measured *in-situ* using an Extech (EC 500 series) pH/Conductivity/TDS/temperature probe and an Extech (DO 600 series) dissolved oxygen (DO) probe and are discussed against various guidelines as follows:

- South African water quality guidelines volume 7, Aquatic ecosystems Target Water Quality Objectives (TWQR; DWAF, 1996);

- Assessment of environmental conditions (nutrient loading, salinisation, pH change and organic enrichment) based on the presence and absence of key indicator diatom taxa inferred from Taylor *et al*. (2007) and Omnidia software (Lecointe *et al.,* 1993). The following indices were calculated for this report;
  - Specific Pollution sensitivity Index (SPI) (CEMAGREF, 1982);
  - Generic Diatom Index (GDI) (Coste and Ayphassorho, 1991);
  - Trophic Diatom Index (TDI) (Kelly and Whitton, 1995); and
  - Percentage Pollution Tolerant Values (%PTV) (Kelly and Whitton, 1995); and
- General catchment impacts were considered in the ecological assessments, such as land use and impoundments.

2.5 *Risk Assessment and Recommendations*

Following the completion of the assessment, the DWS Risk Assessment methodology was conducted for both the proposed and existing infrastructure/activities (please refer to **Appendix D** for the method of approach). Recommendations were also developed to address and mitigate impacts associated with the various proposed and existing activities. A summary of the RAM and the associated mitigation measures are presented in Section 6.

2.6 *Impact Assessment*

In addition to the DWS Risk Assessment, the EAP provided Impact Assessment methodology was undertaken for the proposed underground mining operation (please refer to **Appendix E** for the method of approach).

3 RESULTS OF THE DESKTOP ANALYSIS

3.1 *Analyses of Relevant Databases*

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for integration of results by the reader to take place. Where required, further discussion and interpretation is provided, and information that was considered of importance was emboldened.

It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the “proposed development’s” actual site characteristics at the scale required to inform the EA/WUA processes. Nevertheless, this information is considered useful as background information to the study, is important in legislative contextualisation of risk and impact, and was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision-making process. The information contained in the dashboard report below is intended to provide background to the landscape of the study and associated investigation area. **Actual site conditions at the time of the assessment may differ to the background information provided by various datasets. Please refer to Section 4 for details pertaining to the site investigation**.

Table 1: Desktop data relating to the characteristics of the freshwater ecosystems associated with the study and investigation areas [Quarter Degree Squares (QDS) 2726DA and 2726DC].

Aquatic ecoregion and sub-regions in which the study area is located	
Ecoregion	Highveld
Catchment	Vaal
Quaternary Catchment	C25B
WMA	Middle Vaal
Sub-WMA	Middle Vaal
Dominant characteristics of the Highveld Ecoregion Level II (Kleynhans *et al.,* 2007)	
Ecoregion Level II	11.08
Dominant primary terrain morphology	Plains, moderate relief
Dominant primary vegetation types	Moist Cold Highveld Grassland
Altitude (m a.m.s.l)	1300 to 1700
MAP (mm)	500 to 500
Coefficient of Variation (% MAP)	25 to 34
Rainfall concentration	45 to 60
Rainfall seasonality	Mid to late-summer
Mean annual temp. (°C)	14 to 18
Winter temp. (July) (°C)	-2 to 18
Summer temp. (Feb) (°C)	12 to 28
Annual simulated runoff (mm)	5 to 10 (limited); 10 to 80
Ecological Status of the most proximal sub-quaternary reach (DWS, 2014) (Figure 10)	
Sub-quaternary reach	C52B-02423 (Sandspruit River)
Point Proximity to study area	±8 km east of the study area
Assessed by expert?	Yes
PES Category Median	Moderately Modified (Class C)
Mean EI Class	Moderate
Mean ES Class	Moderate
Stream Order	1
Default Ecological Class	Class C (Moderate)
Summary	Considering the study area is more than 8 km west, albeit upgradient from the SQR monitoring point, it is highly unlikely that similar fish and aquatic macro invertebrate species will be found in the study area, considering the seeming lack of hydrological connectivity. As a result, the ecological status and related background information pertaining

Detail in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database	
FEPA CODE	The entire study area and investigation area are not located within a FEPA catchment considered important in terms of freshwater biodiversity conservation.
Wetland Vegetation Type	According to the NFEPA database, the entire study area and investigation area are situated within the Dry Highveld Grassland Group 3 wetland vegetation (WetVeg) type, indicated as Vulnerable (VU) by Mbona *et al.* (2015).
NFEPA Wetlands (Figure 3)	According to the NFEPA Wetlands database, fourteen depression wetlands, three unchannelled valley bottom (UCVB) wetlands, two channelled valley bottom (CVB) wetlands, two seep wetlands, and one valley head seep wetland are all indicated to be within the study area and associated investigation area. The depression wetlands, two of the UCVBs, and one of the CVBs are all indicated as Moderately Modified (Class C). The two seep wetlands, the valley head seep, one UCVB and one CVB are all indicated by the database as being in a Heavily to Critically Modified (Class Z) ecological condition. Several of the UCVB, CVB and depression wetlands are also indicated to be overlain by artificial Heavily to Critically Modified (Class Z) wetlands.
NFEPA Rivers	According to the NFEPA Rivers database, there are no rivers flowing through the study area or the associated investigation area.
National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) Rivers, Artificial Wetlands, and Draft National Wetland Map 6 (2024) – Condition is based on National Wetland Map 5 (2018) (Figure 4)	
The NBA Rivers Database indicates that there are no rivers flowing through the study area or the associated investigation area. According to the draft National Wetland Map 6 (2024), seventeen (17) depression wetlands, one (1) seep wetland, and one (1) UCVB wetland are all indicated in the study area and associated investigation area. The majority of the depression wetlands are indicated to be in a Natural to Near Natural (Class A/B) ecological condition while the rest are in a Moderately Modified (Class C) ecological condition. The seep wetland is in a Largely to Critically Modified (Class D/E/F) ecological condition while the UCVB wetland is indicated to be in a Moderately Modified (Class C) ecological condition. The depressions are indicated as Least Concern (LC) and Poorly Protected (EPL) while the seep and UCVB wetlands are Critically Endangered (ETS) and Not Protected (EPL). The Artificial Wetlands database indicates five dams in the study area, and three dams in the investigation area. The database also indicates an open reservoir east of the study area within the investigation area.	

	to the PES and EIS for the C52B-02423 (Sandspruit River) are not provided in this report.	
Strategic Water Source Areas (SWSA) (2017 & 2021)		
Surface water SWSAs are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. The SWSA for groundwater reflect areas that have high groundwater recharge and where the groundwater forms a nationally important resource. The 2021 CSIR-MTPA database (Lötter, M.C. and Le Maitre, D) was used for surface water, while the WRC 2017 database (Le Maitre, D.C. et al.) was used for the groundwater SWSAs.		
The study area and associated investigation area are not indicated to be within a surface water SWSA or a groundwater SWSA.		
Detail Of the Study Area in terms of the Free State Biodiversity Plan: Terrestrial Theme only (FSBP, 2019) (Figure 5)		
Critical Biodiversity Area (CBA)	The depression wetland areas in the north and north eastern portion of the study area and investigation area, and a patch in the centre of the study area also associated with a pan-depression wetland are all classified as CBA1: Irreplaceable Areas. **CBAs** are areas that must be maintained in a natural or near-natural state in order to meet biodiversity targets. CBAs should collectively meet biodiversity targets for all ecosystem types as well as for species and ecological processes that depend on natural or near-natural habitat, that have not already been met in the protected area network.	
Ecological Support Areas (ESA)	The sections of the study area and investigation area in the west and a patch in the south of the investigation area are classified as ESA 1 areas while a majority of the study area and investigation area are indicated as ESA 2 areas which especially align with the cultivation areas. **ESAs** are area that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a CBA or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or not necessary to meet them in natural or near-natural areas. **ESA 1** sites are sites with minimal degradation and **ESA 2** are sites with degradation, i.e., they can be totally degraded but not totally transformed.	
Other Natural Areas (ONA)	No sections of the study area and investigation area are classified as Other Natural Areas. Areas identified as "**Other Natural Areas**" account for approximately 16% of the provinces land area. These are areas of natural habitat that are not required to meet biodiversity targets for ecosystem types, species or ecological processes, i.e. natural areas not selected as Critical Biodiversity Areas (CBA) or Ecological Support Areas (ESA). Other Natural Areas (ONA) is an area in a good or fair ecological condition (natural, near-natural or semi-natural) that is not required to meet biodiversity targets for ecosystem types, species or ecological processes.	
Degraded Areas (No Natural Remaining)	Patches of the study area and investigation area in the south west and south east associated with the mining areas are located within Degraded Areas (No Natural Remaining). Areas classified as **degraded** are considered to no longer represent functioning ecosystems with intact or near-intact ecological and evolutionary processes. These areas are not in climax condition due to factors other than physical disturbance. Degraded Areas account for approximately 18% of the province's land area. No Natural Remaining (NNR) is an area in poor ecological condition (severely or irreversibly modified) that is not required to meet biodiversity targets for ecosystem types, species or ecological processes.	
Land Cover/Land Use of the Matjhabeng Local Municipality (Figure 6)		
Cultivation	The majority of the study area and investigation area has agricultural/farming areas which are identified by the land cover database as cultivated. These correlate with the ESA 2 areas identified in the FSBP database (2019).	
Natural	All wetlands identified to be within the study area and investigation area are identified as natural areas. These areas also partially correspond to the areas identified as CBA 1 and ESA1 and 2 areas by the FSBP (2019).	
Waterbodies	All artificial features in the study area and investigation area (indicated as dams by the NBA) are classified as waterbodies.	
Mines	Sections of the study area in the north and sections of the investigation area to the east are indicated as Mining areas. These correspond to the degraded Areas (No Natural Remaining) indicated by the FSBP (2019).	
Detail Of the Study Area in terms of the Land Type (Job *et al.*, 2019) (Figure 7)		
The study area and investigation area are located within the Ae40 and Dc9 land type groupings.		

Ae Land Types are red and yellow, freely drained apedal soils of the Hutton, Griffin and Clovelly soils occupying more than 40% of the landscape. Deeper (> 300 mm, but generally 500 to 1 000 mm) red soils of the Hutton form are dominant. Mishap and Glenrosa soils usually occupy significant proportions of the landscape. Soils with neocutanic, plinthic, duplex horizons and shallow black clay soils may occupy small proportions of the landscape. Katspruit, duplex soils and black clay soils usually occupy bottomland terrain positions with streambeds and erosion. **Dc Land Types** accommodate duplex soils and gleycutanic soils, including Estcourt, Sterkspruit, Swartland, Valsrivier and Kroonstad soil forms. After subtracting exposed rock land, these Land Types consist of land with more than 50% duplex soils. Dc includes land where, in addition to the duplex soils, soils with vertic, melanic and red structured horizons comprise more than 10% of the land surface.	
Importance of the study area according to the Mining and Biodiversity Guidelines (2012) (Figure 8)	
Highest Biodiversity Importance (B)	The study area and investigation area in the northern sections are classified as areas of **Highest Biodiversity Importance** from a mine planning perspective. **Risk for mining:** Highest risk for mining. **Implications for mining:** Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision-making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. An environmental impact assessment should include the strategic assessment of optimum, sustainable land use for a particular area will determine the significance of the impact on biodiversity. This assessment should fully take into account the environmental sensitivity of the area, the overall environmental and socio-economic costs and benefits of mining, as well as the potential strategic importance of the minerals to the country. Authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into licence agreements and/or authorisations.

°C = Degree Celsius; CBA = Critical Biodiversity Area; CVB = Channelled valley Bottom; DWS = Department of Water and Sanitation; EA = Environmental Authorisation; EI = Ecological Importance; EIA = Environmental Impact Assessment; ES = Ecological Sensitivity; ESA = Ecological Support Area; FEPA = Freshwater Ecosystem Priority Area; FSBP = Free State Biodiversity Plan; m.a.m.s.l = Metres above Mean Sea Level; MAP = Mean Annual Precipitation; mm = millimetres; MTPA = Mpumalanga Tourism and Parks Agency; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; ONA = Other Natural Areas; PES = Present Ecological State; SAIIAE = South Africa Inventory of Inland Aquatic Ecosystems; SWSA = Strategic Water Source Area; UCVB – Unchannelled Valley Bottom; VU = Vulnerable; WMA = Water Management Area; WRC = Water Research Commission.

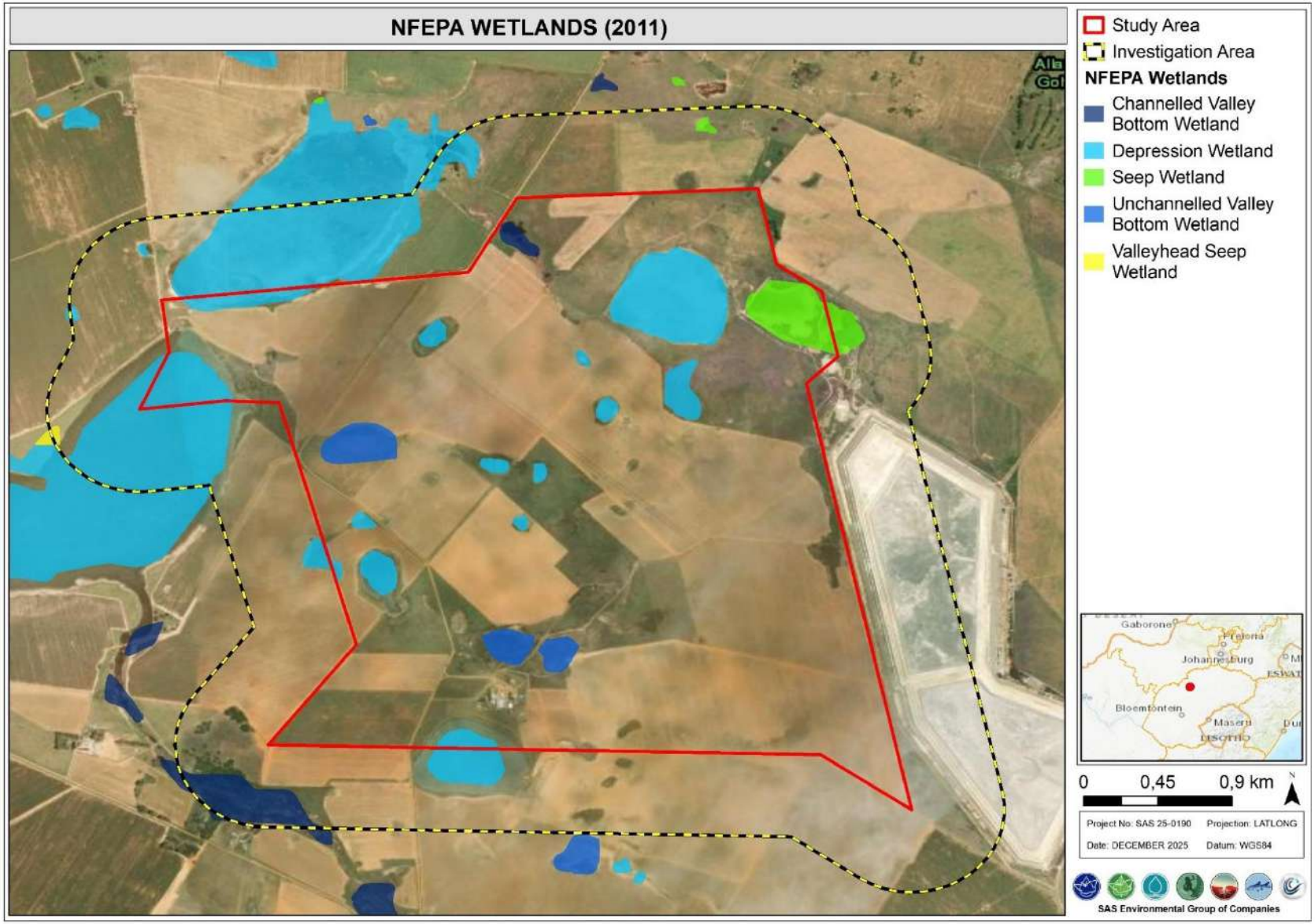


Figure 3: Freshwater ecosystems associated with the study area and associated investigation area according to the NFEPA (2011) database.

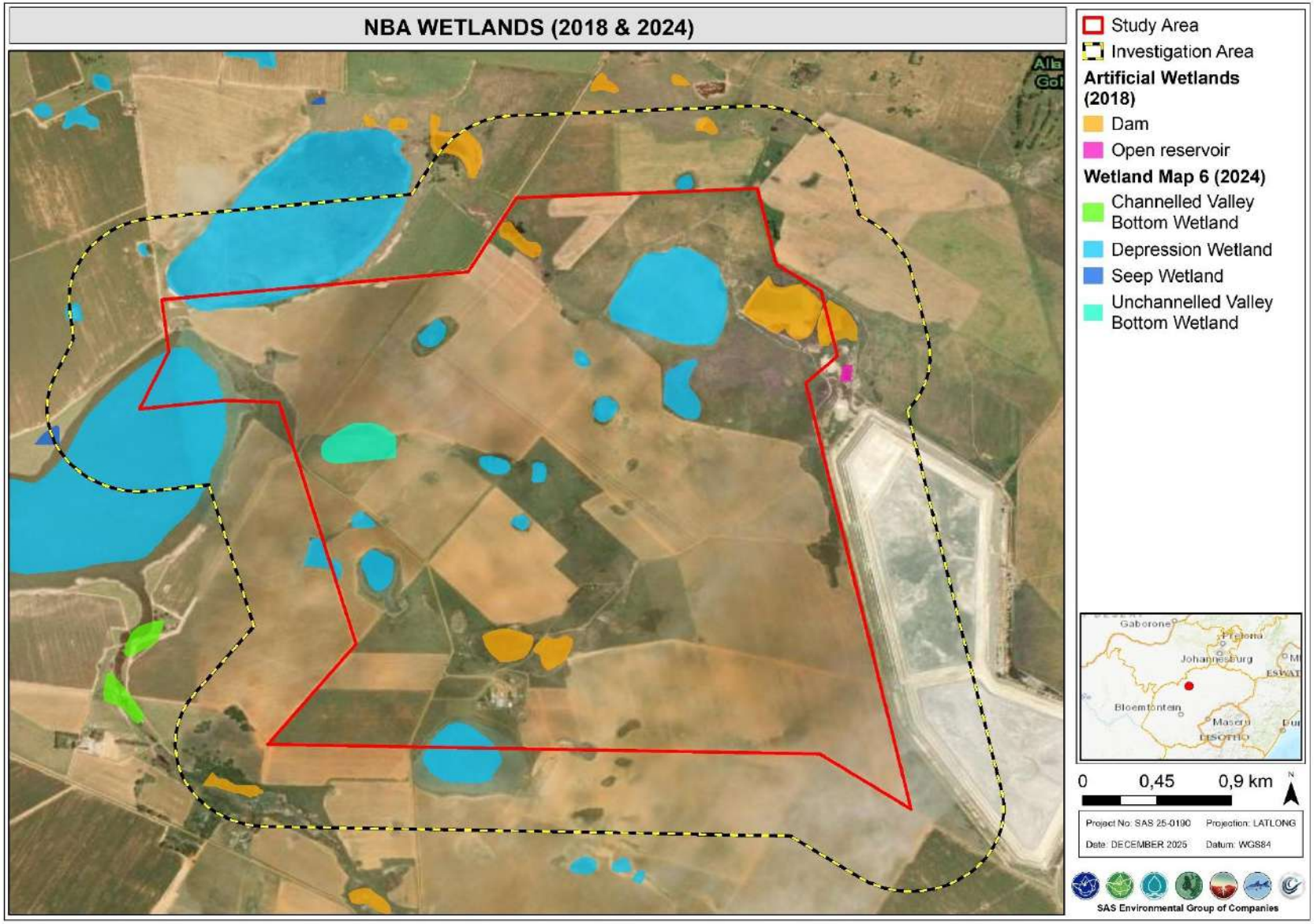


Figure 4: Freshwater ecosystems associated with the study area and associated investigation area according to the NBA (2018) database.

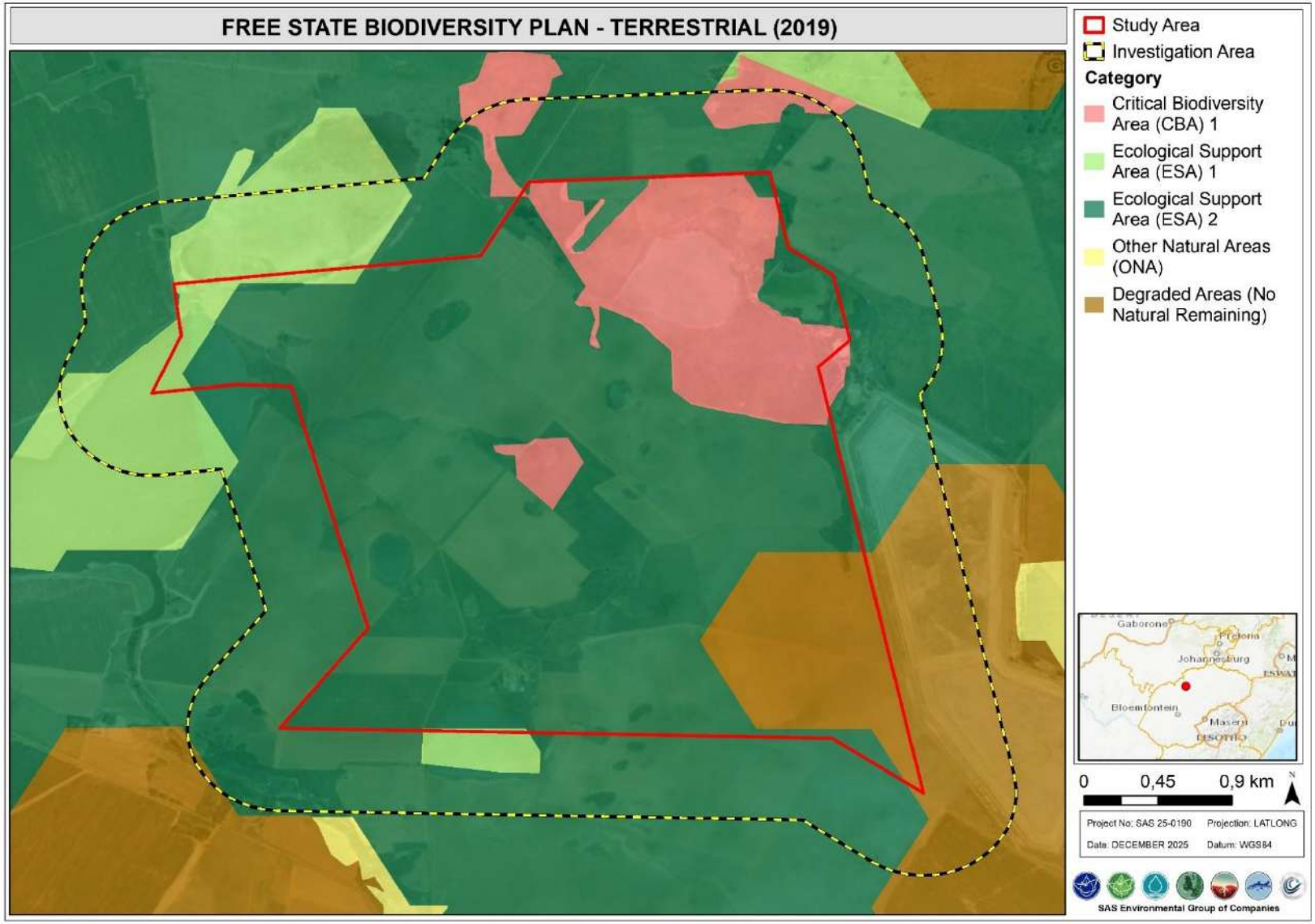


Figure 5: Areas of Biodiversity sensitivity associated with the study area and associated investigation area according to the Free State Biodiversity Plan: Terrestrial Assessment (2019) database.

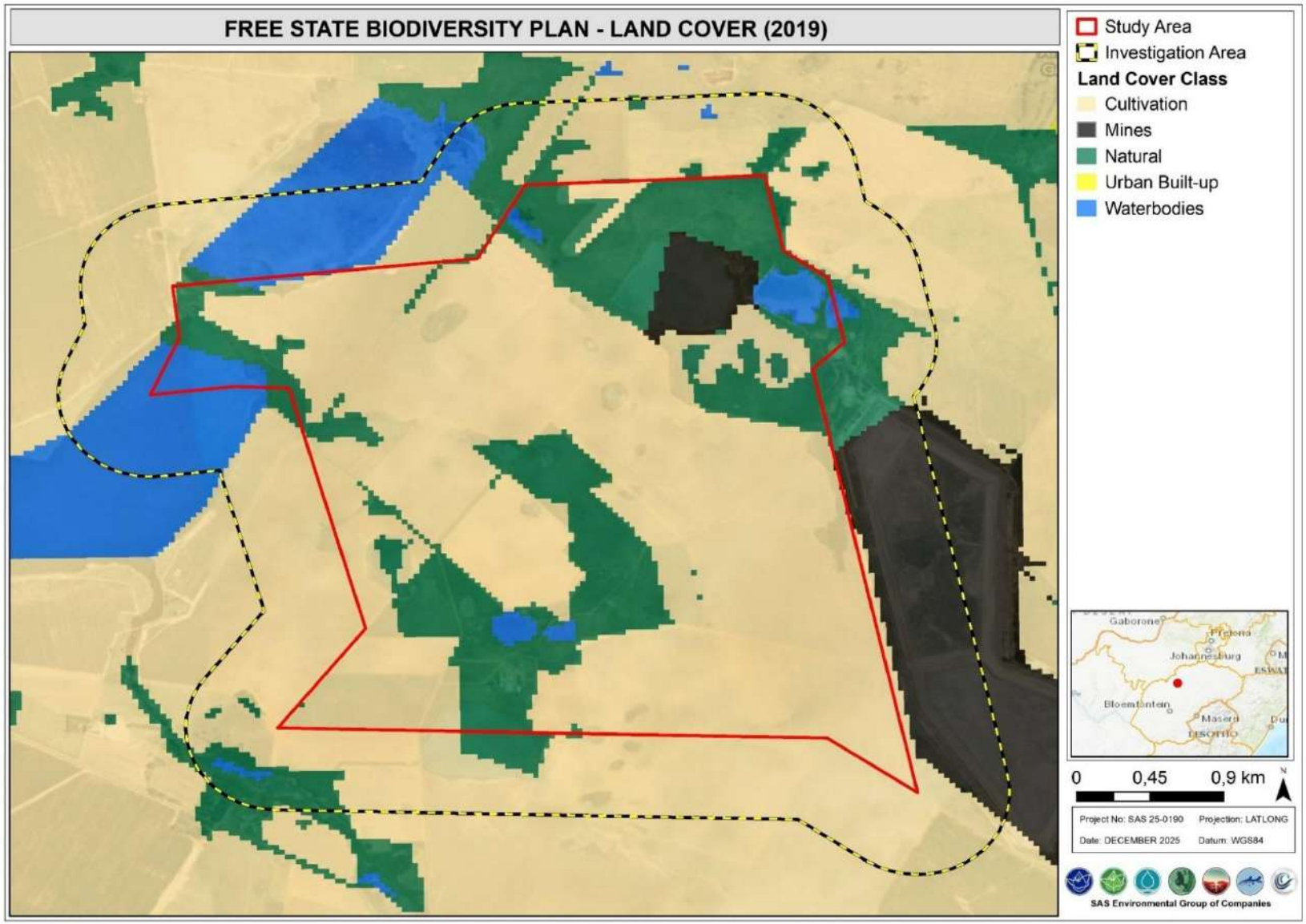


Figure 6: Land cover within the study area and investigation area according to the Free State Biodiversity Plan: Terrestrial Assessment (2019) database.

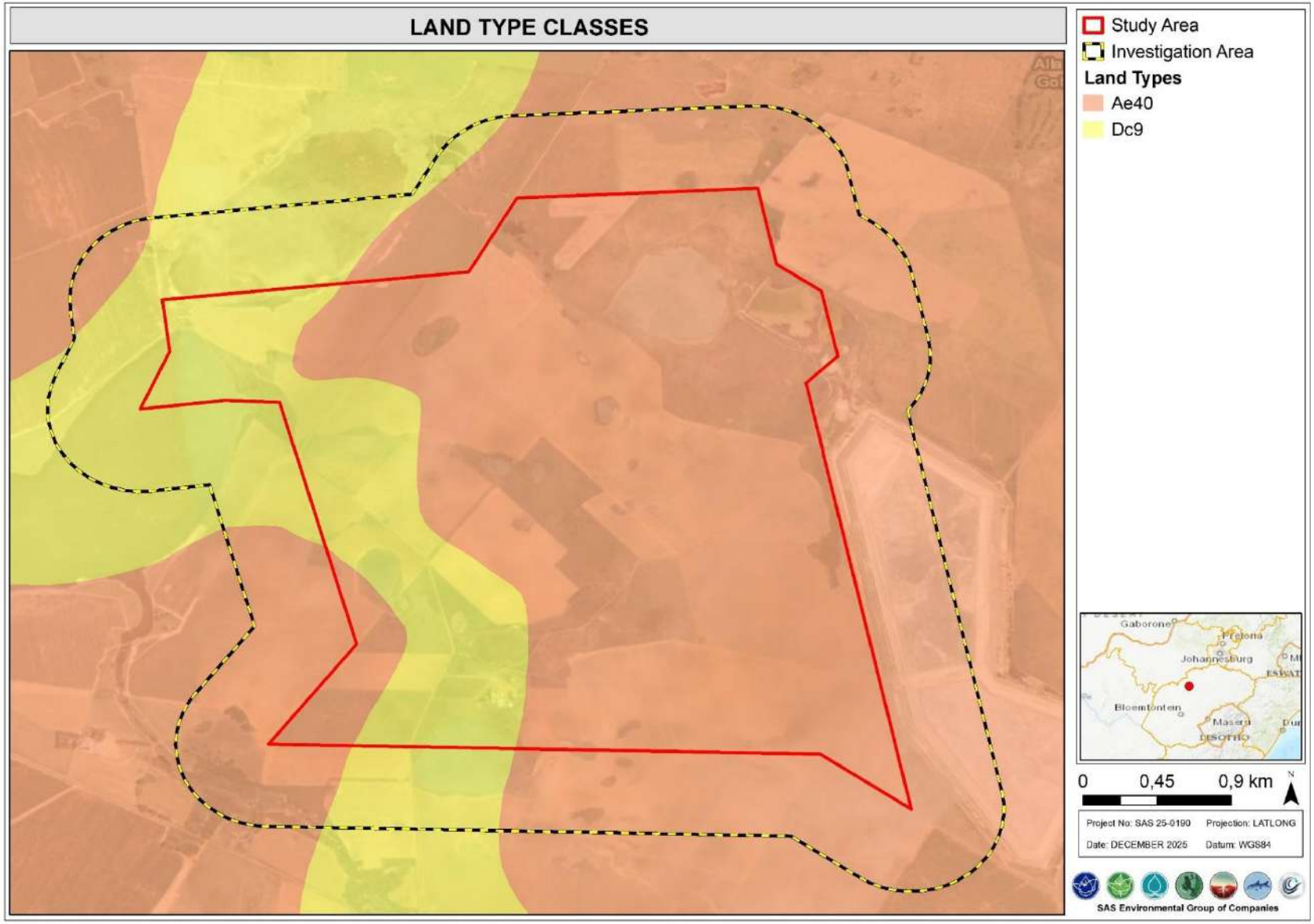


Figure 7: Land types located within the study area and associated investigation area.

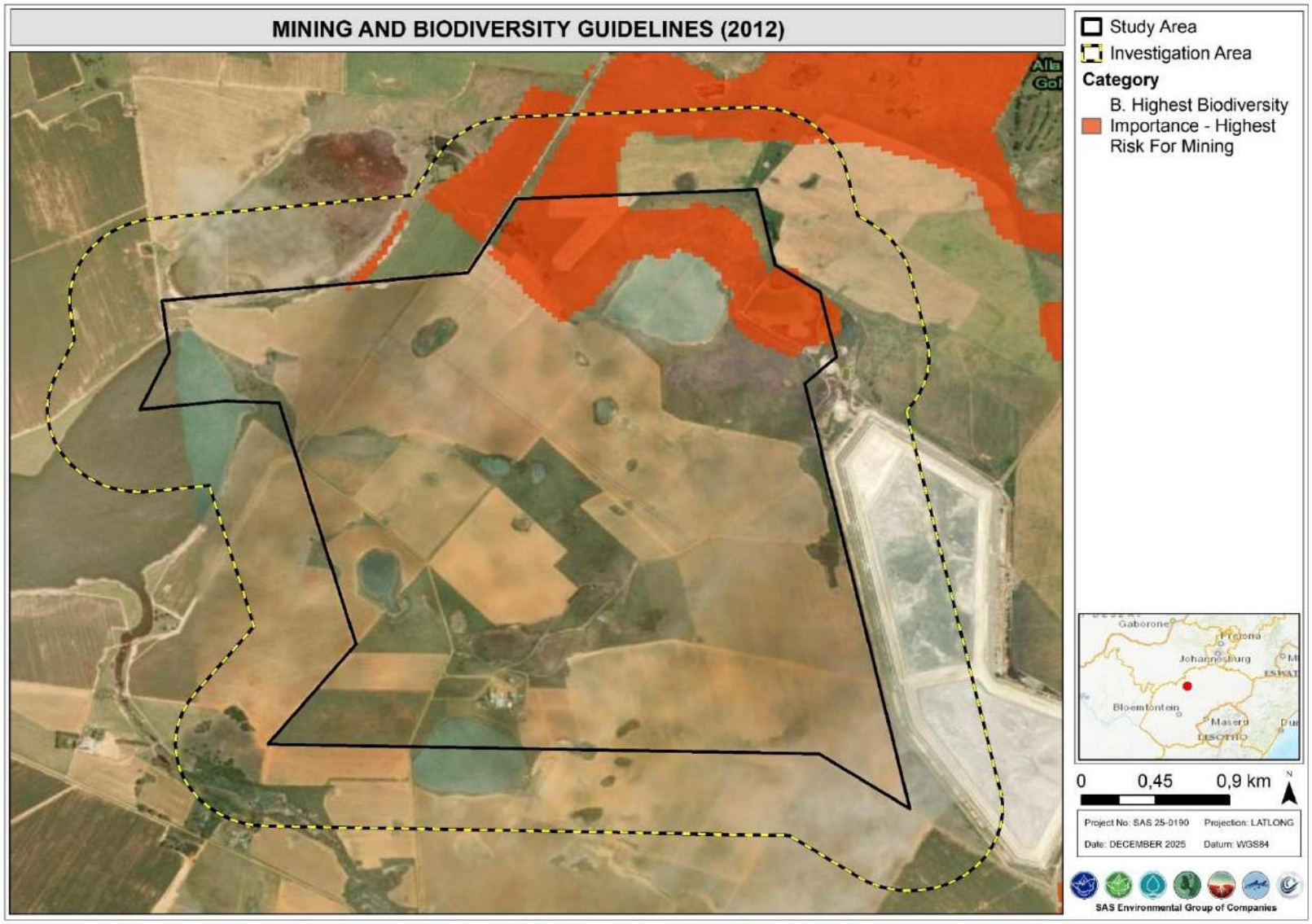


Figure 8: Important areas in terms of mining associated with the study area and investigation area according to the Mining and Biodiversity Guidelines database (2012).

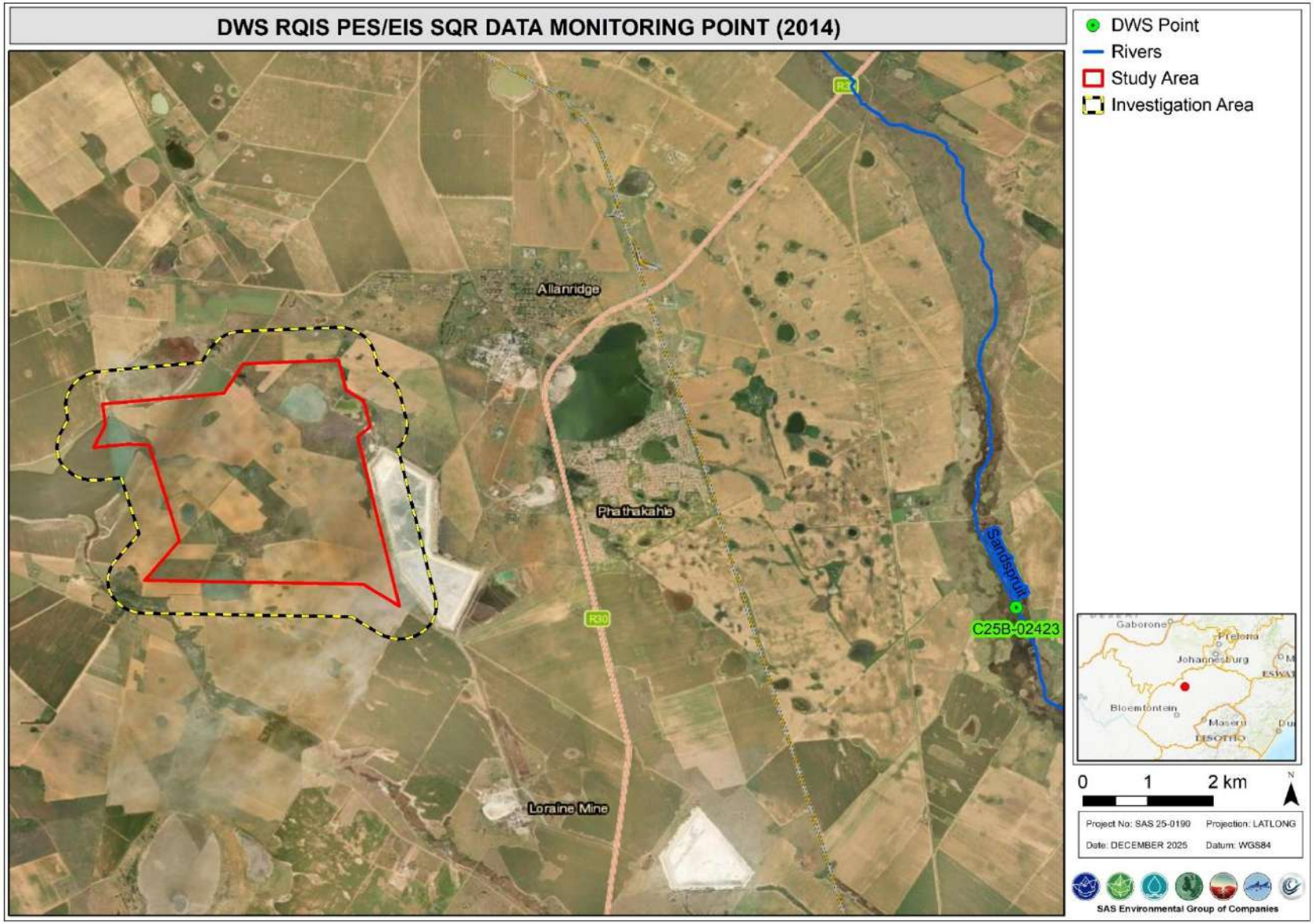


Figure 9: The DWS RQIS PES/EIS monitoring points associated with the study area and associated investigation area.

4 RESULTS: FRESHWATER ECOSYSTEM ASSESSMENT

4.1 *Freshwater Ecosystem Characterisation*

The freshwater ecosystems associated with the proposed underground mining operation (namely the seep and depression wetlands) were classified according to the Classification System (Ollis *et al.*, 2013) as an Inland System within the Dry Highveld Grassland Groups 3 WetVeg (wetland vegetation) group, classified by Mbona *et al*. (2015) as "Vulnerable". At Levels 3 (Landscape Unit) and 4 (Hydrogeomorphic (HGM) Type) of the Classification System, the wetlands are classified as per the summary in the table below.

Table 2: Characterisation at Levels 3 and 4 of the Classification System (Ollis *et al*., 2013) of the freshwater ecosystems within the study area.

Freshwater Ecosystem	Level 3: Landscape unit	Level 4: HGM Type
Depression wetland	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes.	A wetland with closed (or near-closed) elevation contours which increases in depth from the perimeter to a central area of greatest depth and within which water typically accumulates, giving rise to vertical water fluctuations. Depressions may be linked to a river and have channelled in and out flow (exorheic) but may also form in the absence of a river where the water table (groundwater input) intercepts the land surface, with no in and outflow channel present (known as endorheic isolated depressions).
Seep wetland		A wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley, but they do not, typically, extend into a valley floor.

4.2 *Anthropogenically derived artificial features*

Two artificial features were identified within the study and associated investigation areas.

According to Ollis *et al*., (2013) an artificially created system is defined as a feature that is "produced by humans, not naturally occurring". Ollis *et al*., (2013) further elaborates "artificial features are aquatic ecosystems where hydric soil features have developed, or where wetland plants have colonised, in historically non-wetland areas due to human activities". In addition to the identified freshwater ecosystems, anthropogenically derived features in which water ponds, were also noted within the study area and associated investigation area. Two large artificial impoundments were identified within the northern portion of the study area and two smaller impoundments in the southern portion. Multiple smaller impoundments were identified during the site assessment but have not been delineated further due to their artificial nature. The impoundment located in the northeastern portion of the study area is associated with the

current mining activities, while the impoundment located in the northwestern portion of the study area is associated with the current agricultural activities.

These features have formed due to land-use changes prompting increased runoff and ponding, as well as historic excavation activities which have altered the natural topography, thus allowing water to collect. As these features are of an artificial origin and anthropogenically derived they were not further assessed, however these were included for mapping purposes to indicate locality within the landscape. Figure 10 below presents photographs of the artificial features in relation to the wetlands.



Figure 10: Representative photographs of the artificial impoundments within the study area. (Left) The large agricultural dam in the northwestern portion of the study area which is downstream of the CVB wetland and (Right) the artificial impoundment related to the existing mining activities, located in the northeastern portion of the study area.

4.3 *Freshwater Ecosystem Delineation*

As noted in Section 1.2, the freshwater ecosystem assessment was limited to the study area and associated investigation area as provided by the proponent. It was confirmed during the site assessment that various land transformation had occurred within the study area and immediate surrounds over time with the most significant impact from the ongoing agricultural activities and mining activities (to a lesser degree). As a result, changes to the topography, soil and vegetation profiles were evident. Thus, where necessary, delineations were refined and augmented with the use of digital satellite imagery, historical aerial imagery and 5 m contours to improve the accuracy of the delineations, where necessary. The delineations as presented in this report are, nevertheless, deemed the best estimate of the temporary zone boundaries of the freshwater ecosystems based on site conditions present at the time of the assessment, and are considered adequate to allow for informed decision-making.

During the site assessment (undertaken in December 2025), the following indicators were used to verify the boundaries of the freshwater ecosystems:

- Terrain units were used as the primary indicator. Despite transformation of the landscape associated with the investigation area, the terrain provided an indication of low-lying areas where water is likely to collect and/or move through the landscape;
- Vegetation was utilised in conjunction with the soil indicators associated with the freshwater ecosystems, where feasible. The distinction between obligate, facultative, and terrestrial vegetation was relatively discernible;
- Soil wetness indicator, duration and frequency of saturation in the soil profile is a diagnostic indicator since it influences the colour change in the soil. Low chroma (grey and muted colours) as well as mottles are more prominent in soil which have higher saturation frequency. Moist soil also indicates an increased hydroperiod and thus the potential presence of hydromorphic characteristics. This was utilised with the vegetation as the secondary indicator; and
- Soil morphological characteristics typically associated with freshwater ecosystem conditions, such as gleying or mottling were utilised in conjunction with saturation as the secondary indicator.

The delineated freshwater ecosystems and artificial features are conceptually depicted in Figure 13 overleaf.

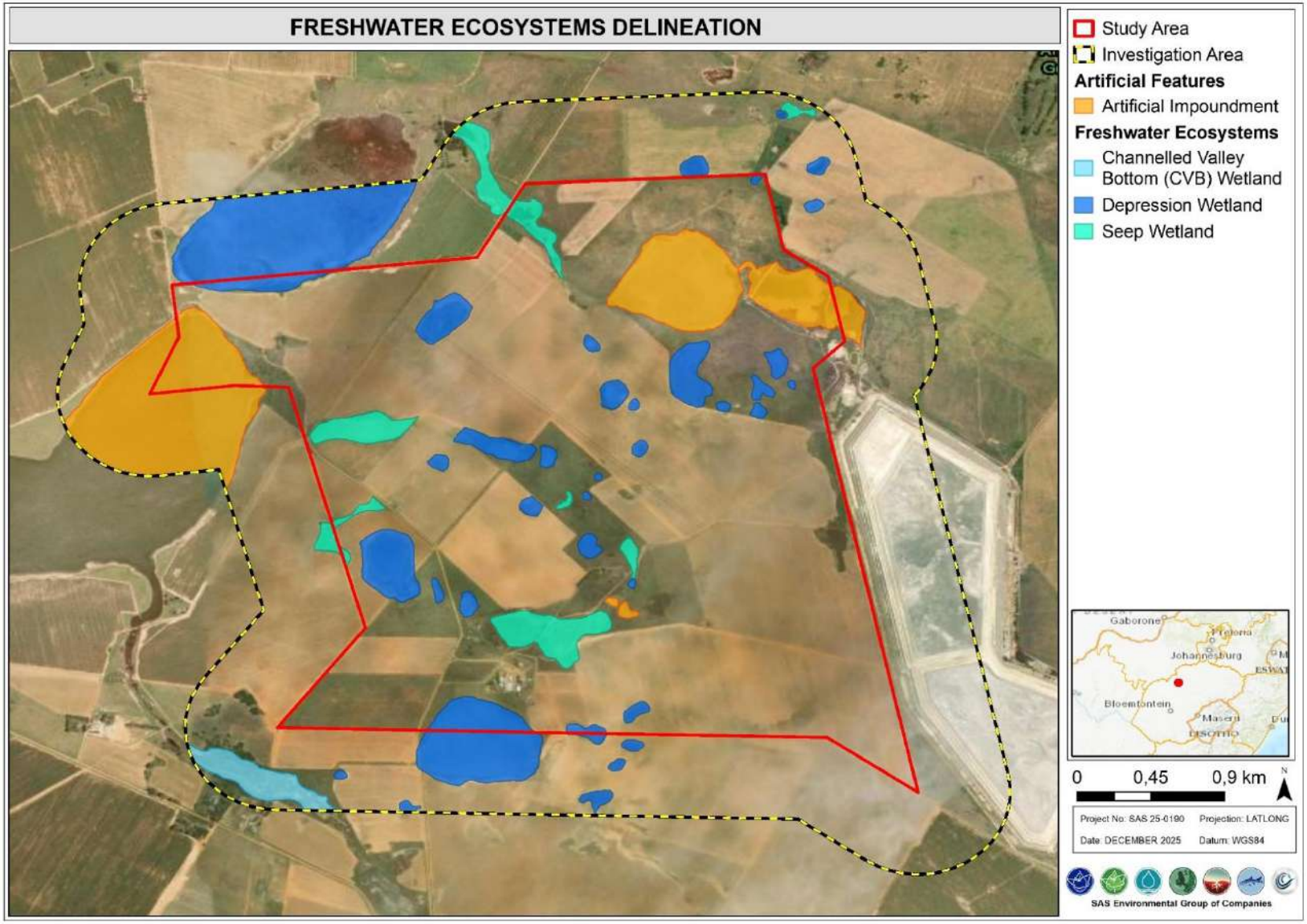


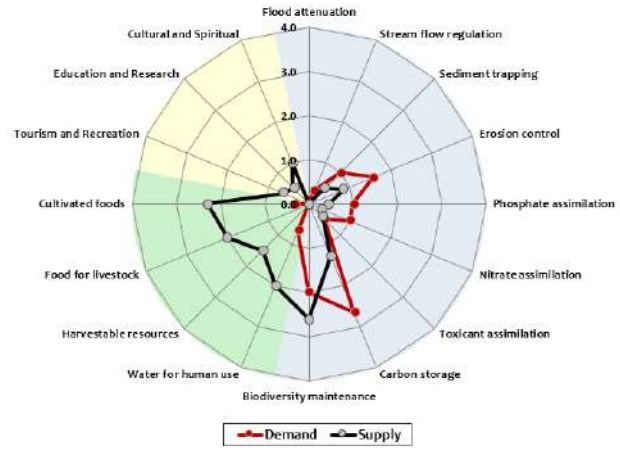
Figure 11: Map depicting the delineated freshwater ecosystems and artificial features associated with the study and investigation areas.

4.4 *Freshwater Ecosystem: Site Verification Results*

Following the site assessment, the assessments outlined in Section 1.2 were applied. The results of the ecological assessment are discussed in the dashboard style reports which follow, and the details thereof are presented in **Appendix F**.

Considering the nature of the proposed activities (i.e. Restricted to underground mining only) and due to similar catchment wide impacts posed on the wetlands (cultivation with livestock grazing husbandry, informal road crossings and AIP proliferation), the assessments were undertaken in a combined manner for each HGM type. Only the freshwater ecosystems within the study area were assessed, i.e. the seep wetlands and depression wetlands.

Table 3: Summary of the assessment of the seep wetlands associated with the proposed underground mining operation.

<table>
<tr><td colspan="2">Ecological & socio-cultural service provision graph:

</td><td colspan="2"> 
Representative photographs of the seep wetlands and the various impacts affecting the ecological condition of the wetlands including linear infrastructure, agricultural activities, embankment erosion and Alien and Invasive Plant (AIP) encroachment.</td></tr>
<tr><td>PES Discussion</td><td>PES Category: C (Moderately modified)
The seep wetlands were assessed to be in a moderately modified ecological condition due to changes in the natural functioning and ecological state of the wetlands. Numerous anthropogenic impacts relating to catchment wide mining, agricultural activities and urbanisation has resulted in changes to the natural timing and pattern of flows, increased sediment loads and erosion, altered water quality which has subsequently led to a transformed habitat with numerous AIP species outcompeting the natural vegetation.</td><td>Ecoservice provision</td><td>Ecoservices importance category: Very Low to Low
The Ecosystem service provided by the seep wetlands of greatest importance is biodiversity maintenance. These wetland areas provide some of the only remaining natural habitat in the area and as such are important in terms of biodiversity maintenance, as well as for livestock grazing. The wetlands are also identified by the Screening Tool (2020), NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale, thus increasing their ecosystem provision for biodiversity maintenance. The importance of sediment trapping, phosphate, nitrate and toxicant assimilation is due to increased hardened surfaces and stormwater inputs into the seep wetlands from the surrounding catchment, and cultivated areas. The limited ecological service provisioning across all components was primarily attributed to the degraded ecological integrity of the wetlands.</td></tr>
</table>

EIS discussion	**EIS Category: Moderate** The seep wetlands are considered to be of moderate ecological importance and sensitive. This is mainly due to the systems being identified by the Screening Tool (2020), as well as the NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale. The wetlands are also considered importance for biodiversity maintenance as they provide some of the only remaining natural habitat in an area dominated by agricultural and mining activities, as well as rural settlements.	**REC, RMO & BAS Category**	**REC: C / BAS: C/ RMO: Maintain** The Recommended Management Objective (RMO) of the seep wetlands is to maintain the PES. The maintenance of the PES of these systems is likely as only underground mining activities are proposed. Any decrease in the PES of these systems would potentially be as a result of the ongoing agricultural activities over which the proponent has no control. Potential improvement of the PES of these systems would require a catchment-wide approach by all stakeholders, and ecological restoration of the wetlands is not the sole responsibility of a single stakeholder. Please refer to the discussion below pertaining to impacts and mitigation measures.

Freshwater Ecosystem drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):

Alterations to the natural hydraulic regime and geomorphological processes of the seep wetlands have occurred. These impacts include road crossings as well as disturbed and hardened surfaces due to catchment wide agricultural and mining activities. The road crossings cause head cut erosion on lateral inflows due to the flow being concentrated and has exacerbated gully erosion within the wetlands. Upstream impoundments and road crossings alter the natural flow path and velocity of flow within the wetlands which can negatively impact habitat and ecoservice provision of the systems. Increased hardened surfaces reduce infiltration rates and increase inputs of sediment laden runoff to the wetlands and subsequently changes in water quality. These impacts have resulted in AIP proliferation.

Basic water quality parameters were taken, during the December 2025 assessment of the seep wetland in the southern portion of the study area (See Figure 13 below for sampling site locations), and the water quality was noted to be poor. Temperature was 32.1 ºC, whilst Electrical Conductivity (EC) was 12.6 mS/m, which is within the acceptable (<30mS/m) to tolerable (≤ 85 mS/m) range limit and pH of 10.61 which is well above the acceptable range limit (≥ 6.5 mS/m - ≤ 8.0 mS/m) according to the Research Water Quality objectives (RWQO) of South Africa (DWA, 2011).

High levels of agricultural and mining activities were noted within the surrounding area, which have had a significant impact on the habitat provisioning of the seep wetlands due to the limited existing buffer zone around the wetlands. However, the wetlands provide isolated habitat for biota with numerous provincially protected floral species present (STS, 2026a) such as *Haemanthu*s sp., *Gladiolus* sp., *Helichrysum* sp. (Status = Species-specific. Probability of Occurrence [POC] = High), as well as *Nerine* sp., *Orchidaceae* sp. and *Kniphofia* sp. (Status = Species-specific. POC = Medium). The wetlands are well vegetated with the following species (STS, 2026a):
AIP species: *Agave americana*, *Argemone ochroleuca* subsp. *ochroleuca, Cirsium vulgare*, *Tamarix ramosissima, Verbena bonariensis* and *Xanthium strumarium;*
Forb species: *Conyza bonariensis, Denekia capensis, Drimia elata, Lobelia erinus, Monsonia angustifolia* and *Senecio coronatus;*
Graminoid species: *Afroscirpoides dioeca*, *Aristida congesta*, *Cyperus congestus*, *Cyperus laevigatus, Cyperus marginatus*, *Imperata cylindrica*, *Juncus rigidus, Kyllinga alba*, *Phragmites australis, Sporobolus africanus* and *Typha capensis;* and
Tree species: *Asparagus laricinus* and *Gomphocarus fruticosus*.

Overall, the wetlands are considered likely to provide some roosting, breeding and feeding habitat for avifauna, small mammals, amphibians, reptiles and invertebrates, albeit less sensitive species. Although the extent of anthropogenic activity surrounding the wetlands will largely deter faunal activity. According to STS (2026b), several vulnerable bird species were found within the wetlands, including the Yellow billed stork and the Great crested grebe. Many bird species of Least Concern (Not threatened) were also identified, such as the Yellow billed duck, African darter, Cape shoveler, Great flamingo, Red billed teal and the Knob-billed duck (STS, 2026b).

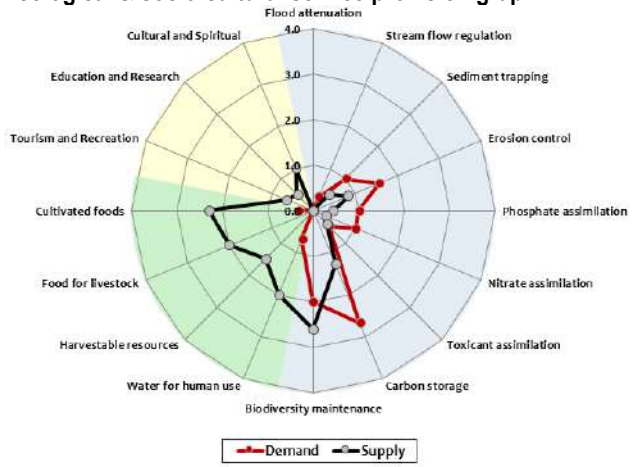
Extent of modification anticipated	The proposed undermining of the seep wetlands has the potential to alter the functioning of the wetlands to an overall low degree. The extraction of ore can potentially lead to destabilisation of the surrounding environment and to subsequent potential subsidence of the land and creation of a cone of depression. Water entering the underground mining area as a result of ingress into underground mine workings may necessitate dewatering of the underground mining area, which may result in the discharge of dirty water into the wetland environment. Possible decant from the underground mining also poses a low threat to the seep wetlands as contaminated water may alter water quality, flow regimes and lead to a subsequent loss of biodiversity of the wetlands. Thus, strict implementation of the recommended mitigation measures will need to occur to prevent direct impacts and edge-effects from occurring.

Risk Assessment Outcome & Business Case:

The DWS Risk Assessment (2023) only considers activities within the delineated extent of freshwater ecosystems and/or within the regulated zone (GN 4167 500 m ZoR). As such, the seep wetlands located within the study area were considered in this assessment.	
Low	Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a "Low" risk to the ongoing functionality of the systems. Key mitigation measures include: ➢ Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and ➢ It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.

Table 4: Summary of the assessment of the depression wetlands associated with the proposed underground mining operation.

Ecological & socio-cultural service provision graph:





Representative photographs of the depression wetlands and the various impacts affecting the ecological condition of the wetlands including animal grazing, embankment erosion and algal blooms.

PES Discussion	**PES Category: D (largely modified)** The largely modified ecological condition of the depression wetlands is ascribed to numerous changes to the hydraulic regimes, geomorphological processes and vegetation composition which have occurred within the wetlands as well as the catchments thereof. Impacts such as ongoing agricultural activities, road crossings, hardened surfaces, , historical and current mining activities, as well as dense alien vegetation have altered the ecological condition of the wetlands.	**Ecoservice provision**	**Ecoservices importance category: Very Low to Moderate** The Ecosystem service provided by these seep wetlands of greatest importance is biodiversity maintenance. These wetland areas provide some of the only remaining natural habitat in the area and as such are important in terms of biodiversity maintenance, as well as for livestock grazing. The wetlands are also identified by the Screening Tool (2020), NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale, thus increasing their ecosystem provision for biodiversity maintenance. The importance of sediment trapping, phosphate, nitrate and toxicant assimilation is due to increased hardened surface and stormwater inputs into the seep wetlands from the surrounding catchment, and cultivated areas. The limited ecological service provisioning across all components was primarily attributed to the degraded ecological integrity of the wetlands.

EIS discussion	**EIS Category: Moderate** The depression wetlands are considered to be of moderate ecological importance and sensitive. This is mainly due to the systems being identified by the Screening Tool (2020), NFEPA (2011) and NBA (2018) datasets as wetlands on a landscape scale. The wetlands are also considered importance for biodiversity maintenance as they provide some of the only remaining natural habitat in an area dominated by agricultural and mining activities.	**REC, RMO & BAS Category**	**REC: D / BAS: D/ RMO: Maintain** The Recommended Management Objective (RMO) of the depression wetlands is to maintain the PES. The maintenance of the PES of these systems is likely as only underground mining activities are proposed. Any decrease in the PES of these systems would potentially be as a result of the ongoing agricultural activities over which the proponent has no control. Potential improvement of the PES of these systems would require a catchment-wide approach by all stakeholders, and ecological restoration of the wetlands is not the sole responsibility of a single stakeholder. Please refer to the discussion below pertaining to impacts and mitigation measures.

Freshwater ecosystems drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):

Alterations to the natural hydraulic regime and geomorphological processes of the depression wetlands have occurred. These impacts include hardened surfaces due to catchment wide agricultural and mining activities. Increased hardened surfaces reduce infiltration rates and increase inputs of sediment laden runoff to the wetlands, especially due to the inward draining characteristics of the wetlands, and subsequently changes in water quality. These impacts has subsequently also led to AIP proliferation.
Although no onsite specific water quality testing was undertaken for the depression wetlands, water quality is likely to be similar to that of the seep wetlands as these HGM types occur in close proximity to one another and are influenced by similar impacts.

High levels of agricultural and mining activities were noted within the surrounding area, which have had a significant impact on the habitat provisioning of the depression wetlands due to the limited existing buffer zone around the wetlands. However, the wetlands provide isolated habitat for biota with numerous provincially protected floral species present (STS, 2026a). Overall, the wetlands are considered likely to provide some roosting, breeding and feeding habitat for avifauna, small mammals, amphibians, reptiles and invertebrates, albeit less sensitive species. Although the extent of anthropogenic activity surrounding the wetlands will largely deter faunal activity. Flora and fauna species present in the depression wetlands were largely similar to those in the seep wetlands (see full list in Table 3 above), with the exception of Forb species which were more abundant in the seep wetlands.

Extent of modification anticipated	The proposed undermining of the depression wetlands has the potential to alter the functioning of the wetlands to an overall low degree. The extraction of ore can potentially lead to destabilisation of the surrounding environment and to subsequent potential subsidence of the land and creation of a cone of depression. Water entering the underground mining area as a result of ingress into underground mine workings may necessitate dewatering of the underground mining area, which may result in the discharge of dirty water into the wetland environment. Possible decant from the underground mining also poses a low threat to the depression wetlands as contaminated water may alter water quality, flow regimes and lead to a subsequent loss of biodiversity of the wetlands. Thus, strict implementation of the recommended mitigation measures will need to occur to prevent direct impacts and edge-effects from occurring.

Risk Assessment Outcome & Business Case:

The DWS Risk Assessment (2023) only considers activities within the delineated extent of freshwater ecosystems and/or within the regulated zone (GN 4167 500 m ZoR). As such, the depression wetlands located within the study area were considered in this assessment.

Low	Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a "Low" risk to the ongoing functionality of the systems. Key mitigation measures include: ➢ Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and ➢ It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.

Diatom Analysis Results (See Figure 12 below for sampling site locations)

Parameter	J1	J2	Discussion

Dominant Taxa	*Navicula* sp., *Cyclotella meneghiniana*, *Nitzschia palea*, *Gyrosigma* sp., *Nitzschia* sp., *Rhopalodia gibba*, *Fragilaria biceps*.	*Cyclotella meneghiniana*, *Diploneis elliptica*, *Navicula* sp.	Site J1 has a moderate species diversity with a high species evenness. The site is considered to be in a Poor ecological condition (Category D) with meso-eutrophic nutrient conditions, elevated electrolyte concentrations, and very heavily to extremely contaminated conditions, as per the calculated SPI score (9.5) and dominant diatom taxa. The dominant diatom taxa included *Navicula sp., Cyclotella meneghiniana, Nitzschia palea, Gyrosigma sp., Nitzschia sp., Rhopalodia gibba,* and *Fragilaria biceps*, representing a community dominated by motile taxa with contributions from planktonic and high-profile forms. The dominance of *Navicula sp., Nitzschia sp.,* and *Gyrosigma sp*. further indicates nutrient enrichment, elevated electrolytes, and physical disturbance (sedimentation, scouring, erosion, trampling, etc.), while the presence of *Fragilaria sp.* and *Rhopalodia sp*. indicates some periods of substrate stability. The functional groups indicate mixed habitat conditions with sedimentation and variable flow regimes. The diatom size classes ranged from small motile taxa to larger benthic forms, consistent with mixed disturbance and nutrient enrichment. The calculated %PTV score (15.1%) indicates that the site is free from organic contamination. Site J2 has a low species diversity with a moderate species evenness. The site is considered to be in a Moderate ecological condition (Category C) with mesotrophic nutrient conditions, moderate electrolyte concentrations, and contaminated conditions, as per the calculated SPI score (13.1) and dominant diatom community. The dominant diatom taxa included *Cyclotella meneghiniana, Diploneis elliptica,* and *Navicula sp.,* indicating a community dominated by low-profile taxa with some motile and adnate forms present. The dominance of Cyclotella sp. further indicates nutrient enrichment and possible hydrological variability, while the presence of *Navicula sp.* indicates physical disturbances and possibly industrial contamination. The functional groups indicate relatively stable substrate conditions with moderate nutrient enrichment. The diatom size classes consisted mostly of small to medium-sized taxa with some larger adnate forms present, supporting the results of moderately enriched but stable conditions. The calculated %PTV score (0%) indicates that the site is free from organic contamination. While some of the observed diatom community patterns may reflect natural geomorphological variability for the sites, the consistent dominance of motile and tolerant taxa across multiple sites indicates anthropogenic impacts and influences at the sites.
Functional Groups	Mix of benthic motile, planktonic centric, and erect taxa.	Mix of planktonic centric and benthic motile taxa with adnate forms present.	
Ecological Guilds	Motile guild dominate site, with low-profile and high-profile guilds also present.	Low-profile guild dominant at site with motile and adnate guilds present.	
Size Classes	Wide range of size classes with small–medium taxa dominant and some larger forms present.	Mostly small to medium-sized taxa with some larger adnate forms present.	
SPI	9.5 - Poor quality (Category D); Meso-eutrophic	13.1 – Moderate quality (Category C); Mesotrophic	
%PTV	15.1 – Site free from organic pollution	0.0 – Site free from organic pollution	
Diversity	2.73 – Moderate	1.41 – Low	
Evenness	0.97 – High	0.89 – Moderate	

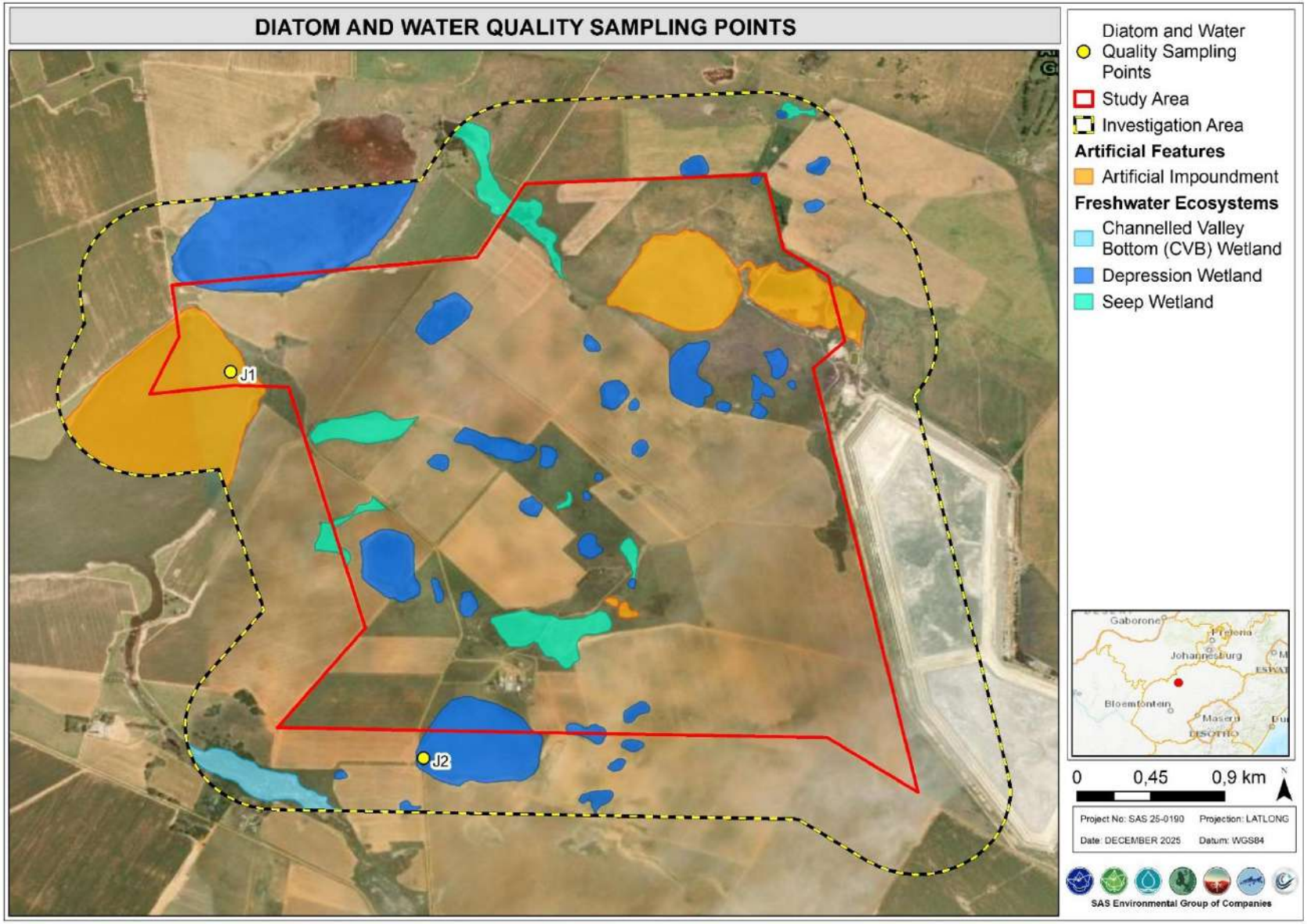


Figure 12: Sampling locations sites for diatom and water quality analyses. See Appendix C for diatom assessment methodology.

5 LEGISLATIVE REQUIREMENTS

The following legislative requirements and relevant provincial guidelines were taken into consideration during the assessment. A detailed description of these legislative requirements is presented in **Appendix B**:

- Constitution of the Republic of South Africa, 1996[2];
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA) as amended;
- Government Notice 4167 (GN 4167) as published in the Government Gazette 49833 of 2023 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended; and
- Government Notice 704 (GN 704) as published in the Government Gazette 20119 of 1999.

The definition and motivation for a regulated zone of activity for the protection of the assessed freshwater ecosystems can be summarised as follows:

Table 5: Articles of Legislation and the relevant zones of regulation applicable to each article.

Regulatory authorisation required	Zone of applicability
Water Use License Application for water uses as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998).	Government Notice 4167 as published in the Government Gazette 49833 of 08 December 2023 as it relates to the National Water Act (NWA), 1998 (Act No.36 of 1998) as amended. In accordance with GN 4167, a regulated area of a watercourse in terms of water uses as listed in Section 21(c) and 21(i) is defined as: • the outer edge of the 1 in 100-year flood line or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake, or dam; and • in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m distance from the edge of a watercourse where the edge of the watercourse (excluding flood plains) is the first identifiable annual bank fill flood bench. • **In respect of a wetland, a 500 m radius around the delineated boundary (extent) of any wetland, including pans.**
	Government Notice 704 Regulations as published in the Government Gazette 20119 of 1999 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) regarding the use of water for mining and related activities aimed at the protection of water resources. These Regulations were put in place in order to prevent the pollution of water resources and protect water resources in areas where mining activity is taking place from impacts generally associated with mining. It is recommended that the proposed project complies with Regulation GN 704 of the National Water Act, 1998 (Act No. 36 of 1998) which contains regulations on use of water for mining and related activities aimed at the protection of water resources. GN 704 states that: *No person in control of a mine or activity may:* *(a) locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line* ***or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or***

[2] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 19996". It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.

Regulatory authorisation required	Zone of applicability
	wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become waterlogged, undermined, unstable or cracked*;* According to the above, the activity footprint must fall outside of the 1:100 year flood line of the aquatic resource or 100m from the edge of the resource, whichever distance is the greatest.
Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended in 2017[3]. **Department of Forestry, Fisheries and the Environment (DFFE).** ***(As confirmed by the EAP)***	**Activities of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended):** **Activity 12** *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—;* ***a) within a watercourse;*** *b) in front of a development setback;* *c) if no development setback exists, within **32 metres of a watercourse**, measured from the edge of a watercourse.* **Activity 14** *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs—;* ***a) within a watercourse;*** *b) in front of a development setback;* *if no development setback exists, within **32 metres of a watercourse**, measured from the edge of a watercourse*

These zones of regulations (ZoR) must be taken into consideration during the proposed underground mining operation, in line with the mitigation hierarchy as advocated by the Department of Environmental Affairs *et. al*, (2013). The delineated wetlands and their applicable zones of regulation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (GN 4167), (GN 704) and the National Environmental Management Act, 1998 (Act No. 107 of 1998) are conceptually depicted in Figure 13 and Figure 14 below.

[3] Note – only listing notice activities that are associated with a zone of regulation are detailed in this table. This does not exclude the applicability of other potentially applicable activities that relate to the freshwater environment (e.g., Listing Notice 1 Activity 19) or any other applicable listing notice activity to the proposed development.

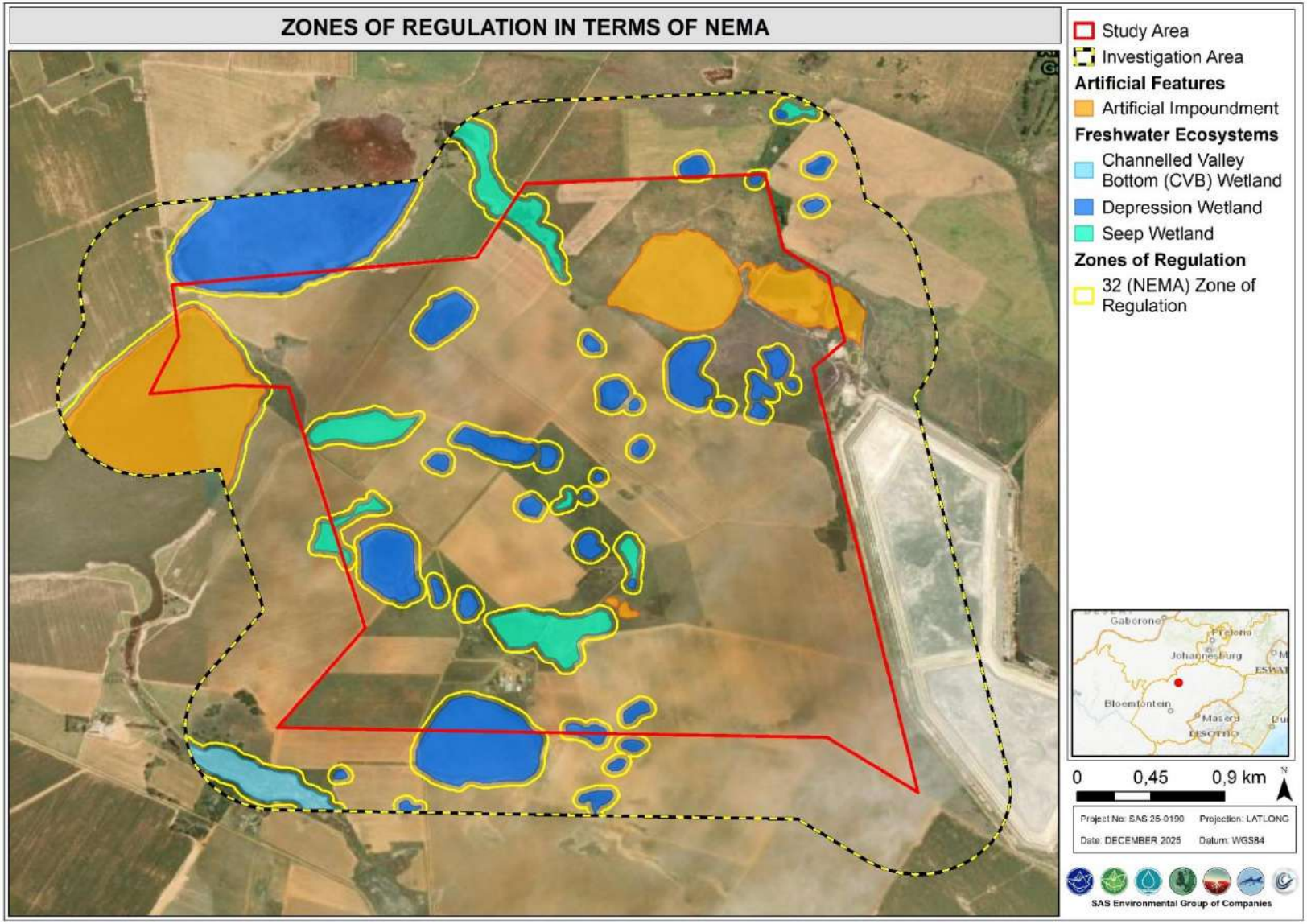


Figure 13: Conceptual presentation of the ZoRs in terms of NEMA, applicable to the study and investigation areas.

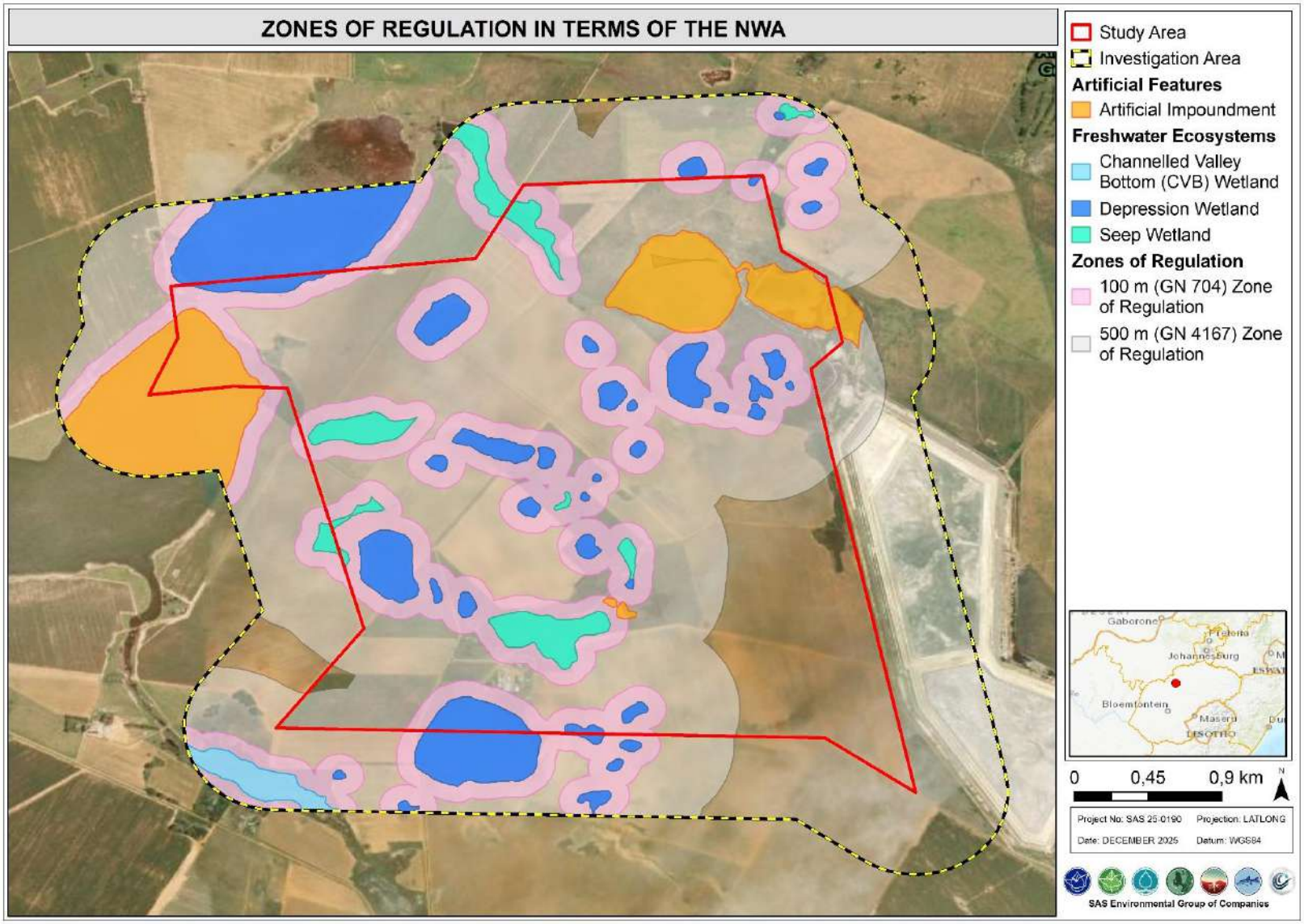


Figure 14: Conceptual presentation of the ZoRs in terms of GN 4167 and GN 704 as it relates to the NWA, applicable to the study and investigation areas.

6 APPLICATION OF THE DFFE SCREENING TOOL FOR THE PROPOSED INFRASTRUCTURE AREAS

The protocol for the assessment of freshwater and aquatic biodiversity prepared in support of the Department of Forestry, Fisheries and Environment (DFFE) (previously the Department of Environmental Affairs (DEA)) National Web-based Environmental Screening Tool (2020), provides the criteria for the assessment and reporting of impacts on aquatic/freshwater biodiversity for activities requiring EA. For the aquatic / freshwater biodiversity theme, the requirements are for sites which support various levels of biodiversity. The relevant aquatic / freshwater biodiversity theme in the National Web-based Environmental Screening Tool (2020) has been provided by the South African National Biodiversity Institute (SANBI). Based on the sensitivity rating, a suitably qualified specialist must prepare the relevant report or opinion memorandum which is to be submitted as part of the EA application.

As part of the process of the background information gathering, the DFFE Screening Tool was applied to the proposed underground mining operation area and the associated investigation area. According to the guidelines, an applicant intending to undertake an activity on a site identified as being of “very high sensitivity” for an aquatic biodiversity theme must submit an Aquatic Biodiversity Impact Assessment, or if the area is identified as being of “low sensitivity” then an Aquatic Biodiversity Compliance Statement must be compiled and submitted to the competent authority. It is noted, however, that during a site survey undertaken by a suitably qualified freshwater ecologist should the sensitivity be determined different from that assigned by the screening tool (i.e. that a high risk to the regional aquatic biodiversity or freshwater ecosystems in the area is likely even though it is assigned as a “low” sensitivity, or if it is assigned a high sensitivity, however, the proposed development risks are deemed low) then the relevant assessment approach must be followed based on the site survey results and not the screening tool allocation.

According to the screening tool, the majority of the proposed underground mining operation area is of low aquatic biodiversity sensitivity. However, isolated portions of study area, as well as sections of the investigation area are indicated as very high aquatic biodiversity sensitivity (Figure 16).
The triggering features for the very high sensitivity are for being within Wetlands (Depression, UCVB, and seep Wetlands).

Based on the site verification undertaken for the proposed underground mining operation, and the findings thereof presented in this report, the designation of very high sensitivity to freshwater features in study and the investigation areas, by the DFFE Screening Tool has been supported through the findings of the freshwater assessment that has confirmed the high sensitivity of the freshwater ecosystems.

Under the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, (GN320 of March 2020), for areas of very high aquatic biodiversity sensitivity an Aquatic Biodiversity Assessment must be produced. Such a reporting approach (EIA-phase freshwater report) have accordingly been compiled.

Please see below map of the specialist site tracks during the site assessment undertaken for the proposed underground mining operation in December 2025 (Figure 15).

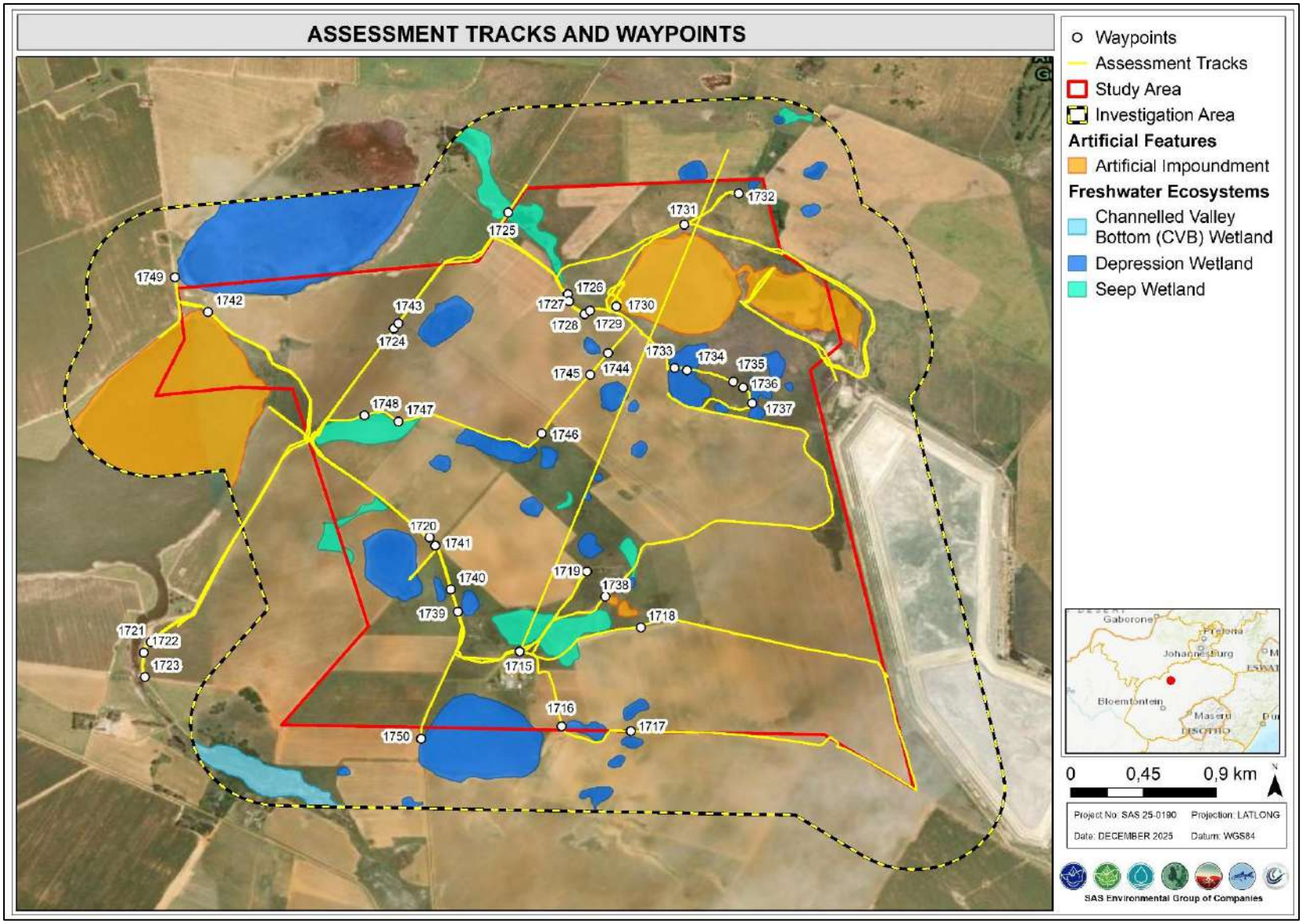


Figure 15: Specialist site tracks and waypoints as per the field verification undertaken on the 10th of December 2025.

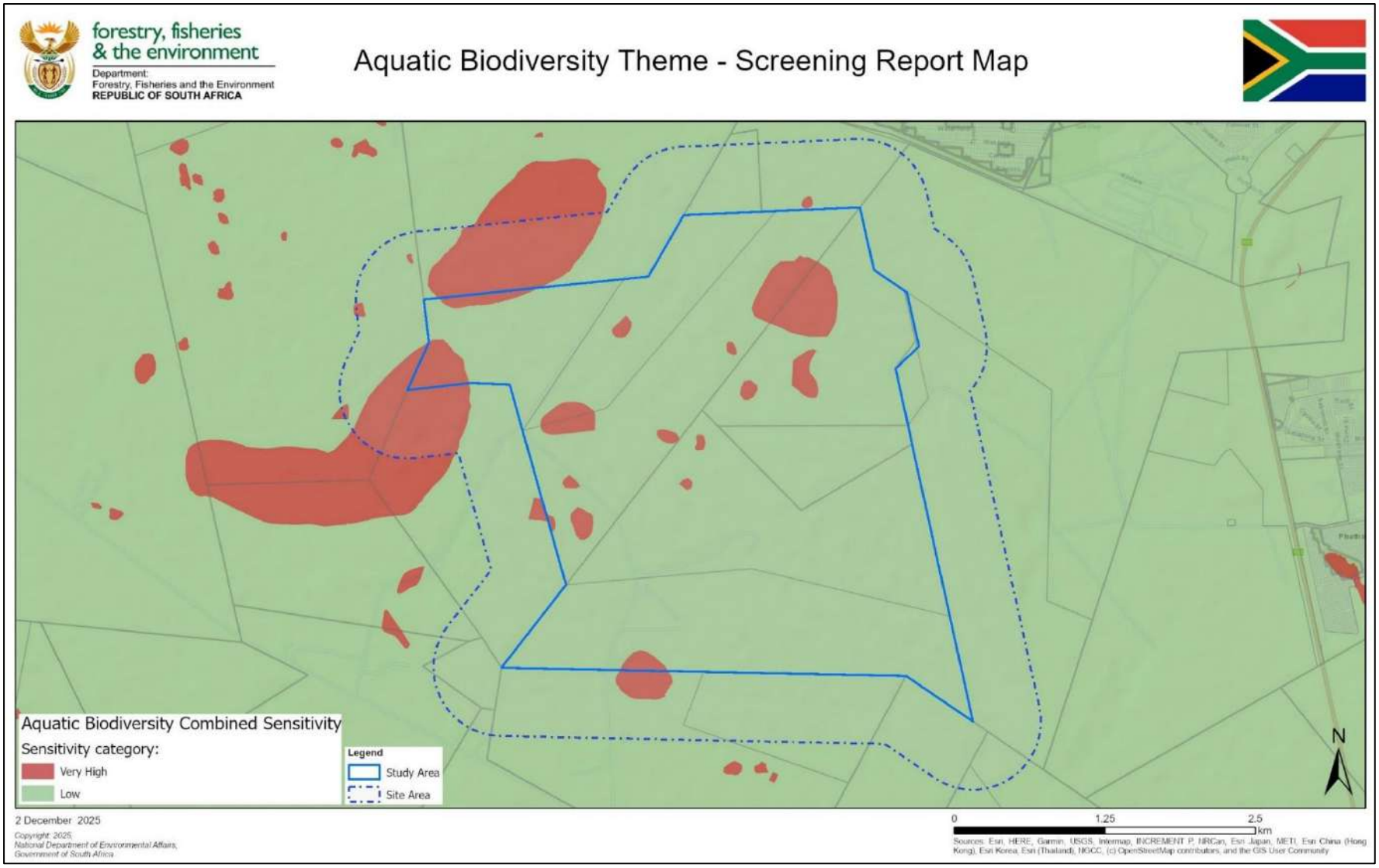


Figure 16: Map of relative aquatic biodiversity theme sensitivity for the study area (blue solid line) and investigation area (blue dashed line) according to the National Web-Based Environmental Screening Tool (2020; Accessed 2025).

7 RISK AND IMPACT ASSESSMENTS

This section presents the significance of potential impacts on the freshwater ecology of the wetlands located within the study area associated with the proposed underground mining operation. In addition, it indicates the required mitigatory measures needed to minimise the perceived impacts of the proposed underground mining operation and presents an assessment of the significance of the impacts taking into consideration the available mitigatory measures and assuming that they are fully implemented.

The results of the Impact Assessment for the proposed undermining activities as presented here (Section 7.3) will be utilised in the EA process, whilst the results of the DWS Risk Assessment Matrix (2023) will be utilised in the WUA process which will be undertaken separately to the EA process, in consultation with the relevant competent authorities. Thus, although the two methods may present different scores for the same activity, this is due to differences in their methodologies (please refer to **Appendix D and Appendix E**) and not due to inconsistencies in their application, and each must be judged individually for their specified purpose as discussed above.

7.1 *Consideration taken with the application of the Risk and Impact Assessment*

The points below summarise the considerations undertaken as part of the risk assessment:

- The DWS Risk Assessment Matrix (RAM) (2023) was applied assuming that a high level of mitigation is implemented, thus the results of the risk assessment provided in this report presents the perceived impact significance ***post-mitigation****;*
- In applying the risk assessment, it was assumed that the mitigation hierarchy as advocated by the DEA *et al.* (2013) (**Figure D1; Appendix D**) would be followed, i.e. the impacts would be avoided, minimised if avoidance is not feasible, rehabilitated as necessary and offset if required;
- The risk assessment only considers activities within the delineated extent of freshwater ecosystems and/or within the regulated zone (GN 4167 500 m ZoR). As such, the seep and depression wetlands in the study are were considered in this assessment;
- It was assumed that no new surface infrastructure will be required as part of the underground mining activities and thus surface infrastructure was not assessed;
- As the proposed activities are only underground – impacts to the surface footprint of the wetlands are considered to be negligible (i.e. no wetland habitat loss);

- **The RAM does not consider impacts to groundwater as this is beyond the scope of the RAM**;
- The DWS RAM (2023) takes into consideration the PES and Overall Freshwater Ecosystem Importance, with the latter carrying the most weight during the calculations. As such the PES and EIS as determined in Section 4.4 was included in the application of the RAM; and
- The considered control measures are easily practicable.

7.2 *Risk Assessment discussion of anticipated ecological impacts*

There are four key ecological impacts on the freshwater ecosystems that are anticipated to occur namely:

- Loss of wetland habitat and ecological structure;
- Changes to the sociocultural and ecological service provision;
- Impacts on the hydrology and sediment balance of the wetlands; and
- Impacts on water quality.

Various activities and development aspects may lead to these impacts, however, provided that the mitigation hierarchy is followed, some impacts can be avoided or adequately minimised where avoidance is not feasible. The mitigation measures provided in this report have been developed with the mitigation hierarchy in mind, and the implementation and strict adherence to these measures will assist in minimising the significance of impacts on the receiving environment.

A summary of the DWS Risk Assessment Matrix applied to the proposed underground mining operation is provided in the table below, whilst a comprehensive outcome of the risk assessment is presented in **Appendix G**.

Table 6: Summary of the results of the DWS Risk Assessment matrix applied to the freshwater ecosystems associated with the proposed underground mining operation.

Phase	No.	Activity	Impact	Potentially affected watercourses			Severity	Consequence	Likelihood	Significance	Risk Rating	Mitigation Measures to be implemented
				Name/s	PES	Overall Watercourse Importance						
Operational	1	Operation of the underground mining area related to the undermining of the freshwater ecosystems.	• Potential creation of a cone of depression, which may drain water from the wetlands, thus resulting in desiccation of the systems.	Seeps	C	Moderate	**10**	**30**	40%	**12**	**L**	• Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; • The management and mitigation measures recommended by a suitably qualified geohydrologist must be implemented to mitigate the potential impacts arising from the formation of a cone of depression and pollution plume, from the mine into the receiving environment; and • Water levels need to be strictly managed to ensure they are kept below any decant level while ensuring that a significant cone of depression impact does not take place.
				Depressions	D	Moderate	**10**	**30**	40%	**12**	**L**	
	2		• Potential destabilisation of the surrounding environment through the extraction of ore and subsequent potential subsidence of the land.	Seeps	C	Moderate	**11**	**33**	60%	**19.8**	**L**	• Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented; • As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided; and • It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.
				Depressions	D	Moderate	**11**	**33**	60%	**19.8**	**L**	

Phase	No.	Activity	Impact	Potentially affected watercourses			Severity	Consequence	Likelihood	Significance	Risk Rating	Mitigation Measures to be implemented
				Name/s	PES	Overall Watercourse Importance						
Closure/ Post closure	3	Post-closure management activities. (Decant of contaminated water from the rehabilitated mine area into the receiving environment subject to confirmation by a suitably qualified geohydrologist).	• Contamination of water within the receiving environment, and subsequent reduction in water quality (increase in salts and specific contaminants of concern and reduced pH); • Post-operational subsidence; • Subsequent negative impacts on biota and vegetation; • Altered flow regimes (increased hydroperiod); and • Habitat degradation..	Seeps	C	Moderate	**8**	**24**	40%	**9.6**	**L**	• The management and mitigation measures as recommended in the Technical Report (Bara Consulting, 2025) must be implemented to mitigate the potential impacts arising from decant of contaminated water from the mine into the receiving environment; • If feasible, the volume of decant can be managed via passive water management systems before release into the environment; and • Any area where decant points may be determined needs to be very carefully managed throughout the Life Of Mining (LOM).
				Depressions	D	Moderate	**8**	**24**	40%	**9.6**	**L**	

As noted from the risk assessment above, the assessed activities and aspects are expected to pose an overall "Low" risk to the wetlands, provided that the mitigation measures as outlined in this report are strictly adhered to. The assessment of potential impacts to groundwater was not part of the scope of this report. As such, the mitigation measures as outlined in the Technical Report (Bara Consulting, 2025) to mitigate against potential subsidence, creation of a pollution plume and possible decant must be implemented and strictly adhered to in order to ensure a low impact significance (as assessed in the previously mentioned reports). It is also recommended that the pillar safety factor under the wetlands be increased with an appropriate margin of safety to ensure that no subsidence of the wetlands take place.

7.3 *Impact Assessment*

The results of the DWS specified Risk Assessment Matrix [as promulgated in GN4167 of 2023 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)], as amended are translated into the impact assessment methodology provided by the EAP.

7.3.1 Impacts associated with the Operational Phase:

Table 7: Potential changes to hydrological functioning and water quality should subsidence occur.

NATURE OF THE IMPACT: Changes to hydrological functioning and water quality.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Definite	Possible
Calculated Significance Rating	**Medium**	**Low**
Reversibility: *(Reversible or Irreversible)*	Irreversible: Depending on the degree of subsidence, (i.e., sink hole or cracking) physical rehabilitation will need to be implemented (following a Landscape and Rehabilitation plan developed by qualified specialists) to restore any impact to wetland habitat integrity and ecological functionality.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: *(Yes or No)*	Yes, with rehabilitation measures.	
Potential Residual impacts ➢ Localised but irreversible loss of wetland habitat, particularly where subsidence causes sinkholes or persistent ground deformation. ➢ Altered runoff patterns within the local catchment of the freshwater ecosystems, potentially leading to increased erosion and sedimentation of the receiving freshwater environment. ➢ Potential impacts on the water quality of surface water runoff (when present) which may potentially enter the downgradient freshwater ecosystems and contamination of soils.		
Mitigation measures ➢ **Adaptive Subsidence Management:** Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.		

NATURE OF THE IMPACT: Changes to hydrological functioning and water quality.
➢ **Planning and mine design:** Adequate safety precautions and monitoring protocols be developed to lower the potential of subsidence and effective monitoring (especially of freshwater ecosystems) to allow for immediate management of potential subsidence events. ➢ In areas where subsidence is anticipated a walkdown should take place to observe and mark any signs of erosion and any changes to hydraulic pattern in the landscape.

Table 8: Potential changes to geomorphological processes should subsidence occur .

NATURE OF THE IMPACT: Changes to the geomorphological processes (sediment balance, erosion and sedimentation).		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**Medium**	**Low**
Reversibility:	Irreversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: *(Yes or No)*	Yes, with rehabilitation measures.	
Potential Residual impacts ➢ Reduced nutrient cycling and soil water retention. ➢ Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the impacted freshwater ecosystems. ➢ Impact of increased sedimentation, potentially leading to smothering of biota and potentially altering surface water quality (if present). ➢ Soil compaction altering run-off patterns. ➢ Disturbed and fragmented habitats remain susceptible to invasion by AIPs.		
Mitigation measures ➢ Bare areas are more susceptible to erosion, and these areas should be monitored to indicate any initial signs of subsidence. ➢ **Adaptive Subsidence Management:** Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. ➢ **Concurrent rehabilitation** should be implemented. At the first signs of soil erosion the surface should be covered with native plant species to prevent further loss of soil (where applicable).		

Table 9: Potential increased proliferation of AIPs and potential habitat loss.

NATURE OF THE IMPACT: Increased proliferation of AIPs and potential habitat loss.		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Site
Duration	Long term	Short term
Magnitude	Minor	Minor
Probability	Possible	Possible
Calculated Significance Rating	**Medium**	**Low**
Reversibility:	Reversible with proactive AIP management.	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: *(Yes or No)*	Yes, with rehabilitation measures.	
Potential Residual impacts ➢ Decreased habitat integrity and diversity of biota as a result of unmanaged AIP proliferation. ➢ Potential inadequate AIP control methods, in turn altering freshwater habitat and runoff patterns, or contamination of surface water (if present) with herbicides. ➢ Potential inadequate re-vegetation methods, leading to failure of vegetation establishment, resulting in bare soil with increased risk of erosion and AIP proliferation.		
Mitigation measures		

NATURE OF THE IMPACT: Increased proliferation of AIPs and potential habitat loss.
➢ **Adaptive Subsidence Management:** Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. ➢ **Concurrent rehabilitation** should be implemented. At the first signs of AIP proliferation and establishment within monitoring areas or operation areas AIP management must commence. Following an AIP Management and Control Plan associated with the mine. Any current or existing AIP control plans should be updated to include all additional proposed activities and be updated annually to incorporate any new information.

7.3.2 Impacts associated with the Closure/Post-Closure Phase:

Following the completion of the proposed underground mining operations, the decommissioning, closure, and rehabilitation activities for the proposed project will be limited to the removal of underground infrastructure.

Table 10: Potential freshwater habitat/functionality loss and impacts to biota due to potential subsidence post mine closure.

NATURE OF THE IMPACT: Potential freshwater habitat loss and impacts to biota		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Moderate	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**Medium**	**Low**
Reversibility:	Irreversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: *(Yes or No)*	Yes, with rehabilitation measures.	
Potential Residual impacts ➢ Possible localised but irreversible loss of wetland habitat and functionality, particularly where subsidence causes sinkholes or persistent ground deformation. ➢ Disturbed and fragmented habitats remain susceptible to invasion by AIPs. ➢ Altered runoff patterns within the local catchment of the freshwater ecosystems, potentially leading to increased erosion and sedimentation of the receiving freshwater environment. ➢ Exposure of soils, leading to increased runoff and erosion, and thus increased sedimentation of the impacted freshwater ecosystems. ➢ Impact of increased sedimentation, potentially leading to smothering of biota and potentially altering surface water quality (if present).		
Mitigation measures ➢ **Adaptive Subsidence Management:** Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. ➢ A Rehabilitation and Landscape Plan should be developed as a precautionary measure for subsidence to follow protocols and guidelines provided by qualified experts. ➢ Monitoring post mine closure and decommission should take place for at least 5 year post closure to ensure no delayed subsidence has occurred.		

7.4 *Cumulative Impact Assessment*

Cumulative impacts are activities and their associated impacts on the past, present and foreseeable future, both spatially and temporally, considered together with the impacts identified in Section 7.2 & 7.3, above. Freshwater ecosystems within the region are under continued threat largely due to ongoing mining and agricultural activities as well as urbanisation. These cumulative impacts lead to increasing impacts on the functioning and service provision by wetlands and rivers.

As the wetlands are isolated and small in extent, it is imperative that impacts on the wetlands be reduced through implementation of the mitigation measures provided in this report to reduce the cumulative risk and impacts on the surrounding freshwater and terrestrial environment which is affected by mining, agricultural and urbanisation impacts which affect water quality, as well as instream and aquatic biota.

The potential for decant of contaminated water also increases which can lead to impaired water quality and changes to the hydrological processes of the freshwater ecosystems in the region.

Mining, agricultural and urban activities in the area have resulted in the reduction of functional freshwater habitats in the landscape and continued mining and urban activities will contribute to the degradation of water quality, and loss of indigenous vegetation, especially if potential impacts are not managed accordingly in line with the mitigation hierarchy and best practice protocols.

Table 11: Potential cumulative effects on wetland habitat due to potential subsidence post mine closure.

NATURE OF THE CUMULATIVE IMPACT: Potential freshwater habitat loss and impacts to biota		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status:	**Negative**	**Negative**
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Minor	Minor
Probability	Unlikely	Unlikely
Calculated Significance Rating	**Low**	**Low**
Reversibility:	Irreversible	
Irreplaceable loss of resources:	No	
Can impacts be enhanced: *(Yes or No)*	Yes, with rehabilitation measures.	
Potential Residual impacts ➢ Increased risk of AIP proliferation due to disturbances within the delineated extent of the freshwater ecosystems and within the immediate surrounds. ➢ Increased risk for erosion and sedimentation due to increased stormwater runoff within the catchment of the freshwater ecosystems.		

NATURE OF THE CUMULATIVE IMPACT: Potential freshwater habitat loss and impacts to biota
➢ Increased risk of nutrient inputs from the mining and agricultural activities resulting in changes to the water quality of the freshwater ecosystems. ➢ Increased dust generation due to mining and agricultural activities and vehicle movement within the freshwater ecosystems and within the immediate surrounds. ➢ Increased likelihood of deterioration of ecological functioning and ecoservice provisioning potential of the freshwater ecosystems.
Mitigation measures ➢ **Adaptive Subsidence Management:** Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. ➢ A Rehabilitation and Landscape Plan should be developed as a precautionary measure for subsidence to follow protocols and guidelines provided by qualified experts. ➢ Monitoring post mine closure and decommission should take place for at least 5 year post closure to ensure no delayed subsidence has occurred.

8 CONCLUSION

SAS (Pty) Ltd was appointed to conduct freshwater and aquatic assessments as part of the EA and WUA processes for the proposed Jelani JV area underground mining project, Free State province (referred to as the 'proposed underground mining operation').

Multiple seep and depression wetlands were identified within the study and investigation areas. The results of the assessment are summarised in the table below:

Table 12: Summary of results of the field assessment as discussed in Section 4.

Freshwater ecosystems	PES	Ecoservices importance	EIS	REC / RMO / BAS
Seep Wetlands	C	Very low to Moderate	Moderate	REC Category: C BAS Category: C RMO: Maintain
Depression Wetlands	D			REC Category: D BAS Category: D RMO: Maintain
Extent of modification anticipated.	**Low** Based on the PES and EIS of the wetlands and the findings of the DWS Risk Assessment Matrix (2023), the activities associated with the proposed undermining of the wetlands will pose a "Low" risk to the ongoing functionality of the systems. Key mitigation measures include: ➢ Mitigation measures as stipulated in the Technical Report compiled by Bara Consulting (2025), to mitigate against subsidence and dewatering, formation of a pollution plume and decant respectively, must be implemented; and ➢ It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place.			

Following the freshwater ecosystem assessment, the Department of Water and Sanitation (DWS) Risk Assessment Matrix (2023) was applied to determine the significance of impacts of the proposed undermining of the wetlands. Provided that all mitigation measures outlined in this report are adhered to throughout the life of the proposed underground mining operation,

the perceived impact significance is “Low” provided that the mitigation measures as outlined in this report are strictly adhered to.

The assessment of potential impacts to groundwater was not part of the scope of this report but was considered, at a high level, as the potential for decant relates to surface freshwater resource management. As such, the mitigation measures as outlined in the Technical Report (Bara Consulting, 2025) to mitigate against potential subsidence, creation of a groundwater pollution plume, that poses a risk to surface water resources, and possible decant must be implemented and strictly adhered to in order to ensure a low impact significance. It is also recommended that the pillar safety factor under the wetlands be included as an additional margin of safety to ensure that no subsidence of the wetlands takes place.

The outcome of the impact assessment (provided by the EAP) states that the operational and closure phase activities associated with the proposed project are medium without the implementation of mitigation measures and low with the implementation of mitigation measures.

Thus, it is the opinion of the specialist that the proposed undermining of the wetlands associated with the proposed Jelani JV project is considered acceptable and can be authorised by means of a Water Use Authorisation process in terms of GN 4167 as it relates to the NWA and is acceptable for EA.

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APPENDIX A – Terms of Use and Indemnity

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS (Pty) Ltd and its staff reserve the right, at their sole discretion, to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field or pertaining to this investigation.

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APPENDIX B – Legislative Considerations

The Constitution of the Republic of South Africa, 1996	The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact. Provincial regulations must also be considered.
National Environmental Management: Biodiversity Act (2004) (Act 10 of 2004) (NEMBA)	**Ecosystems that are threatened or in need of protection** (1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection. *(b)* An MEC for environmental affairs in a province may, by notice in *the Gazette,* publish a provincial list of ecosystems in the province that are threatened and in need of protection. (2) The following categories of ecosystems may be listed in terms of subsection (1): *(a)* critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation; *(b)* endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems; (c) vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and *(d)* protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs *(a), (b)* or (c).
The National Water Act 1998 (Act No. 36 of 1998) (NWA)	The National Water Act (NWA) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) & (i).
Government Notice 4167 as published in the Government Gazette 49833 of 08 December 2023 as it relates to the NWA (Act 36 of 1998) as amended	GN 4167 outlines the parameters and process of a General Authorisation (GA), which replaces the need to apply for a licence in terms of Section 40 of the NWA, provided that the water use is within the limits and conditions of the GA. The notice replaces GN 509 of 2016. The GA sets out the need to determine the regulated area of a watercourse, as well as the degree of risk posed by an activity/ies related to a particular water use. In accordance with GN 4167 of December 2023, the regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as: a) the outer edge of the 1 in 100-year flood line or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake, or dam; b) in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m distance from the edge of a watercourse where the edge of the watercourse (excluding flood plains) is the first identifiable annual bank fill flood bench; or

	c) In respect of a wetland, a 500 m radius around the delineated boundary (extent) of any wetland, including pans. The GA only applies to the use of water in terms of Section 21(c) and (i) of the NWA where the risk class is LOW as determined through the application of the Risk Matrix as prescribed in the Notice. The GA also does not apply where other Section 21 water uses are triggered, does not apply for most sewage infrastructure and pipelines carrying hazardous materials, water uses associated with hazardous materials, water uses associated with water and wastewater treatment works, and for most mining-related water uses. The GA may be exercised as follows: i) Section 21(c) or (i) water use activities that are determined to pose a LOW Risk as determined through the application of the Risk Matrix as prescribed in the Notice can be undertaken subject to the general conditions of the GA; ii) Section 21(c) or (i) water use activities set out in Appendix D1 of the Notice can be undertaken without being subject to the requirement of a risk assessment and subject to the general conditions of the GA. Such water use activities in Appendix D1 include inter alia emergency river crossings, fence erection, solar renewable infrastructure that has no direct impact on watercourses and mini-scale hydropower developments; iii) Prescribed water use activities undertaken by certain State Owned Entities as detailed in Appendix D2 of the Notice can be undertaken without being subject to the requirement of a risk assessment and subject to the general conditions of the GA; iv) Maintenance work associated an existing lawful water use in terms of section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix can be undertaken ; v) River and stormwater management activities including maintenance of infrastructure as contained in a river management plan or similar management plan, may be conducted subject to the approval of such a plan by the relevant DWS regional office or catchment management agency; vi) Rehabilitation of wetlands or rivers where such rehabilitation activities has a LOW risk class as determined through the Risk Matrix can be conducted; and vii) Emergency work arising from an emergency situation and or incident associated with the persons' existing lawful water use entitlement can be undertaken, provided that all work is executed and reported in the manner prescribed in the Emergency protocol contained in Appendix C of the GA. A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA. Upon completion of the registration, the responsible authority will provide a certificate of registration to the water user within 30 working days of the submission. On written receipt of a registration certificate from the Department, the person will be regarded as a registered water user and can commence within the water use as contemplated in the GA.
Government Notice 704 as published in the Government Gazette 20119 of 1999 as it relates to the National Water Act, 1998 (Act 36 of 1998)	Regarding the use of water for mining and related activities aimed at the protection of water resources. These Regulations were put in place in order to prevent the pollution of water resources and protect water resources in areas where mining activity is taking place from impacts generally associated with mining. It is recommended that the proposed project complies with Regulation GN 704 of the National Water Act, 1998 (Act No. 36 of 1998) which contains regulations on use of water for mining and related activities aimed at the protection of water resources. GN 704 states that: *No person in control of a mine or activity may:* *(a) locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become waterlogged, undermined, unstable or cracked;* According to the above, the activity footprint must fall outside of the 1:100 year flood line of the aquatic resource or 100m from the edge of the resource, whichever distance is the greatest.

APPENDIX C – Freshwater Ecosystems and Aquatic Method of Assessment

1. Desktop Study

Prior to the commencement of the field assessment, a background study, including a literature review, was conducted in order to determine the ecoregion and ecostatus of the larger aquatic system within which the freshwater features present or in close proximity of the proposed study area are located. Aspects considered as part of the literature review are discussed in the sections that follow.

1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

The NFEPA project is a multi-partner project between the Council of Scientific and Industrial Research (CSIR), Water Research Commission (WRC), South African National Biodiversity Institute (SANBI), DWA, South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks). The project responds to the reported degradation of freshwater ecosystem condition and associated biodiversity, both globally and in South Africa. It uses systematic conservation planning to provide strategic spatial priorities of conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development.

The NFEPA project aims to identify a national network of freshwater conservation areas and to explore institutional mechanisms for their implementation. Freshwater ecosystems provide a valuable, natural resource with economic, aesthetic, spiritual, cultural and recreational value. However, the integrity of freshwater ecosystems in South Africa is declining at an alarming rate, largely as a consequence of a variety of challenges that are practical (managing vast areas of land to maintain connectivity between freshwater ecosystems), socio-economic (competition between stakeholders for utilisation) and institutional (building appropriate governance and co-management mechanisms).

The NFEPA database was searched for information in terms of conservation status of rivers, wetland habitat and wetland features present in the vicinity of or within the proposed study area.

2. Classification System for Wetlands and other Aquatic Ecosystems in South Africa

The freshwater features encountered within the proposed study area were assessed using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis *et al*., 2013), hereafter referred to as the "Classification System". A summary of Levels 1 to 4 of the classification system are presented in Table C1 and C2, below.

Table C1: Proposed classification structure for Inland Systems, up to Level 3.

WETLAND / AQUATIC ECOSYSTEM CONTEXT		
LEVEL 1: SYSTEM	LEVEL 2: REGIONAL SETTING	LEVEL 3: LANDSCAPE UNIT
Inland Systems	DWA Level 1 Ecoregions OR NFEPA WetVeg Groups OR Other special framework	Valley Floor
		Slope
		Plain
		Bench (Hilltop / Saddle / Shelf)

Table C2: Hydrogeomorphic (HGM) Unit for the Inland System, showing the primary HGM Types at Level 4A and the subcategories at Level 4B to 4C.

FUNCTIONAL UNIT		
LEVEL 4: HYDROGEOMORPHIC (HGM) UNIT		
HGM type	Longitudinal zonation/ Landform / Outflow drainage	Landform / Inflow drainage
A	**B**	**C**
River	Mountain headwater stream	Active channel
		Riparian zone
	Mountain stream	Active channel
		Riparian zone
	Transitional	Active channel
		Riparian zone
	Upper foothills	Active channel
		Riparian zone
	Lower foothills	Active channel
		Riparian zone
	Lowland river	Active channel
		Riparian zone
	Rejuvenated bedrock fall	Active channel
		Riparian zone
	Rejuvenated foothills	Active channel
		Riparian zone
	Upland floodplain	Active channel
		Riparian zone
Channelled valley-bottom wetland	(not applicable)	(not applicable)
Unchannelled valley-bottom wetland	(not applicable)	(not applicable)
Floodplain wetland	Floodplain depression	(not applicable)
	Floodplain flat	(not applicable)
Depression	Exorheic	With channelled inflow
		Without channelled inflow
	Endorheic	With channelled inflow
		Without channelled inflow
	Dammed	With channelled inflow
		Without channelled inflow
Seep	With channelled outflow	(not applicable)
	Without channelled outflow	(not applicable)
Wetland flat	(not applicable)	(not applicable)

Level 1: Inland systems

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean[4] (i.e. characterised by the complete absence of marine exchange and/or tidal influence) but which are inundated or saturated with water, either permanently or periodically. It is important to bear in mind, however, that certain Inland Systems may have had a historical connection to the ocean, which in some cases may have been relatively recent.

Level 2: Ecoregions & NFEPA Wetland Vegetation Groups

For Inland Systems, the regional spatial framework that has been included at Level 2 of the classification system is that of DWA's Level 1 Ecoregions for aquatic ecosystems (Kleynhans *et al.,* 2005). There is

[4] Most rivers are indirectly connected to the ocean via an estuary at the downstream end, but where marine exchange (i.e. the presence of seawater) or tidal fluctuations are detectable in a river channel that is permanently or periodically connected to the ocean, it is defined as part of the estuary.

a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have most commonly been used to categorise the regional setting for national and regional water resource management applications, especially in relation to rivers.

The Vegetation Map of South Africa, Swaziland and Lesotho (Mucina & Rutherford, 2006) group's vegetation types across the country according to Biomes, which are then divided into Bioregions. To categorise the regional setting for the wetland component of the National Freshwater Ecosystem Priority Areas (NFEPA) project, wetland vegetation groups (referred to as WetVeg Groups) were derived by further splitting bioregions into smaller groups through expert input (Nel *et al*., 2011). There are currently 133 NFEPA WetVeg Groups. It is envisaged that these groups could be used as a special framework for the classification of wetlands in national- and regional-scale conservation planning and wetland management initiatives.

Level 3: Landscape Setting

At Level 3 of the Classification System, for Inland Systems, a distinction is made between four Landscape Units (Table C1) on the basis of the landscape setting (i.e. topographical position) within which an HGM Unit is situated, as follows (Ollis *et al.,* 2013):

- **Slope:** an included stretch of ground that is not part of a valley floor, which is typically located on the side of a mountain, hill or valley;
- **Valley floor:** The base of a valley, situated between two distinct valley side-slopes;
- **Plain:** an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land; and
- **Bench (hilltop/saddle/shelf):** an area of mostly level or nearly level high ground (relative to the broad surroundings), including hilltops/crests (areas at the top of a mountain or hill flanked by down-slopes in all directions), saddles (relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction), and shelves/terraces/ledges (relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction).

Level 4: Hydrogeomorphic Units

Seven primary HGM Types are recognised for Inland Systems at Level 4A of the Classification System (Table C2), on the basis of hydrology and geomorphology (Ollis *et al*., 2013), namely:

- **River:** a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water;
- **Channelled valley-bottom wetland:** a valley-bottom wetland with a river channel running through it;
- **Unchannelled valley-bottom wetland:** a valley-bottom wetland without a river channel running through it;
- **Floodplain wetland:** the mostly flat or gently sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank;
- **Depression:** a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.
- **Wetland Flat:** a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench. Closed elevation contours are not evident around the edge of a wetland flat; and
- **Seep:** a wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley but they do not, typically, extend into a valley floor.

The above terms have been used for the primary HGM Units in the classification system to try and ensure consistency with the wetland classification terms currently in common usage in South Africa. Similar terminology (but excluding categories for "channel", "flat" and "valleyhead seep") is used, for example, in the recently developed tools produced as part of the Wetland Management Series including

WET-Health (Macfarlane *et al*., 2008), WET-IHI (DWAF, 2007) and WET-EcoServices (Kotze *et al*., 2009).

3. WET-Health

Healthy wetlands are known to provide important habitats for wildlife and to deliver a range of important goods and services to society. Management of these systems is therefore essential if these attributes are to be retained within an ever-changing landscape. The primary purpose of this assessment is to evaluate the eco-physical health of wetlands, and in so doing to promote their conservation and wise management.

Level of Evaluation

Two levels of assessment are provided by WET-Health:

- Level 1: Desktop evaluation, with limited field verification. This is generally applicable to situations where a large number of wetlands need to be assessed at a very low resolution; or
- Level 2: On-site evaluation. This involves structured sampling and data collection in a single wetland and its surrounding catchment.

Framework for the Assessment

A set of three modules has been synthesised from the set of processes, interactions and interventions that take place in wetland systems and their catchments: hydrology (water inputs, distribution and retention, and outputs), geomorphology (sediment inputs, retention and outputs) and vegetation (transformation and presence of introduced alien species).

Units of Assessment

Central to WET-Health is the characterisation of HGM Units, which have been defined based on geomorphic setting (e.g. hillslope or valley-bottom; whether drainage is open or closed), water source (surface water dominated or sub-surface water dominated) and pattern of water flow through the wetland unit (diffusely or channelled) as described under the Classification System for Wetlands and other Aquatic Ecosystems above.

Quantification of Present State of a wetland

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present State score. This takes the form of assessing the spatial *extent* of the impact of individual activities and then separately assessing the *intensity* of the impact of each activity in the affected area. The extent and intensity are then combined to determine an overall *magnitude* of impact. The impact scores, and Present State categories are provided in the table below.

Table C3: Impact scores and categories of Present State used by WET-Health for describing the integrity of wetlands.

Impact category	Description	Impact score range	Present State category
None	Unmodified, natural	0-0.9	A
Small	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9	B
Moderate	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2-3.9	C
Large	Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	4-5.9	D
Serious	The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognisable.	6-7.9	E
Critical	Modifications have reached a critical level and the ecosystem processes have been completely modified with an almost complete loss of natural habitat and biota.	8-10	F

Assessing the Anticipated Trajectory of Change
As is the case with the Present State, future threats to the state of the wetland may arise from activities in the catchment upstream of the unit or within the wetland itself or from processes downstream of the wetland. In each of the individual sections for hydrology, geomorphology and vegetation, five potential situations exist depending upon the direction and likely extent of change (table below).

Table C4: Trajectory of Change classes and scores used to evaluate likely future changes to the present state of the wetland.

Change Class	Description	HGM change score	Symbol
Substantial improvement	State is likely to improve substantially over the next 5 years	2	↑↑
Slight improvement	State is likely to improve slightly over the next 5 years	1	↑
Remain stable	State is likely to remain stable over the next 5 years	0	→
Slight deterioration	State is likely to deteriorate slightly over the next 5 years	-1	↓
Substantial deterioration	State is expected to deteriorate substantially over the next 5 years	-2	↓↓

Overall health of the wetland
Once all HGM Units have been assessed, a summary of health for the wetland as a whole needs to be calculated. This is achieved by calculating a combined score for each component by area-weighting the scores calculated for each HGM Unit. Recording the health assessments for the hydrology, geomorphology and vegetation components provide a summary of impacts, Present State, Trajectory of Change and Health for individual HGM Units and for the entire wetland.

4. Watercourse Function Assessment

"The importance of a water resource, in ecological social or economic terms, acts as a modifying or motivating determinant in the selection of the management class".[5] The assessment of the ecosystem services supplied by the identified freshwater features was conducted according to the guidelines as described by Kotze *et al.* (2020). An assessment was undertaken that examines and rates 16 different ecosystem services, selected for their specific relevance to the South African situation, as follows:

- Flood attenuation;
- Stream flow regulation;
- Sediment trapping;
- Phosphate assimilation;
- Nitrate assimilation;
- Toxicant assimilation;
- Erosion control;
- Carbon storage;
- Biodiversity maintenance;
- Provision of water for human use;
- Provision of harvestable resources;
- Food for livestock;
- Provision of cultivated foods;
- Cultural and spiritual experience;
- Tourism and recreation; and
- Education and research.

For each ecosystem service, indicator scores are combined automatically in an algorithm given in the spreadsheet that has been designed to reflect the relative importance and interactions of the attributes represented by the indicators to arrive at an overall supply score. In addition, the demand for the

[5] Department of Water Affairs and Forestry, South Africa Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999

ecosystem service is assessed based on the wetland's catchment context (e.g. toxicant sources upstream), the number of beneficiaries and their level of dependency, which are also all rated on a five-point scale. Again, an algorithm automatically combines the indicator scores relevant to demand to generate a demand score.

*It is important to note that when assessing riparian zones associated with riverine habitats, the contribution of the riparian zone to streamflow regulation is omitted, owing to a lack of relevant studies (Kotze *et al*, 2020).

Table C5: Integrating scores for supply and demand to obtain and overall importance score

Integrating scores for supply & demand to obtain an overall importance score						
		Supply				
		Very Low	Low	Moderate	High	Very High
Demand		0	1	2	3	4
Very Low	0	0,0	0,0	0,5	1,5	2,5
Low	1	0,0	0,0	1,0	2,0	3,0
Moderate	2	0,0	0,5	1,5	2,5	3,5
High	3	0,0	1,0	2,0	3,0	4,0
Very High	4	0,5	1,5	2,5	3,5	4,0

A single overall importance score is generated for each ecosystem service by combining the supply and demand scores. This aggregation therefore places somewhat more emphasis on supply than demand, with the supply score acting as the starting score for a “moderate” demand scenario. The importance score is, however, adjusted by up to one class up where demand is “very high” and by up to one class down where demand is “very low”. The overall importance score can then be used to derive an importance category for reporting purposes.

Table C6: Classes for determining the likely extent to which a benefit is being supplied.

Importance Category		Description
Very Low	0-0.79	The importance of services supplied is very low relative to that supplied by other wetlands.
Low	0.8 – 1.29	The importance of services supplied is low relative to that supplied by other wetlands.
Moderately-Low	1.3 – 1.69	The importance of services supplied is moderately-low relative to that supplied by other wetlands.
Moderate	1.7 – 2.29	The importance of services supplied is moderate relative to that supplied by other wetlands.
Moderately-High	2.3 – 2.69	The importance of services supplied is moderately-high relative to that supplied by other wetlands.
High	2.7 – 3.19	The importance of services supplied is high relative to that supplied by other wetlands.
Very High	3.2 - 4.0	The importance of services supplied is very high relative to that supplied by other wetlands.

5. Ecological Importance and Sensitivity (EIS) (Rountree and Kotze, 2013)

The purpose of assessing importance and sensitivity of water resources is to be able to identify those systems that provide higher than average ecosystem services, biodiversity support functions or are especially sensitive to impacts. Water resources with higher ecological importance may require managing such water resources in a better condition than the present to ensure the continued provision of ecosystem benefits in the long term (Rountree & Kotze, 2013).

In order to align the outputs of the Ecoservices assessment (i.e. ecological and socio-cultural service provision) with methods used by the DWA (now the DWS) used to assess the EIS of other watercourse types, a tool was developed using criteria from both WET-Ecoservices (Kotze, *et, al,* 2009) and earlier

DWA EIA assessment tools. Thus, three proposed suites of important criteria for assessing the Importance and Sensitivity for wetlands were proposed, namely:

- Ecological Importance and Sensitivity, incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWA and thus enabling consistent assessment approaches across water resource types;
- Hydro-functional importance, taking into consideration water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and
- Importance in terms of socio-cultural benefits, including the subsistence and cultural benefits provided by the wetland system.

The highest of these three suites of scores is then used to determine the overall Importance and Sensitivity category (Table C7) of the wetland system being assessed.

Table C7: Ecological Importance and Sensitivity Categories and the interpretation of median scores for biota and habitat determinants (adapted from Kleynhans, 1999).

EIS Category	Range of Mean	Recommended Ecological Management Class
Very high Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications.	>3 and <=4	A
High Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications.	>2 and <=3	B
Moderate Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications.	>1 and <=2	C
Low/marginal Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications.	>0 and <=1	D

6. Recommended Management Objective (RMO) and Recommended Ecological Category (REC) Determination

“A high management class relates to the flow that will ensure a high degree of sustainability and a low risk of ecosystem failure. A low management class will ensure marginal maintenance of sustainability but carries a higher risk of ecosystem failure” (DWA, 1999).

The RMO (table below) was determined based on the results obtained from the PES, reference conditions and EIS of the freshwater resource (sections above), with the objective of either maintaining, or improving the ecological integrity of the watercourse in order to ensure continued ecological functionality.

Table C8: Recommended management objectives (RMO) for water resources based on PES & EIS scores.

PES			Ecological and Importance Sensitivity (EIS)			
			Very High	High	Moderate	Low
	A	Pristine	A Maintain	A Maintain	A Maintain	A Maintain
	B	Natural	A Improve	A/B Improve	B Maintain	B Maintain
	C	Good	A Improve	B/C Improve	C Maintain	C Maintain
	D	Fair	C Improve	C/D Improve	D Maintain	D Maintain
	E/F	Poor	D* Improve	E/F* Improve	E/F* Maintain	E/F* Maintain

***PES Categories E and F are considered ecologically unacceptable (Malan and Day, 2012) and therefore, should a freshwater resource fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category.**

A freshwater resource may receive the same class for the REC as the PES if the freshwater resource is deemed in good condition, and therefore must stay in good condition. Otherwise, an appropriate REC should be assigned in order to prevent any further degradation as well as enhance the PES of the watercourse.

Table C9: Description of Recommended Ecological Category (REC) classes.

Class	Description
A	Unmodified, natural
B	Largely natural with few modifications
C	Moderately modified
D	Largely modified

7. Diatom Sampling Methodology

Diatom slides were prepared through pipetting three drops of the diatom samples onto microscope plates and covering with a microscope cover slide. Diatom taxa were identified to the lowest possible level of identification and diatom valves counted (400 counts) for ecological conclusions to be drawn. Dominant species ecology was inferred from Taylor *et al*. (2007) and Omnidia software (Lecointe *et al.,* 1993) were used to calculate diatom index scores with score interpretation presented in Tables 1 to 4. The following indices were calculated for the present report:

- Specific Pollution sensitivity Index (SPI) (CEMAGREF, 1982) (Tables 1 & 2): This index is the most comprehensive as it includes >1400 species to calculate its final score and provides a measure of organic pollution.
- Generic Diatom Index (GDI) (Coste and Ayphassorho, 1991) (Table 2): Final score is based on genus level and is a measure of organic pollution.
- Trophic Diatom Index (TDI) (Kelly and Whitton, 1995) (Table 3): The index's final score is quantified based on the degree of organic and inorganic pollution.
- Percentage Pollution Tolerant Valves (%PTV) (Kelly and Whitton, 1995) (Table 4): Indicates the diatoms in the sampled community that are tolerant to pollution, thus indicating the degree of eutrophication vs organic pollution. The %PTV score indicates whether nutrients or organic pollution contributed to the TDI final score.

Values for the SPI and GDI were transformed to a score out of 20 where a score of 0 indicates eutrophication and very heavy pollution and a score of 20 indicates no pollution and oligotrophic conditions (Tables C10 & C11). The TDI score is worked off a maximum of 100, where a score of <20% infers that the site is oligotrophic and free from pollution and a score >60% infers that the site is eutrophic with pollution present (Table C12). The %PTV is worked off a maximum score of 100%, where a score of <20% infers that the site is free from organic pollution and a score >60% infers that the site is heavily contaminated with organic pollution (Table C13). For the diatom frustule abnormality assessment, if the percentage of deformed frustules is greater than 2% of the population it is considered that there is

significant impact from either pesticides or metals and further assessment is recommended, especially where mining is a related concern.

Further to the calculated index scores, the diatom results are also discussed based on functional groups (diatom species grouped together based on ecological and morpho-physiological features). Diatoms are grouped and discussed based on life-forms (benthic, colonial, mobile, mucous tubules, pedunculate, pioneer and planktonic), ecological guilds (high profile, low profile, motile), and size classes (Size 1 to Size 5) (Passy, 2007; Rimet & Bouchez, 2011; Viktória *et al*., 2017). Diatoms have adapted to these different groups as a strategy to survive and resist a large set of environmental stressors. Knowledge on these functional groups and diatom ecology allows us to make precise conclusions on environmental health and stressors based on the adaptability of the diatoms.

Table C10: Interpretation of Ecological Categories from the SPI index scores.

Index Score (up to 20)	Ecosystem quality	Ecological Category
18 – 20	High quality	A
17 – 18		A/B
15 – 17	Good quality	B
14 – 15		B/C
12 – 14	Moderate quality	C
10 – 12		C/D
8 – 10	Poor quality	D
6 – 8		D/E
5 – 6	Bad quality	E
4 – 5		E/F
< 4		F

Table C11: Interpretation of both the SPI and GDI scores to determine the Ecosystem Quality and Trophic level of the sampled site.

Index Score (up to 20)	Trophic Level
>17	Oligotrophic (No Pollution)
15 - 17	Oligo-mesotrophic
12 - 15	Mesotrophic
9 - 12	Meso-eutrophic
< 9	Eutrophic

Table C12: Interpretation of the TDI score to determine the Trophic level of the sampled site.

Index Score	Trophic Level
0 – 20	Oligotrophic (No Pollution)
21 – 40	Oligo-mesotrophic
41 – 60	Mesotrophic
61 – 80	Meso-eutrophic
>80	Eutrophic

Table C13: Interpretation of the %PTV score to determine the Ecological Status of the site.

Index Score (up to 20)	Ecological Status
< 20	Site free from organic pollution
21 – 40	Some evidence of organic pollution
41 – 60	Organic pollution likely to contribute to eutrophication
>60	Heavily contaminated with organic pollution

Table C14: Interpretation of the different diatom ecological groups, guilds and size classes.

Category	Name	Key Features	Ecological Role	Typical Habitat	Examples
Functional Group	**Benthic**	Live on/in substrate (sediments, rocks)	Nutrient cycling, biofilm formation	Stream beds, lake bottoms	*Navicula*, *Cymbella*
	Colonial	Form chains or colonies (often planktonic)	Buoyancy, resistance to grazing	Pelagic or littoral zones	*Asterionella*, *Fragilaria*
	Mobile	Glide using raphe	Access to resources, avoid stress	Benthic habitats, biofilms	*Nitzschia*, *Navicula*
	Mucous Tubules	Secrete tubes for protection	Shelter, nutrient filtering	Benthic, periphytic	*Berkeleya*, *Encyonema*
	Pedunculate	Stalked diatoms; elevate above substrate	Avoid burial; better light access	Vegetated, stable benthic zones	*Gomphonema*, *Rhoicosphenia*
	Pioneer	Fast colonizers of new substrates	Early succession species	Recently disturbed surfaces	*Achnanthidium*, *Nitzschia*
	Planktonic	Free-floating in water column	Primary production in open water	Lakes, oceans	*Cyclotella*, *Thalassiosira*
Guild	**High Profile**	Tall, erect, or chain-forming forms	Good light access, sensitive to disturbance	Stable, low-disturbance zones	*Fragilaria*, *Gomphonema*
	Low Profile	Small, adnate, or prostrate	Tolerate disturbance and low light	High-shear or nutrient-poor areas	*Achnanthidium*, *Cocconeis*
	Motile	Glide over substrate	Avoid stress; access nutrients	Fine sediments, biofilms	*Navicula*, *Nitzschia*
Size Class	**Size 1**	Very small (<15 µm)	Tolerant to stress; high surface area	Oligotrophic or disturbed systems	*Achnanthidium minutissimum*
	Size 2	Small (15–30 µm)	Efficient resource use	Common in most environments	*Fragilaria*, *Eunotia*
	Size 3	Medium (30–60 µm)	Balanced traits	Mid-succession or stable zones	*Navicula*, *Cymbella*
	Size 4	Large (60–100 µm)	Competitive in stable, rich habitats	Low flow or high productivity sites	*Gomphonema*, *Surirella*
	Size 5	Very large (>100 µm)	Sensitive; low colonization rate	Undisturbed, nutrient-rich zones	*Gyrosigma*, *Didymosphenia*

APPENDIX D – DWS Risk Assessment Methodology

In order for the proponent to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below.

The first stage of the risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

DWS Risk Assessment Matrix (2023)

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation;
- **Environmental impacts** are the consequences of these impacts on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is;
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems;
- **Resources** include components of the biophysical environment;
- **Intensity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards;
- **Spatial scale** refers to the geographical scale of the impact; and
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria (refer to the table below). The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The intensity, spatial scale and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 75. The likelihood of the impact occurring is determined by assigning a likelihood score of between 20% and 100%. The values for likelihood and consequence of the impact are then read off a significance rating matrix and are used to determine whether control is necessary[6].

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act, 1998 (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

[6] Some risks/impacts that have low significance will however still require control

"RISK ASSESSMENT KEY" (Based on DWS 2023 publication: Section 21 c and i water use Risk Assessment Protocol)

Table D1: Intensity (What is the intensity of the impact on the resource quality - hydrology, water quality, geomorphology, biota?)

Negative impacts	
Negligible / non-harmful; no change in PES	0
Very low / potentially harmful; negligible deterioration in PES (<5% change)	+1
Low / slightly harmful; minor deterioration in PES (<10% change)	+2
Medium / moderately harmful; moderate deterioration in PES (>10% change)	+3
High / severely harmful; large deterioration in PES (by one class or more)	+4
Very high / critically harmful; critical deterioration in PES (to E/F or F class)	+5
Positive impacts	
Negligible; no change in PES	0
Very low / potentially beneficial; negligible improvement in PES (<5% change)	-1
Low / slightly beneficial; minor improvement in PES (<10% change)	-2
Medium / moderately beneficial; moderate improvement in PES (>10% change)	-3
Highly beneficial; large improvement in PES (by one class or more) and/or increase in protection status	-4
Very highly beneficial; improvement to near-natural state (A or A/B class) and/or major increase in protection status	-5

*PES of affected watercourses must be considered when scoring Impact Intensity

Table D2: Spatial Scale (How big is the area that the activity is impacting on, relative to the size of the impacted watercourses).

Very small portion of watercourse/s impacted (<10% of extent)	1
Moderate portion of watercourse/s impacted (10-60% of extent)	2
Large portion of watercourse/s impacted (60-80%)	3
Most or all of watercourse/s impacted (>80%)	4
Impacts extend into watercourses located well beyond the footprint of the activities	5

Table D3: Duration (How long does the aspect impact on the resource quality).

Transient (One day to one month)	1
Short-term (a few months to 5 years) OR repeated infrequently (e.g. annually) for one day to one month	2
Medium-term (5 – 15 years)	3
Long-term (ceases with operational life)	4
Permanent	5

Table D4: Likelihood of impact (What is the probability that the activity will impact on the resource quality).

Improbable / Unlikely	20%
Low probability	40%
Medium probability	60%
Highly probable	80%
Definite / Unknown	100%

Table D5: Rating Classes.

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 29	(L) Low Risk	Acceptable as is or with proposed mitigation measures. Impact to watercourses and resource quality small and easily mitigated, or positive.
30 – 60	M) Moderate Risk	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
61 – 100	(H) High Risk	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

A low risk class must be obtained for all activities to be considered for a GA

Table D6: Calculations.

Intensity = Maximum Intensity Score (negative value for positive impact)	MAX = 5
Severity = Intensity + Spatial Scale + Duration (<Intensity - Spatial Scale - Duration> for positive impact)	MAX = 15 (MIN = -15 for +ve impacts)
Consequence = Severity X Importance rating	MAX = 75
Significance\Risk = (Consequence X Likelihood) X (100/75)	MAX = 100

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
  - Primary project site and related facilities that the client and its contractors develops or controls;
  - Areas potentially impacted by cumulative impacts for further planned development of the project, any existing project or condition and other project-related developments; and
  - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts were assessed for construction phase and operational phase; and
- Individuals or groups who may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status were assessed.

Mitigation Measure Development

The following points present the key concepts considered in the development of control measures for the proposed construction:

- Control and performance improvement measures and actions that address the risks and impacts[7] are identified and described in as much detail as possible. Mitigating measures are investigated according to the impact minimisation hierarchy as follows:
  - Avoidance or prevention of impact;
  - Minimisation of impact;
  - Rehabilitation; and
  - Offsetting.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, control or compensation; and
- Desired outcomes are defined and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, wherever possible.

[7] Mitigation measures should address both positive and negative impacts

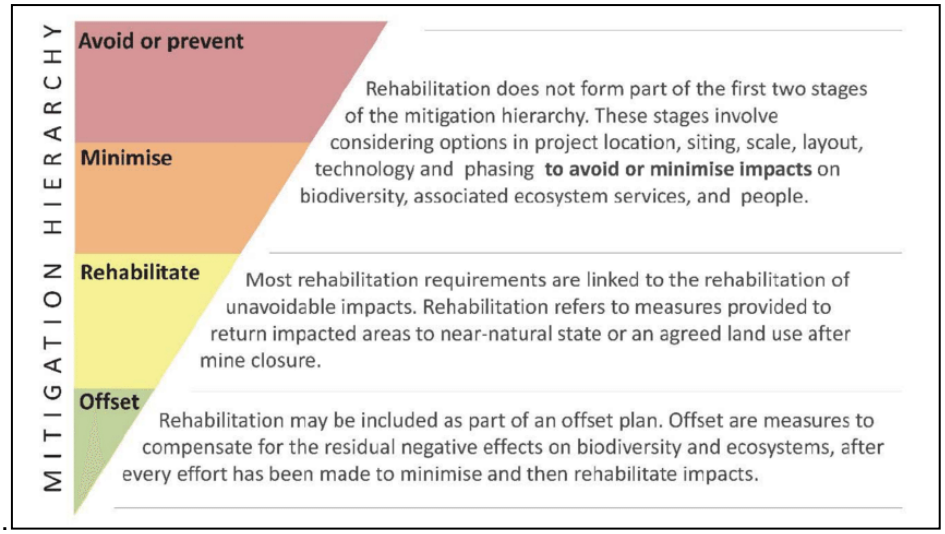


Figure D1: Impact Minimisation hierarchy as advocated by the DEA *et al.* (2013).

Recommendations

Recommendations were developed to address and control potential impacts on the ecology of the freshwater ecosystems traversed by or in close proximity of the proposed development activities.

APPENDIX E – EAP Provided Impact Assessment Methodology

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance. The impact significance rating system is presented in Table E1, Table E2, and Table E3 and involves three parts:

1. **Part A**: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;
2. **Part B**: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and
3. **Part C**: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Table E1: Consequence Rating Methodology

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on the definition of magnitude, spatial extent and duration.

Table E2: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
Magnitude					
Minor	**DURATION**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**DURATION**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**DURATION**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability.

Table E3: Significance Rating Methodology

Probability (of Exposure to Impacts)	Consequence Negative			Consequence Positive		
	Low	Medium	High	Low	Medium	High
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

APPENDIX F - Results of the Field Investigation

PRESENT ECOLOGICAL STATE (PES) AND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) RESULTS

Table F1: Presentation of the results of the WET-Health PES assessment applied to the seep wetlands associated with the proposed activities.

Wetlands	Hydrology		Geomorphology		Vegetation		Overall PES Score
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	
Seeps	2.0	-1	2.4	-2	6.8	-2	3.49 (C)

Table F2: Presentation of the results of the WET-Health PES assessment applied to the depression wetlands associated with the proposed activities.

Wetlands	Hydrology		Geomorphology		Vegetation		Overall PES Score
	Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score	
Depressions	6.5	-2	0.9	-2	3.5	-2	4.04 (D)

Table F3: Presentation of the results of the Ecoservices assessment applied to the freshwater ecosystem associated with the proposed activities.

		Seep Wetlands				Depression Wetlands			
ECOSYSTEM SERVICE		Supply	Demand	Importance Score	Importance	Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0.0	0.1	0.0	Very Low	0.0	0.1	0.0	Very Low
	Stream flow regulation	0.0	0.3	0.0	Very Low	0.0	0.3	0.0	Very Low
	Sediment trapping	0.5	1.0	0.0	Very Low	0.5	1.0	0.0	Very Low
	Erosion control	0.8	1.6	0.1	Very Low	0.8	1.6	0.1	Very Low
	Phosphate assimilation	0.4	1.0	0.0	Very Low	0.4	1.0	0.0	Very Low
	Nitrate assimilation	0.3	1.0	0.0	Very Low	0.3	1.0	0.0	Very Low
	Toxicant assimilation	0.4	0.5	0.0	Very Low	0.4	0.5	0.0	Very Low
	Carbon storage	1.3	2.7	1.1	Low	1.3	2.7	1.1	Low
	Biodiversity maintenance	2.6	2.0	2.1	Moderate	2.6	2.0	2.1	Moderate
PROVISIONING SERVICES	Water for human use	2.0	0.7	0.8	Low	2.0	0.7	0.8	Low
	Harvestable resources	1.5	0.0	0.0	Very Low	1.5	0.0	0.0	Very Low
	Food for livestock	2.0	0.0	0.5	Very Low	2.0	0.0	0.5	Very Low
	Cultivated foods	2.3	0.3	1.0	Low	2.3	0.3	1.0	Low
CULTURAL SERVICES	Tourism and Recreation	0.6	0.0	0.0	Very Low	0.6	0.0	0.0	Very Low
	Education and Research	0.5	0.0	0.0	Very Low	0.5	0.0	0.0	Very Low
	Cultural and Spiritual	1.0	0.0	0.0	Very Low	1.0	0.0	0.0	Very Low

Table F4: Presentation of the results of the EIS assessment applied to the freshwater ecosystems associated with the proposed activities.

Ecological Importance and Sensitivity			Seep wetlands	Depression wetlands
			Score (0-4)	Score (0-4)
Biodiversity support			A (average)	A (average)
			2.00	2.00
Presence of Red Data species			1	1
Populations of unique species			2	2
Migration/breeding/feeding sites			3	3
Landscape scale			B (average)	B (average)
			2.00	2.00
Protection status of the wetland			2	2
Protection status of the vegetation type			2	2
Regional context of the ecological integrity			1	2
Size and rarity of the wetland type/s present			2	2
Diversity of habitat types			3	2
Sensitivity of the wetland			C (average)	C (average)
			2.00	1,00
Sensitivity to changes in floods			4	1
Sensitivity to changes in low flows/dry season			1	1
Sensitivity to changes in water quality			1	1
Hydro-Functional Importance			Score (0-4)	Score (0-4)
			2,00	2,00
Regulating & supporting benefits	**Flood attenuation**		1	2
	Streamflow regulation		1	2
	Water Quality Enhancement	***Sediment trapping***	3	2
		Phosphate assimilation	2	2
		Nitrate assimilation	2	2
		Toxicant assimilation	2	2
		Erosion control	2	3
	Carbon storage		3	3
Direct Human Benefits			Score (0-4)	Score (0-4)
			0,67	0,83
Subsistence benefits	***Water for human use***		1	2
	Harvestable resources		2	2
	Cultivated foods		1	1
Cultural benefits	***Cultural heritage***		0	0
	Tourism and recreation		0	0
	Education and research		0	0

APPENDIX G – Risk Assessment Results

Table G1: Summary of the scorings of the DWS risk assessment matrix (2023) applied to the freshwater ecosystems within the study area.

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity	Spatial scale	Duration	Severity	Importance rating	Consequence	Likelihood	Significance	Risk Rating	Confidence level
						Abiotic Habitat (Drivers)			Biota (Responses)											
			Name/s	PES	Overall Watercourse Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
OPERATIONAL	Operation of the underground mining area related to the undermining of the freshwater ecosystems.	• Potential creation of a cone of depression, which may drain water from the wetlands, thus resulting in desiccation of the systems.	Seeps	C	Moderate	1	2	1	1	1	**4**	2	4	**10**	**3**	**30**	40%	**12**	L	High
			Depressions	D	Moderate	1	2	1	1	1	**4**	2	4	**10**	**3**	**30**	40%	**12**	L	High
		• Potential destabilisation of the surrounding environment through the extraction of ore and subsequent potential subsidence of the land.	Seeps	C	Moderate	2	3	2	2	1	**6**	2	3	**11**	**3**	**33**	60%	**19.8**	L	High
			Depressions	D	Moderate	2	3	2	2	1	**6**	2	3	**11**	**3**	**33**	60%	**19.8**	L	High
CLOSURE/POST-CLOSURE	Post-closure management activities. (Decant of contaminated water from the rehabilitated mine area into the receiving environment subject to confirmation by a suitably qualified geohydrologist).	• Contamination of water within the receiving environment, and subsequent reduction in water quality (increase in salts and specific contaminants of concern and reduced pH); • Subsequent negative impacts on biota and vegetation; • Altered flow regimes (increased hydroperiod); and • Habitat degradation.	Seeps	C	Moderate	2	2	2	2	2	**4**	2	2	**8**	**3**	**24**	40%	**9.6**	L	Medium
			Depressions	D	Moderate	2	2	2	2	2	**4**	2	2	**8**	**3**	**24**	40%	**9.6**	L	Medium

APPENDIX H – Specialist information

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

1. (a) (i) Details of the specialist who prepared the report

Cathrine-Rose De Freitas	MSc Geography and Environmental Studies (Stellenbosch University)
Dr Anrich Kock	PhD Environmental Sciences (North-West University)
Kristen Coertze	MSc (Botany) (University of the Free State)
Stephen van Staden	MSc (Environmental Management) (University of Johannesburg)

1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview, 2007		
Postal code:	1401	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Natural Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health Practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Cathrine-Rose De Freitas, declare that -

- I act as the **independent freshwater specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.

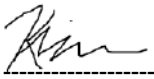


Signature of the Specialist

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Kristen Coertze, declare that -

- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Signature of the Specialist

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Dr. Anrich Kock, declare that -

- I act as the **independent Aquatic specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Signature of the Specialist

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Stephen van Staden, declare that -

- I act as the **independent Aquatic specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES –

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health Practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000

Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

Freshwater Assessments

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Biodiversity Offset Plan

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Hydropedological Assessment

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES –

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF KRISTEN COERTZE

PERSONAL DETAILS

Position in Company	Freshwater Ecologist
Joined SAS Environmental Group of Companies	2021

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional Scientist at South African Council for Natural Scientific Professions (Pri.Sci.Nat #146386)
Member of the Gauteng Wetland Forum
Member of the Grassland Society of Southern Africa
Member of the South African Wetland Society
Golden Key Honorary Society

EDUCATION

Qualifications

MSc Botany (University of the Free State)	2023
BSc (Hons) Environmental Science (University of the Free State)	2019
BSc Geography and Environmental Science (University of the Free State)	2018

AREAS OF WORK EXPERIENCE

South Africa – Free State, Western Cape, Northern Cape, North West, Gauteng, Mpumalanga, Limpopo Provinces.
Central Africa – Democratic Republic of Congo (DRC), Malawi

DEVELOPMENT SECTORS OF EXPERIENCE

1. Linear developments (energy transmission, telecommunication, pipelines, roads)
2. Renewable energy (wind and solar)
3. Commercial development
4. Residential development
5. Industrial/chemical
6. Mining: Cole, chrome Platinum Group Metals (PGMs)
7. Agriculture

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Freshwater Offset Plan
- Maintenance and Management Plans
- Plant Species and Landscape Plans

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use License Applications / General Authorisations)

SAS ENVIRONMENTAL GROUP OF COMPANIES –

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CATHRINE-ROSE DE FREITAS

PERSONAL DETAILS

Position in Company	Wetland Ecologist
Joined SAS Environmental Group of Companies	2024

AFFILIATIONS

Board member of the Western Cape Wetlands Forum (WCWF)
Member of the International Society of Wetland Scientists
Professional Scientist at South African Council for Natural Scientific Professions - pending

EDUCATION

Qualifications

MSc Geography and Environmental Studies (Stellenbosch University)	2022
BSc Hons Environmental Monitoring and Modelling (Unisa)	2020
BSc Environmental Management, majoring in Botany (Unisa)	2017

Short Courses

IAIAsa Introductory EIA report writing course	2020

AREAS OF WORK EXPERIENCE

South Africa – Western Cape, Eastern Cape, Northern Cape, Free State

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Wetland Monitoring Plans
- Maintenance and Management Plans
- Rehabilitation Assessment / Planning
- Plant Species and Landscape Plans

GIS Assessments

- Spatial analysis and geoprocessing
- Freshwater ecosystem mapping

PUBLICATIONS

- De Freitas, C., & Grenfell, S. (2024). Event-scale suspended sediment fluxes in a dryland environment valley-bottom wetland: Implications for downstream sediment and phosphorous fluxes. *Geomorphology*, *452*, 109101.

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION
CURRICULUM VITAE OF ANRICH KOCK

PERSONAL DETAILS

Position in Company	Aquatic Ecologist
Joined SAS Environmental Group of Companies	2022

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional Scientist at South African Council for Natural Scientific Professions (Pri.Sci.Nat)
Member of the Southern African Society of Aquatic Research (SASAqS) since 2014
Member and council member of the International Diatom Society

EDUCATION

Qualifications

PhD Environmental Sciences (North-West University)	2020
MSc Environmental Sciences (North-West University)	2016
BSc Environmental Sciences (Hons) (North-West University)	2014
BSc Environmental and Biological Sciences (North-West University)	2013

AREAS OF WORK EXPERIENCE

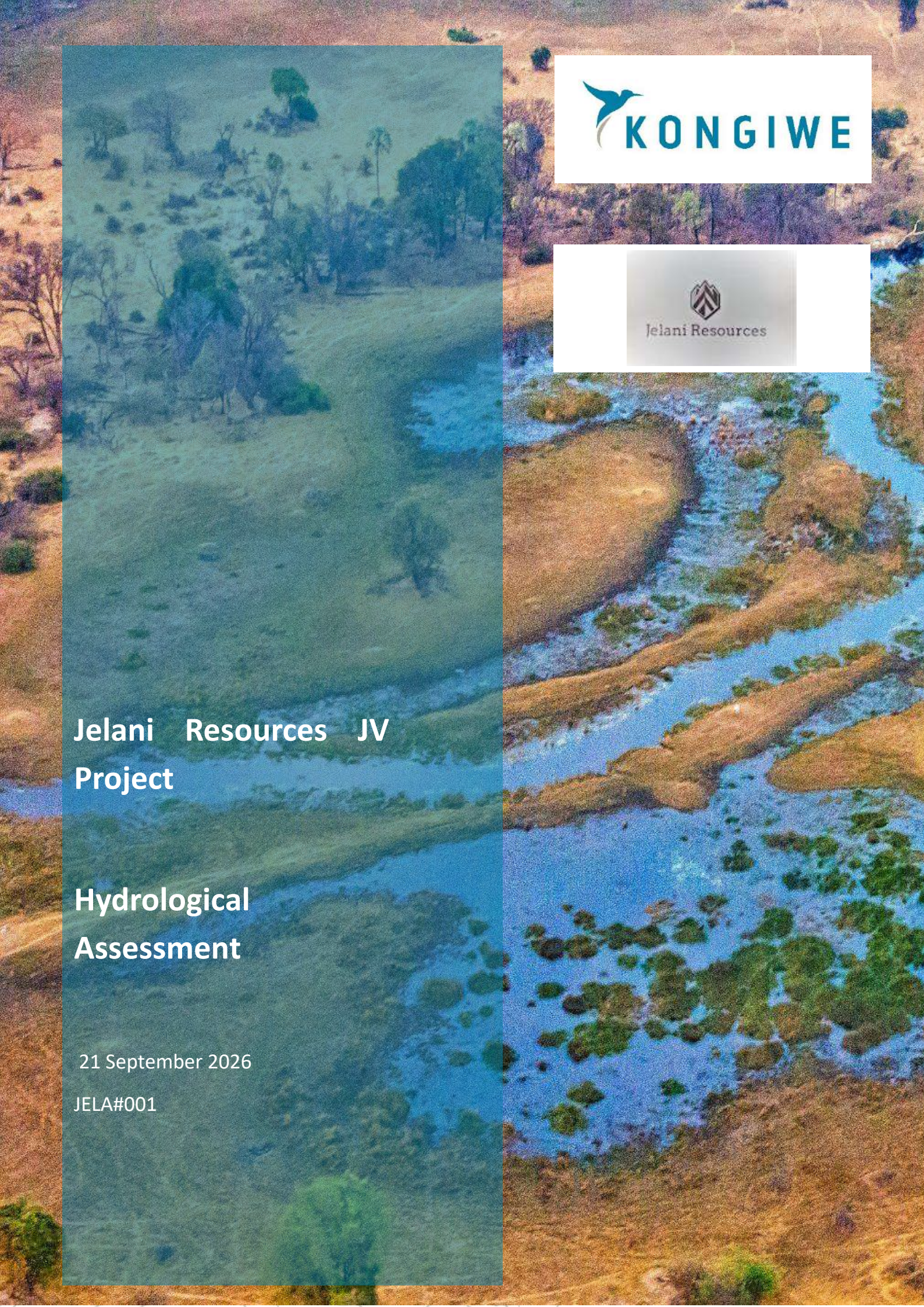
South Africa – Gauteng, Free State, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Western Cape, Eastern Cape
Central Africa – Democratic Republic of the Congo

KEY SPECIALIST DISCIPLINES

Aquatic Ecological Assessment and Water Quality Studies

- Diatom Biomonitoring, Ecology & Ecotoxicology
- Riverine and Wetland Biomonitoring
- Fish Assemblage Integrity Index (FRAI)
- Water Quality Monitoring
- Sediment Assessment
- Habitat Assessment Indices (IHAS)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Toxicological Analysis
- Riverine Rehabilitation Plans

Appendix D5 - Hydrological Report



Jelani Resources JV Project

Hydrological Assessment

21 September 2026

JELA#001

Report Preparation By

Kongiwe Environmental (Pty) Ltd	
Registration Number	2016/135562/07
Telephone Number	+27 (10) 140 6508
Email	info@kongiwe.com
Registered Address	150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Website	www.kongiwe.com

Report Information

Project Name	Jelani Resources JV Project
Project Code	JELA#001
Report Title	Hydrological Assessment
Client	Jelani Resources (Pty) Ltd
File Reference	
Compilation Date	21 September 2026
Status of Report	V2 - Final

Approval

Verification	Capacity	Name	Signature	Date
By Author	Professional Engineer	Hilton Sparks		21 September 2026
Reviewed by	Engineer	Mutondwa Mushaathoni		21 September 2026
Reviewed and approved by	Professional Engineer	H D N Sparks PrEng 740604		21 September 2026

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Executive Summary

This hydrological study analyses the surface water and flood risks for the Jelani Project, to support environmental and water use licensing initiatives. By modelling 1:50 and 1:100-year events and assessing site-specific features, the study identifies potential impacts and proposes mitigating engineering solutions.

Key Findings:

- Site Context
  - The topography of the Jelani Project is flat, with an average slope of less than 3 %. The only areas where steep slopes occur, are along the sides of the TSFs and WRDs outside the Project area. Several natural occurring pans characterise the landscape, resulting in much of the area of the Jelani Project being endoreic (i.e. not discharging into any of the surrounding river systems).
- Flood Analysis:
  - Modelling indicated that the Swartpan/Emergency Overflow Dam/Blue RWD/North-west RWD are at risk of inundation during peak 1 :50 year and 1:100-year events, requiring mitigation.
- Stormwater Management:
  - The existing capacity of the Swartpan Open Bypass Channel is inadequate for the 1:50 and 1:100-year events, necessitating intervention.

Recommendations:

- The proposed solution separates the “clean” and “dirty” water impacting the Jelani Project Area. The “clean” water from the catchment area is collected by means of earth berms and an open by-pass channel and transferred to Swartpan, which is now a “clean” water pan. Swartpan has an attenuation effect even if it is full, and the resultant outflow hydrographs are routed down the natural watercourse downstream of Swartpan to Pan A. Floodlines are provided for this natural watercourse.
- The open by-pass channel to Swartpan will have to be cleaned out and protected by unreinforced concrete lining to prevent scouring and erosion.
- The “dirty” water in now confined to the North-west RWD, Blue RWD and Emergency Overflow Dam, which must be operated at a level to allow sufficient spare capacity to accommodate the 1:50-year event runoff.
- Construct containment berms around potential pollution-generating areas to prevent contamination of nearby water resources throughout the construction and operational phases of the Life of Mine.

The proposed clean- and dirty-water separation system is considered conceptually feasible, subject to confirmation of the available storage capacity and operating levels of the relevant return-water dams, verification of the channel dimensions and condition, confirmation of infrastructure ownership and authorisation, and completion of detailed design. The floodlines presented in Section 4.4.3 are indicative only and should not be regarded as formal or final floodline delineations.

This report confirms that with the implementation of the recommended design changes and management plans, the project can be developed safely while managing hydrological impacts effectively.

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Abbreviations and Units

Abbreviation	Description
DTM	Digital Terrain Model
ELU	Existing Lawful Use
hr	Hour
IWULA	Integrated Water Use Licence Application
km	Kilometers
LoM	Life of Mine
m	Metres
mamsl	metres above mean sea level
MAP	Mean Annual Precipitation
min	Minute
mm	Millimetres
mm/a	Millimetres per annum
NWA	National Water Act (Act No 36 of 1998)
PCD	Pollution Control Dam
Pr CPM	Professional Construction and Project Manager
Pr Eng	Professional Engineer
RWD	Return Water Dam
SANRAL	South African National Roads Agency Limited
SAWS	South African Weather Service
S-Pan	Symons Pan
SWMP	Stormwater Management Plan
Tc	Time of Concentration
TSF	Tailings Storage Facility
WRD	Waste Rock Dump
yr	Year

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1. INTRODUCTION AND BACKGROUND

1.1 Terms of Reference

Kongiwe Environmental (Pty) Ltd (Kongiwe) was appointed by Jelani Resources (Pty) Limited (Jelani) to undertake the required Consultancy Services for Environmental Authorisation and Water Use License for the proposed Jelani Resources JV Project in Free State Province (hereafter referred to as the "Project"). This report provides the Hydrological Assessment of the proposed site.

1.2 Project Description

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Operations (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate **underground mining operations** within the same area (hereafter the Jelani Project).

The Jelani Project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target).
- Silver ore.
- Uranium ore.
- Sulphur.
- Platinum Group Metals.
- Rare earths.
- Diamonds (alluvial).
- Copper ore.
- Cobalt ore.
- Manganese ore.
- Molybdenum ore.
- Nickel ore.
- Lead ore.
- Tungsten ore.
- Zinc ore.
- Iron ore.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1,200 mbs). As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

Ore will be transported to the shaft ore pass system using conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mine's life, be used for the movement of men, material and rock depending on which phase the mine is in.

Project Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Operations mining right area. No new operational mining infrastructure is planned within the JV project area. Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory and operational functions associated with the respective underground mining operations/targets. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished.

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated with the Proposed Project will be relocated to this shaft.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m^2), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony.

1.2.1 Locality

1.2.1.1 Local Orientation

The Project area is situated immediately adjacent to and west of the Harmony Gold Target Operations, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality. Please refer to Figure 1 for the Jelani Project local orientation, and Figure 2 for the Project Regional orientation.

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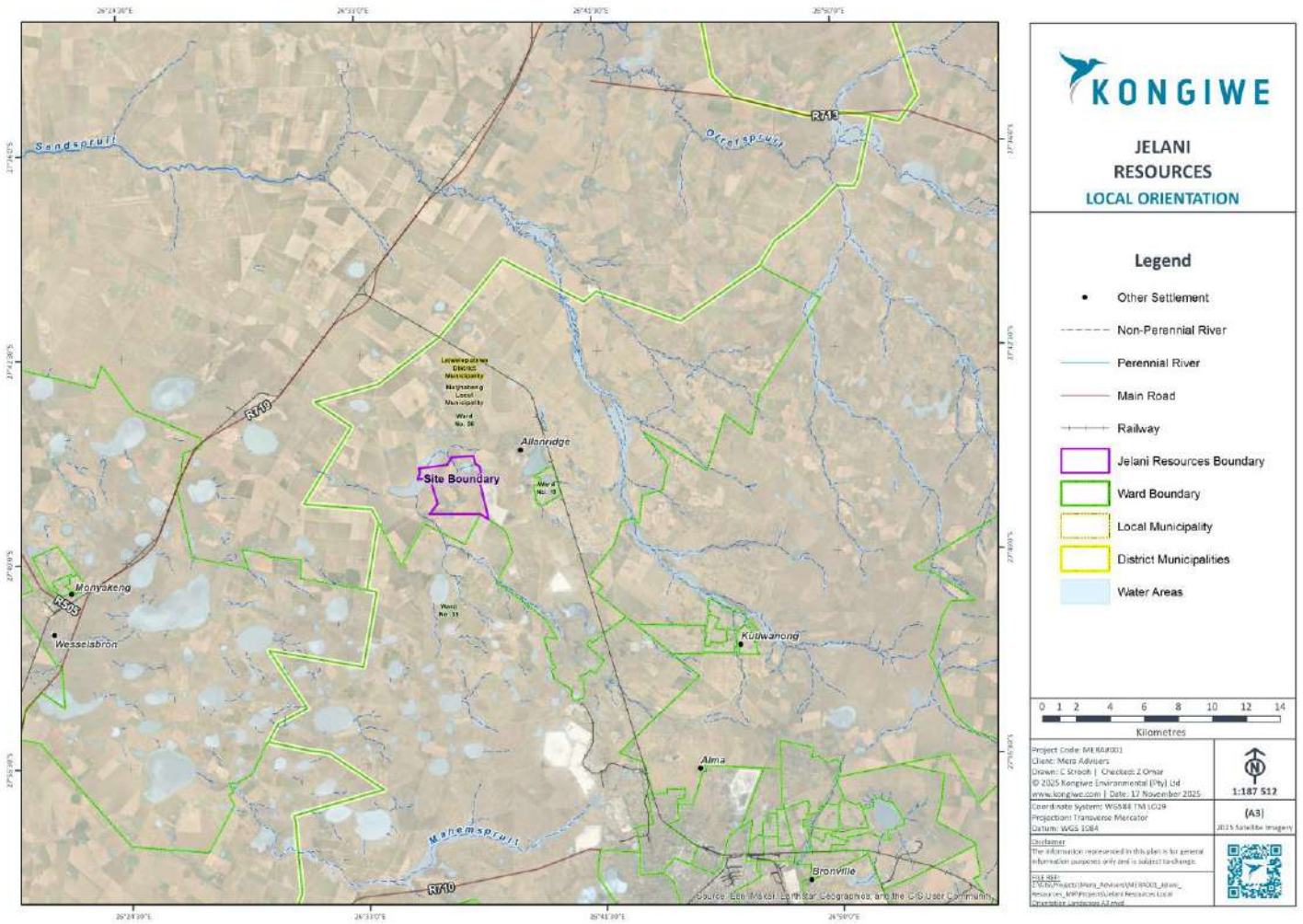


Figure 1 : Local Orientation Map

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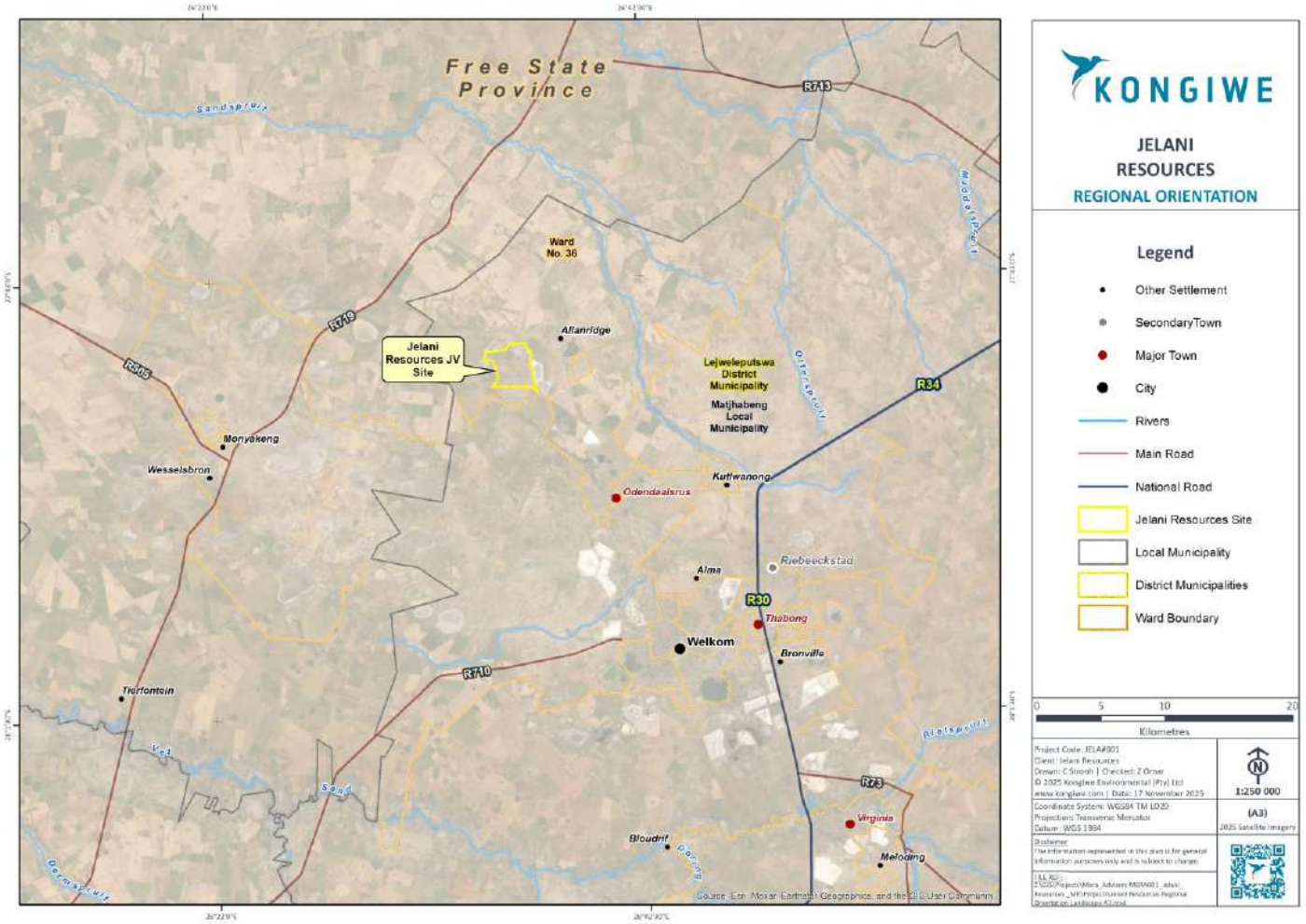


Figure 2 : Regional Orientation Map

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1.3 Mining Activities

1.3.1 Surrounding Resources

The Jelani Project is adjacent to the Target Operation owned by Harmony Gold Mining Company Limited.

Underground mining at the Target Operations was initiated in 1950. Ore is hoisted to surface at the Target 1 Shaft, and the depths of the underground workings are approximately 2 500 m below ground level. Operations at Target 2 Shaft ceased during 2009 and the underground workings have been flooded. Operations at Target 3 Shaft ceased in September 2014 and the shaft is currently under care and maintenance. This shaft continues to pump water from the underground workings to maintain safe operations at Target 1 Shaft, as these two shafts are connected via their underground workings. The Target Plant is situated south of the Target 1 Shaft, where mined ore and waste rock from the WRDs is processed. Tailings from the plant is deposited on the Target 1 and 2 TSF Complex. The approximate Life of Mine for the current operations is until 2027.

Figure 3 shows the surrounding resources, and Figure 4 shows the project area relative to the Target Operations.

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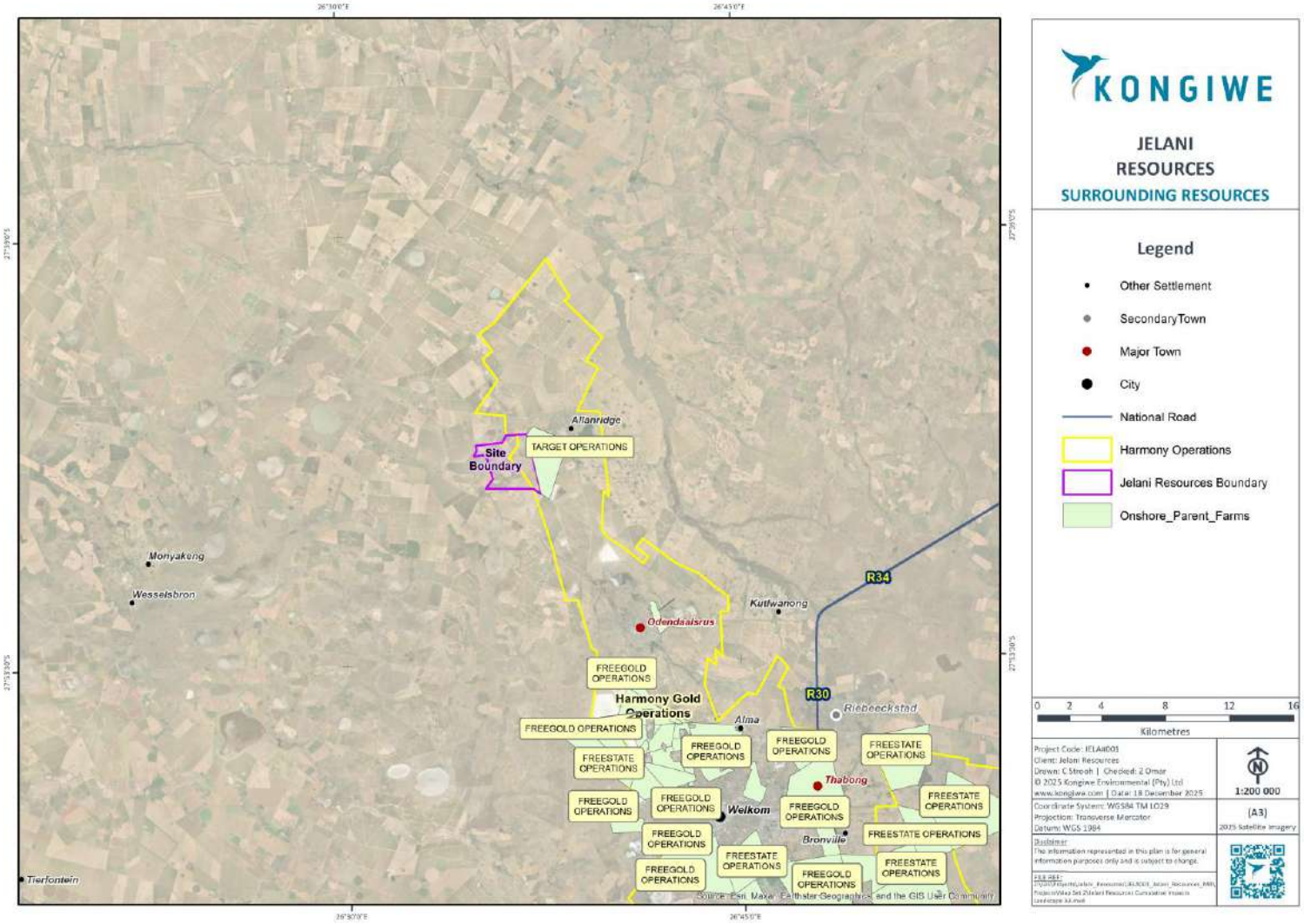


Figure 3: Surrounding Resources

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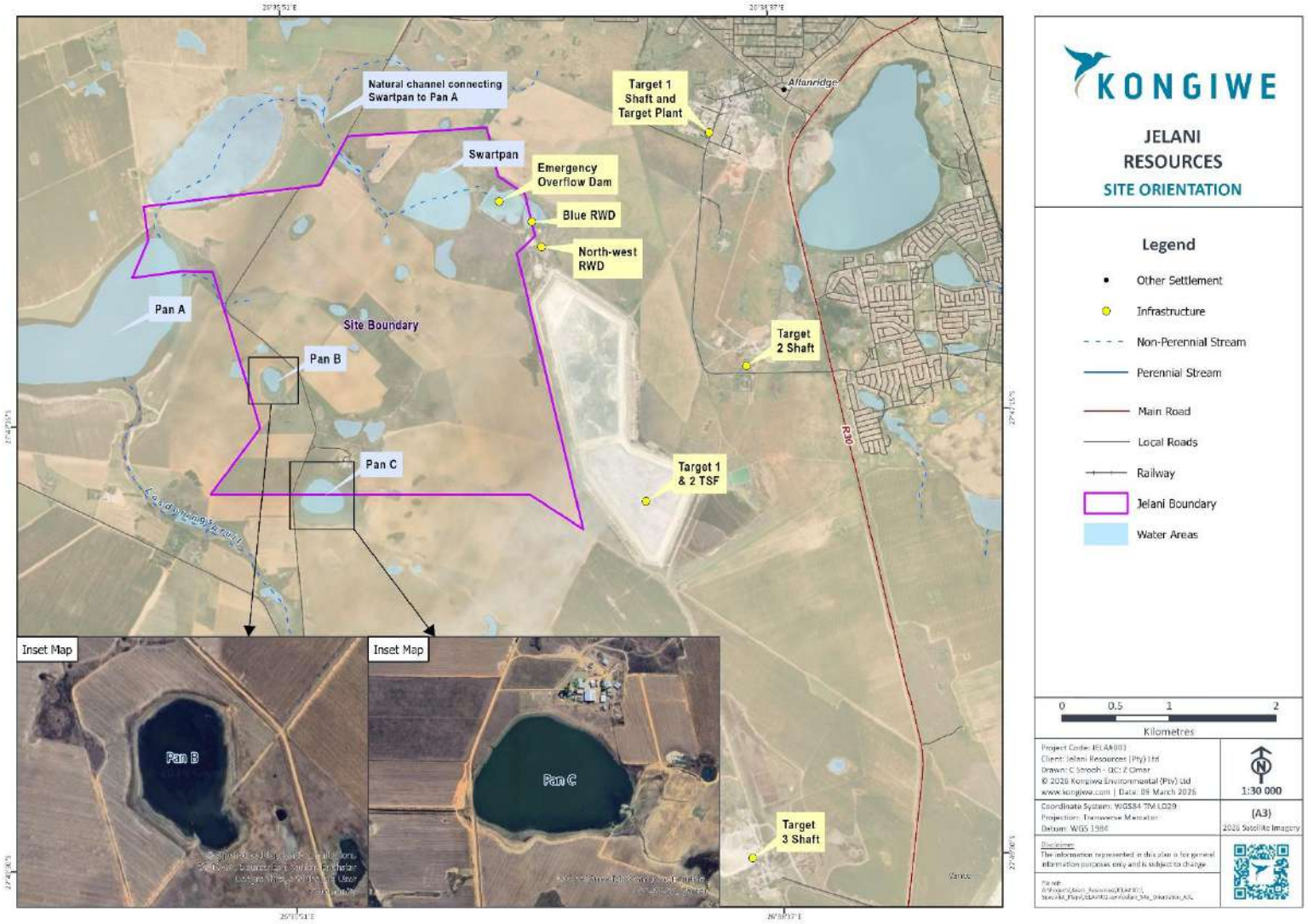


Figure 4: Site Orientation

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1.4 Terminology

The following terminology is relevant to this study and is defined below:

- Activity:
  - Any mining related process on the mine including the operation of washing plants, mineral processing facilities, mineral refineries and extraction plants.
  - The operation and the use of mineral loading and off-loading zones, transport facilities and mineral storage yards, whether situated at the mine or not,
    - in which any substance is stockpiled, stored, accumulated or transported for use in such process; or
    - out of which process any residue is derived, stored, stockpiled, accumulated, dumped, disposed of or transported.
- Clean area:
  - This refers to any area at or near a mine or activity that is unaffected by mining activities.
- Clean water system:
  - This includes any dam, other form of impoundment, canal, works, pipeline and any other structure or facility constructed for the retention or conveyance of clean unpolluted water.
- Dam:
  - This includes any return water dam, settling dam, tailings dam, evaporation dam, catchment or barrier dam and any other form of impoundment used for the storage of unpolluted water or water containing waste.
- Dirty area:
  - This refers to any area at a mine or activity which causes, has caused or is likely to cause pollution of a water resource (i.e. areas that generate contaminated water from mining activities).
- Dirty water system:
  - This includes any dam, other form of impoundment, canal, works, pipeline, residue deposit and any other structure or facility constructed for the retention or conveyance of water containing waste.
- Watercourse:
  - This is defined in the NWA as:
    - A river or spring.
    - A natural channel in which water flows regularly or intermittently.
    - A wetland, lake or dam into which, or from which, water flows.
    - Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

1.5 Legal Requirements and Guidelines

The following key legislative requirements and guidelines are applicable to this study:

- National Water Act (Act No. 36 of 1998) (NWA):
  - Regulations on the Use of Water for Mining and Related Activities aimed at the Protection of Water Resources (published under Government Notice 704 (GN R704) in Government Gazette 20119, on 4 June 1999). In particular:
    - Regulation 6: Which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained and operated to ensure conveyance and/or containment of

flows of a 1:50-year event. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8 m above full supply level.

- Regulation 7: Which refers to measures which must be taken to protect water resources. All dirty water or substances which may cause pollution of a water resource (through spillage, seepage, erosion, etc.), must be prevented from doing so. Additionally, dirty water should be recycled and reused as far as practicable.

- Department of Water and Sanitation (DWS) Best Practice Guideline (BPG) documents, particularly, BPG G1: Storm Water Management.

1.6 Details of the Specialist

The study was undertaken by Hilton David Neville Sparks who is a Professional Engineer at Kongiwe. Hilton graduated with a Bachelor of Science (BSc) in Engineering in 1969. He is registered as a Professional Engineer (Pr Eng) (Registration Number 740604) with the Engineering Council of South Africa (ECSA). Work experience includes rainfall – runoff modelling, floodline determinations, attenuation dam analysis, water network analysis, water and sanitation master plans, and development of stormwater management plans, as well as general engineering work. Hilton has more than 54 years' experience and has worked on projects around South Africa.

2. SCOPE OF WORK

The scope of work includes the following:

- Undertake site investigations to locate and assess the current stormwater measures, as well as to assess areas where stormwater measures may be required.
- Delineate the clean and dirty water areas.
- Provide stormwater measures and recommendations for areas that require interventions.
- Provide conceptual sizing's for the proposed stormwater measures in line with GN 704 regulations.

3. BASELINE HYDROLOGY

3.1 Site Investigation

Site investigations of the Jelani Project were undertaken on 28 -29 January 2026.

The purpose of the site investigations was to locate and assess the current stormwater measures, as well as to assess areas where stormwater measures may be required.

3.2 Climate

3.2.1 Rainfall

The mean monthly rainfall for the Welkom (0364300 W) weather station between October 1920 – March 2022 is shown in Table 1. Rainfall is highest over the summer months of October to April, with December and January generally being the wettest months. Very little rainfall falls over the winter months.

Table 1 : Monthly Rainfall Data for Welkom (0364300 W)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Rainfall (mm)	45	63	72	84	66	68	42	17	7	6	8	14	492

3.2.2 Storm Rainfall Depths

The storm rainfall depths, which are required to calculate the peak flows, were extracted using the Design Rainfall Estimation in South Africa software programme. The programme uses the six closest rainfall stations (See Table 2) to the user specified coordinates, to calculate the storm rainfall depths for that site. Storm rainfall depths were extracted at the centre of the project area (27°47' S, 26°37' E). The storm rainfall depths are indicated in Table 3.

Table 2 : Six Closest Rainfall Stations to the Project

Station Name	Station No.	Latitude	Longitude	MAP (mm)	Altitude (mamsl)
Odendaalsrus	0364322_W	27°52'	26°41'	497	1 330
Hanoverspan	0364093_W	27°33'	26°34'	512	1 295
Mahemispruit	0364119_W	27°59'	26°34'	514	1 299
Newlands	0364562_W	27°52'	26°49'	518	1 349
Hoopvlei	0363868_W	27°58'	26°28'	492	1 294
Richmond Noord	0364546_W	27°36'	26°49'	489	1 308

Table 3 : Storm Rainfall Depths for the Project Area

Storm Duration	Return Period/Storm Rainfall Depth (mm)						
min/hr/day	1:2yr	1:5yr	1:10yr	1:20yr	1:50yr	1:100yr	1:200yr
5 min	9.0	12.2	14.4	16.5	19.5	21.8	24.2
10 min	13.4	18.1	21.3	24.6	28.9	32.4	36.9
15 min	16.9	22.8	26.9	31.0	36.5	40.8	45.2
30 min	21.3	28.8	34.0	39.2	46.2	51.6	57.2
45 min	24.5	33.1	39.1	45.0	53.0	59.3	65.7
1 hr	27.0	36.5	43.1	49.6	58.5	65.4	72.4
1.5 hr	31.0	41.9	49.4	57.0	67.1	75.0	83.2
2 hr	34.2	46.2	54.5	62.8	74.0	82.7	91.7
4 hr	39.7	53.7	63.4	73.0	86.0	96.1	106.6
6 hr	43.4	58.6	69.2	79.7	93.9	104.9	116.3
8 hr	46.2	62.4	73.6	84.8	99.9	111.7	123.8
10 hr	48.5	65.5	77.3	89.0	104.9	117.2	129.9
12 hr	50.4	68.1	80.4	92.6	109.1	121.9	135.2
16 hr	53.7	72.5	85.5	98.5	116.1	129.8	143.9
20 hr	56.3	76.1	89.8	103.4	121.8	136.2	151.0
24 hr	58.6	79.1	93.4	107.6	126.7	141.7	157.1
1 day	48.7	65.8	77.7	89.4	105.4	117.8	130.6
2 days	59.9	80.9	95.4	109.9	129.5	144.8	160.5
3 days	67.5	91.2	107.6	124.0	146.1	163.3	181.0

4 days	73.3	99.0	116.9	134.6	158.6	177.3	196.6
5 days	77.6	104.8	123.7	142.5	167.9	187.7	208.1
6 days	81.9	110.7	130.6	150.4	177.2	198.1	219.6
7 days	85.1	114.9	135.6	156.2	184.1	205.8	228.1

3.2.3 Evaporation

Mean monthly S-Pan evaporation data for the study area, was obtained from the DWS weather station C4E002, located at the Erfenis Dam. S-Pan evaporation was converted into open water evaporation, by multiplying by monthly pan factors obtained from the WR90 study. This was done, as the water temperatures in an S-Pan are higher than that of open water bodies (e.g. dams), resulting in higher evaporation rates. Table 4 provides the monthly evaporation adopted for the study area. Evaporation is highest over the warmer months of October to March, and lowest over the cooler months of May to August.

Table 4: Evaporation data for the area

Month	C4E002 S-Pan Evaporation (mm)	Pan Factor	Open Water Evaporation (mm)
October	210	0.84	176
November	233	0.88	205
December	257	0.88	226
January	246	0.88	216
February	191	0.87	166
March	173	0.85	147
April	124	0.83	103
May	98	0.81	79
June	75	0.81	61
July	86	0.81	70
August	122	0.82	100
September	173	0.83	144
Total	**1 988**	**N/A**	**1 694**

3.3 Hydrological Setting

3.3.1 Regional Catchments and Drainage

The DWS has divided South Africa into primary, secondary, tertiary and quaternary catchments. Primary catchments are the largest defined catchments for South Africa, of which there are 22, and are assigned a letter ranging from A – X (excluding O). Secondary catchments are subdivisions of the primary catchments and are the second largest catchments in South Africa and are assigned the primary catchment letter within which they are located and a number e.g. C2 (secondary catchment 2 located within primary catchment C). Similarly, tertiary catchments are subdivisions of secondary catchments and are represented for example by C21 (tertiary catchment 1 located within secondary catchment C2). Lastly, quaternary catchments are the smallest defined

catchments and are assigned the tertiary catchment number, along with a quaternary catchment letter e.g. C21D (quaternary catchment D located within tertiary catchment C21).

Further to the above, the DWS has divided South Africa into 6 Water Management Areas (WMAs), that is, the Breede-Olifants, Inkomati-Usuthu, Limpopo-Olifants, Mzimvubu-Tsitsikamma, Pongola-Mtamvuna and Vaal-Orange WMAs. .

The Project area is predominantly located within the Vaal-Orange WMA and within quaternary catchment C25B.

Several natural occurring pans characterise the landscape. The Losdoringspruit is located to the west of the project area within the C25B quaternary catchment. (See Figure 5).

3.3.2 Topography

The elevation of the Jelani Project varies from a high of 1 310 metres above mean sea level (mamsl) in the north-eastern corner, to a low of 1 298 mamsl at Pan A on the western boundary. The topography of the Jelani Project is flat, with an average slope of less than 3 %. The only areas where steep slopes occur, are along the sides of the TSFs and WRDs outside the Project area. (See Figure 6).

The Jelani Project drain towards the Losdoringspruit and Pan A. Several natural occurring pans characterise the landscape, resulting in much of the area of the Jelani Project being endoreic (i.e. not discharging into any of the surrounding river systems).

3.3.3 Soil Classification

The land type database of South Africa (Land Type Survey Staff, 1972 - 2006), which consists of areas of homogeneous, unique combinations of terrain type, soil pattern and macro climate zone (Paterson et al., 2015), was used to provide an indication of the soils covering the Jelani Project area (See Figure 7). The dominant land types include the following:

- Ae40 – Red yellow Apedal, freely drained soils.
- Dc9 – Soils in which prismacutanic and/or pedocutanic diagnostic horizons are dominant.

3.3.4 Land Cover/Use

Land Use data form an important component in the hydrological assessment undertaken to calculate the peak flows. The South African National Land Cover (SANLC) Dataset (2020) was used to assess the land use characteristics of the catchments.

A review of Google Earth imagery as well as the National Land Cover Dataset, which is shown on Figure 8, indicated that the Jelani Project consist mostly of cultivated land and grasslands.

3.3.5 Wetlands

A total of 12 wetland units were identified within the Jelani Area. Much of the area of the Jelani Projects is endoreic (i.e. not discharging into any of the surrounding river systems). There is one drainage line through Swartpan, down a natural channel to an unnamed Pan (Pan A) (See Figure 9).

3.3.6 Geology

The Jelani area is located adjacent to the Target Operations lease area in the northwestern portion of the Free State Goldfield (locally also referred to as the Welkom Goldfield). The Free State Goldfield is in a northward-striking, synclinal structure which is split near its axis by two major faults that structurally divide the Goldfield into a western (Odendaalsrus) and eastern (Virginia) section around the centrally situated De Bron Horst (Minter et al., 1986).

The pre-dominant geological formations are (See Figure 10):

- Pvo – Volksrust formation.
- N-Qg – Alluvium, Colluvium, Eluvium, Gravel, Scree, Sand, Soil, Debris.
- ANal – Allanridge Formation.

3.3.7 Vegetation

The vegetation within the project area comprises the following vegetation types (See Figure 11):

- Gh10 – Vaal-Vet Sandy Grassland.
- Gh9 – Western Free State Clay Grassland

3.3.8 Roads

The R30 provincial road is located to the east of the Project area. There is a local road that traverses the site. See Figure 12.

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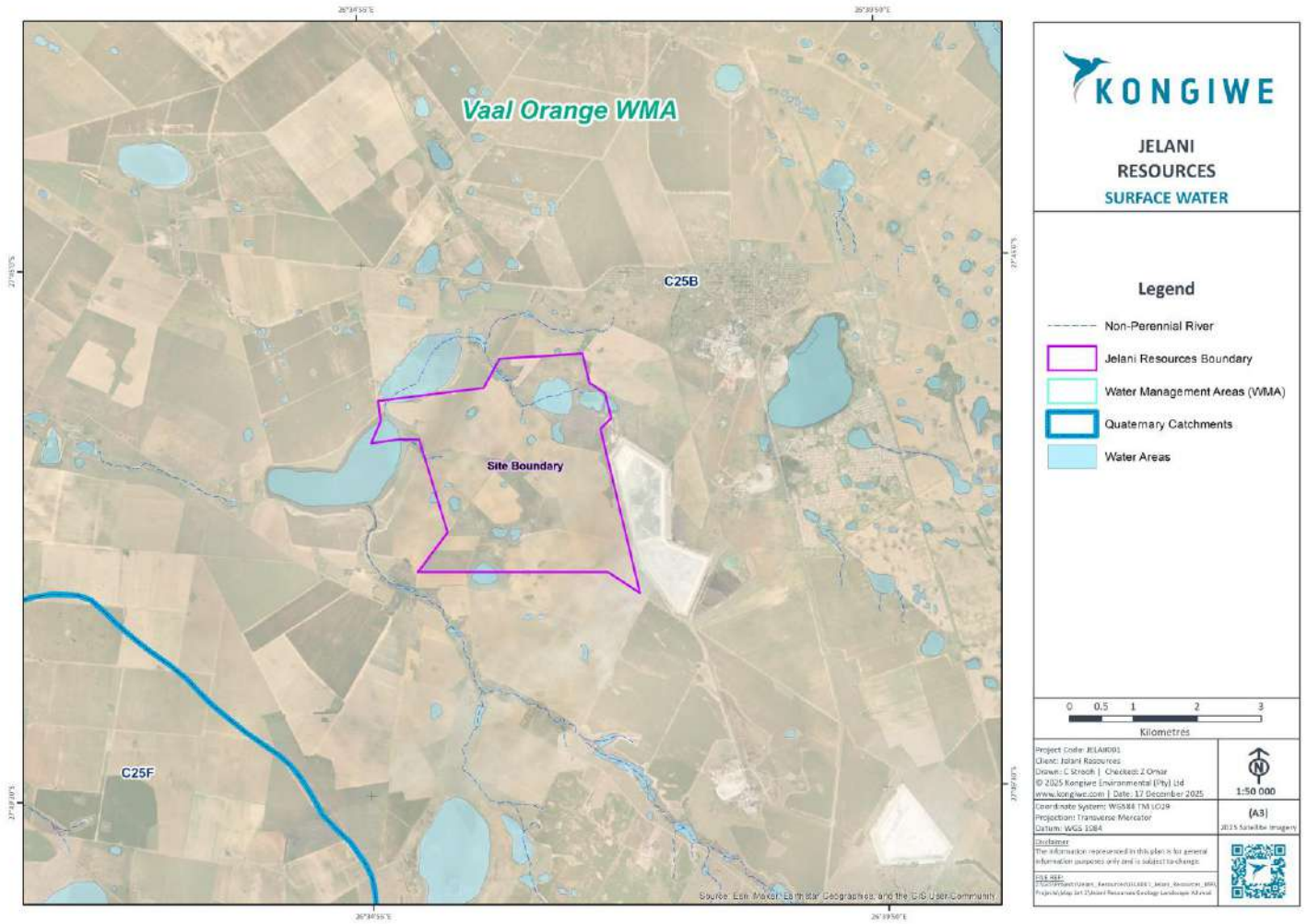


Figure 5: Surface Water

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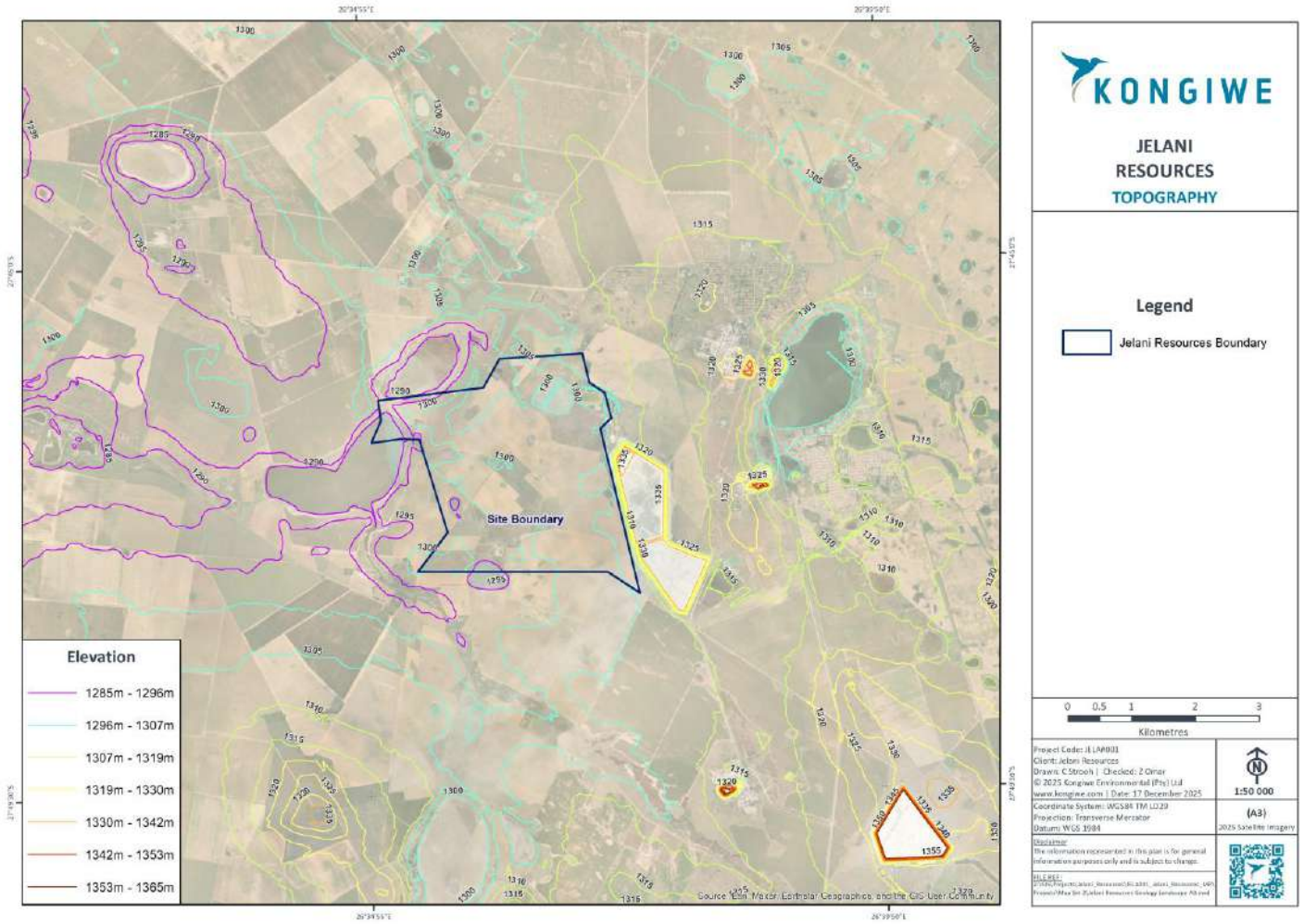


Figure 6: Topography

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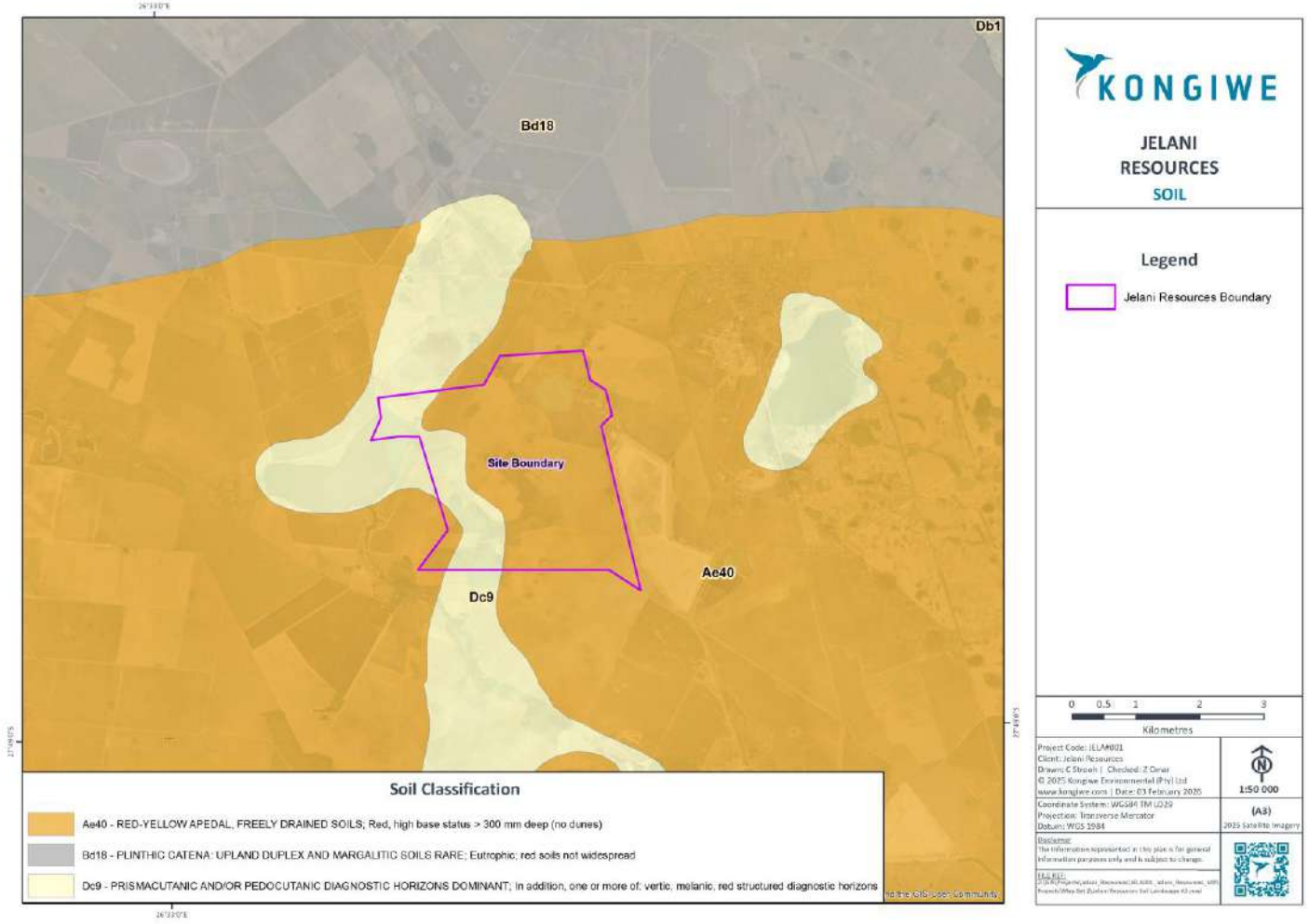


Figure 7: Soils Classification

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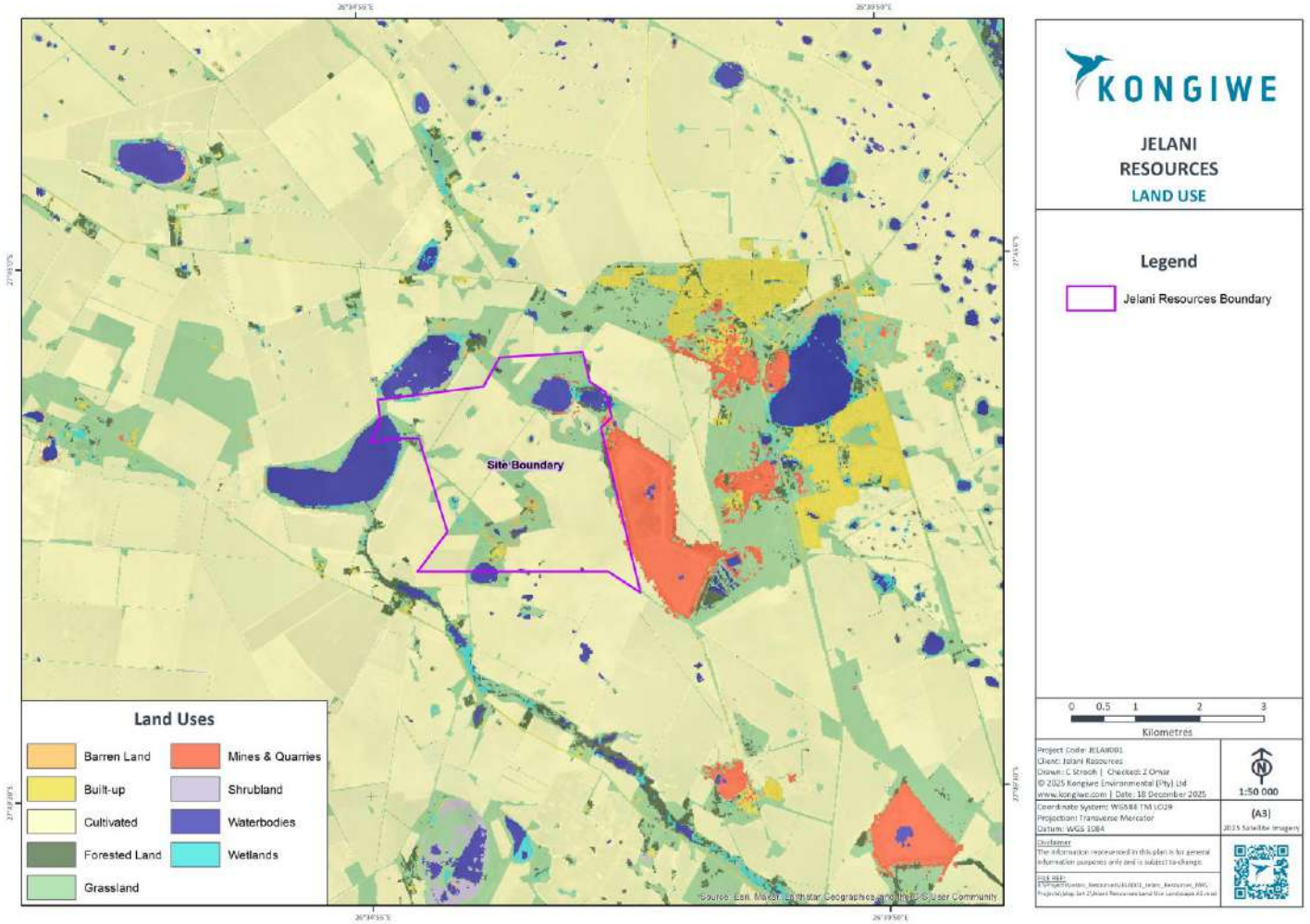


Figure 8: Land Uses

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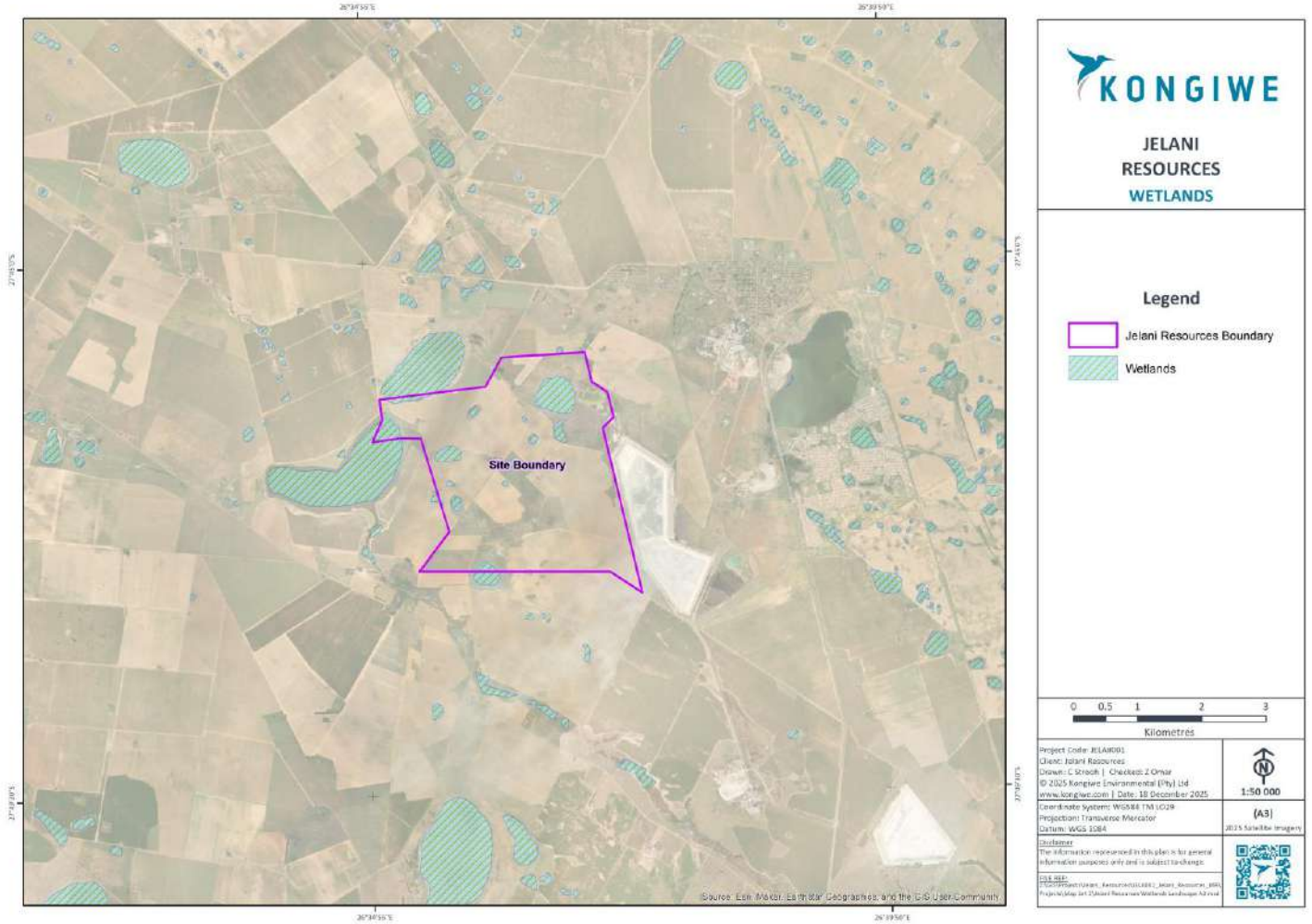


Figure 9: Wetlands

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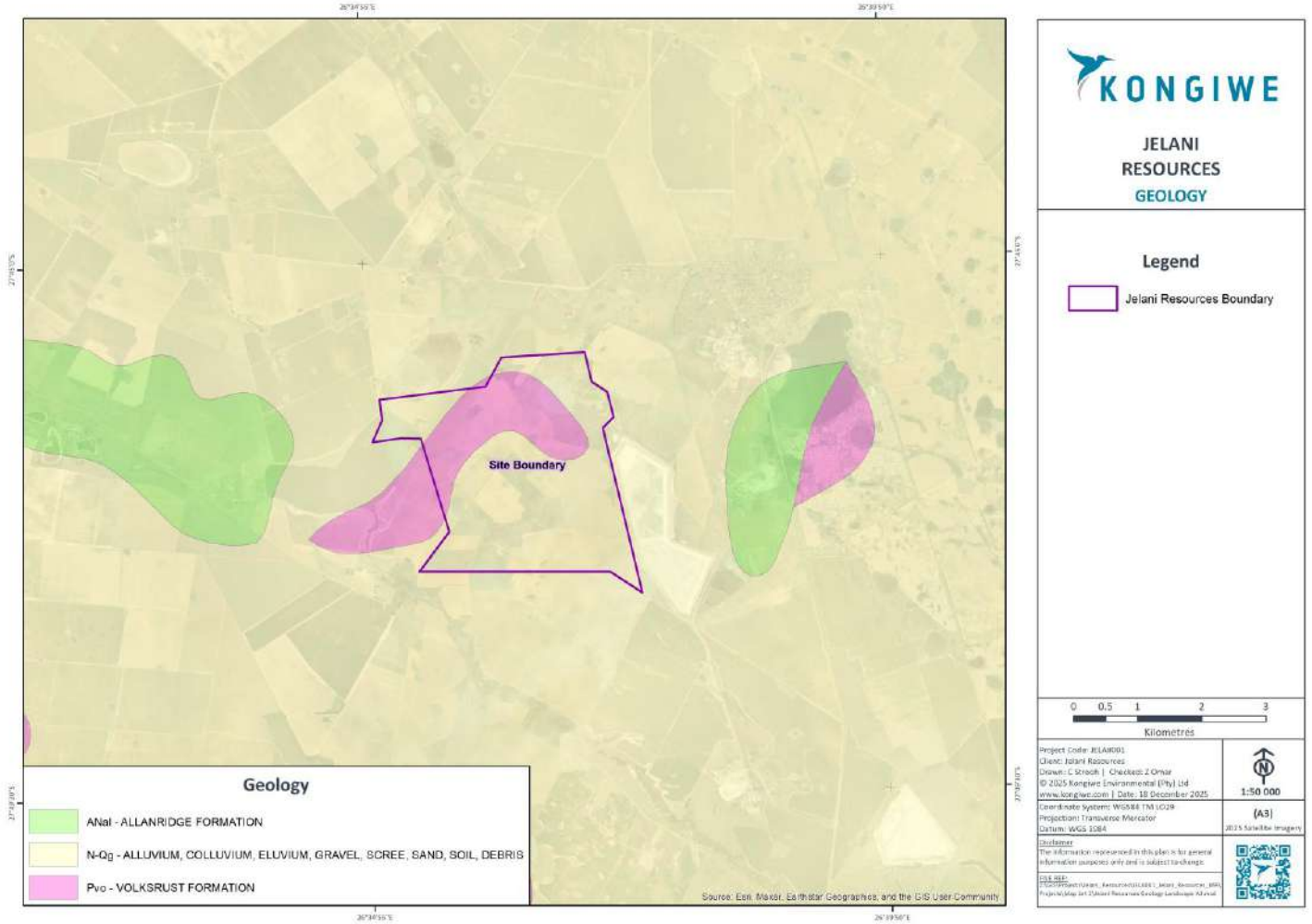


Figure 10: Geology

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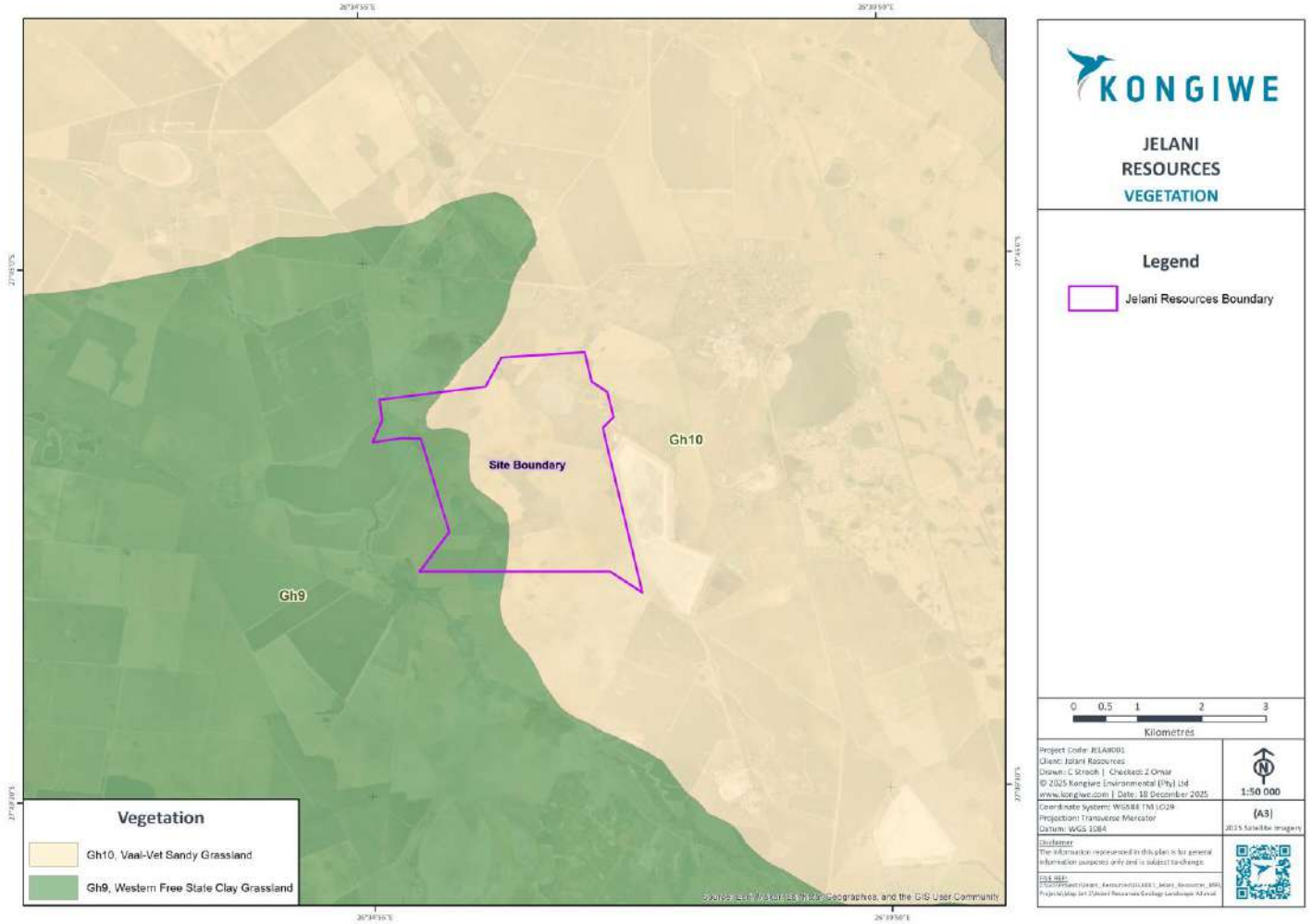


Figure 11: Vegetation

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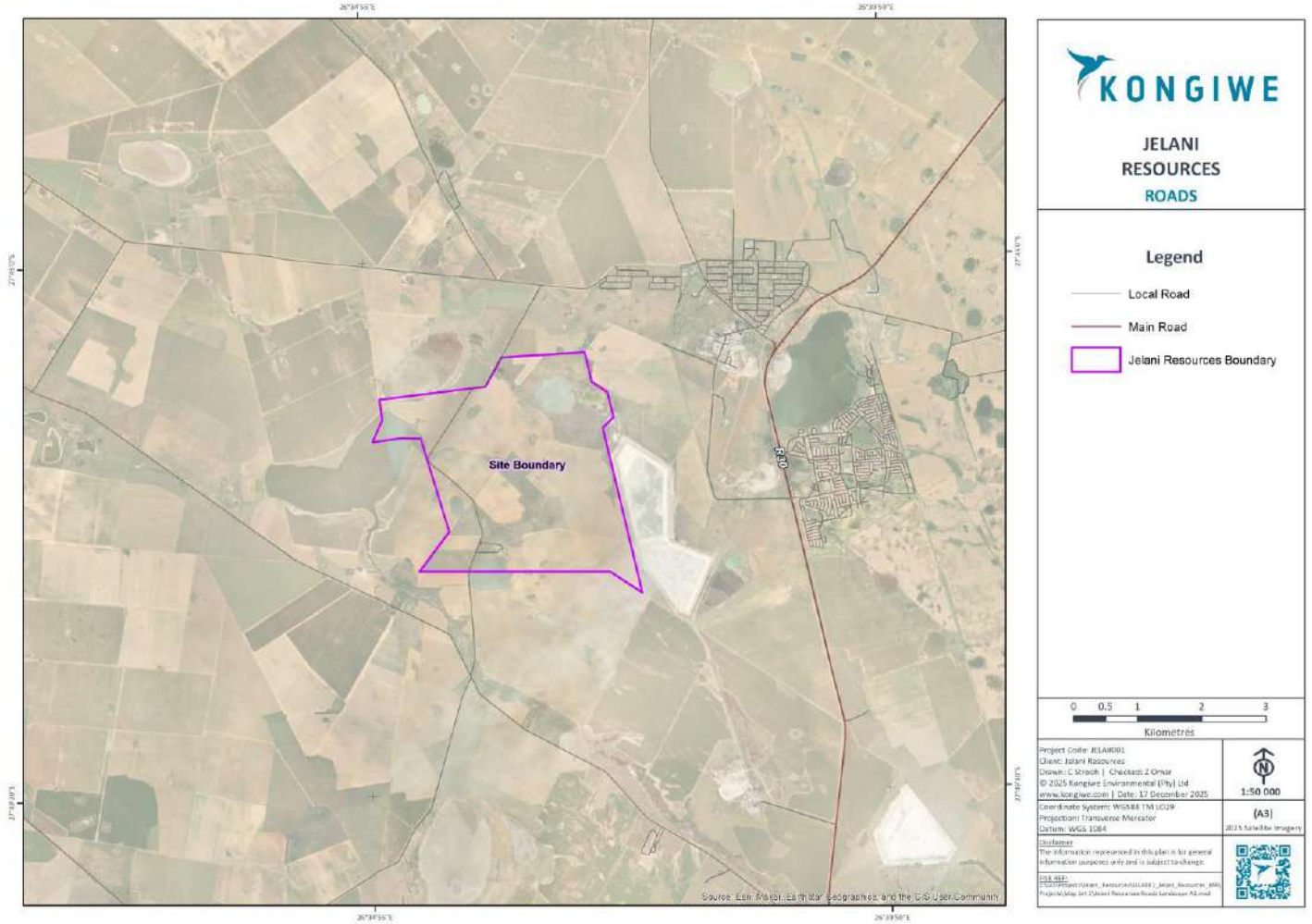


Figure 12: Roads

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4. CONCEPTUAL STORMWATER MANAGEMENT PLAN

4.1 Design Philosophy

The following design philosophy was adopted to guide the development of the SWMP, and is based on GN R704 regulations and the DWS BPG G1: Storm Water Management:

- Confine or divert any unpolluted water to a clean water system, away from a dirty area.
- Runoff from dirty areas must be captured and contained and should as far as possible be recycled and reused.
- Clean and dirty water systems must be designed and constructed to prevent cross contamination.
- Clean and dirty water systems must convey or contain runoff from the 1:50-year event.
- Appropriate maintenance and management of stormwater related infrastructure should always be ensured.

4.2 Peak Flows and Volumes

4.2.1 Rational Method

The Rational Method is suitable as a preliminary method for estimating peak runoff from small, reasonably homogeneous catchments where rainfall intensity, catchment response and flow concentration can be represented by a single design storm. It can provide a practical estimate of peak discharge for sizing channels, culverts and diversion structures, particularly where reliable rainfall intensity data and clearly defined catchment boundaries are available.

The selection of the runoff coefficient requires particular care. The adopted values should reflect land cover, soil conditions, slope, antecedent moisture, impervious or compacted areas, mining infrastructure and the presence of disturbed or saturated ground. A single coefficient may not adequately represent a catchment containing natural veld, roads, dams, wetlands and mining-related surfaces. Where catchments contain materially different surfaces, a weighted runoff coefficient should be calculated. Sensitivity testing should also be undertaken because a change in the runoff coefficient produces a directly proportional change in the calculated peak flow.

The time of concentration should be calculated from the longest or hydraulically controlling flow path to the relevant outlet. The report should state the adopted method, flow-path length, slope, surface characteristics and any assumptions used. The selected rainfall intensity is directly dependent on this value. A shorter time of concentration produces a higher design rainfall intensity, which results in a higher calculated peak discharge. In flat terrain, the time of concentration may be uncertain because runoff can move slowly as shallow overland flow, pond in depressions or be temporarily intercepted by wetlands and pans. The assessment should therefore include a sensitivity check using reasonable alternative times of concentration.

The Rational Method are therefore be presented as indicative peak-flow estimates.

The Rational method is used to calculate the peak flows. The Rational method is based on the following equation:

$$Q_T = \frac{C\ I\ A}{3.6}$$

where:

- Q_T = Peak flow for a recurrence interval e.g., a 1:100-year event (m^3/s).
- C = Runoff coefficient (dimensionless).

- I = Average rainfall intensity over the catchment (mm/hour).
- A = Catchment area contributing to the peak flow (km²).
- 3.6 = Conversion factor.

The runoff coefficient "C" is calculated by specifying the percentage area covered by different physical characteristics of the contributing catchment. This includes the vegetation, slope, soil permeability and land use characteristics.

The average rainfall intensity "I" was calculated by dividing the gridded storm rainfall depths obtained from Smithers and Schulze (2002) by the time of concentration (T_c). The T_c is the amount of time it takes for water to travel from the hydraulically most remote point in the contributing catchment to the catchment outlet. It is essentially the amount of time for runoff in the catchment to contribute to the peak flow.

The contributing catchment area "A" was calculated by delineating a catchment from the point where the watercourse exits the Project area.

A Microsoft Excel spreadsheet was used to perform the calculations based on the South African National Roads Agency Limited (SANRAL) procedure (SANRAL, 2013) (Attached as Annexures A and C).

The Rational Method is based on the following assumptions:

- Rainfall has a uniform area distribution across the total contributing catchment.
- Rainfall has a uniform time distribution for at least a duration equal to the Tc.
- The peak discharge occurs when the total catchment contributes to the flow occurring at the end of the critical storm duration, or Tc.
- The runoff coefficient "C" remains constant for the storm duration, or Tc.
- The return period of the peak flow is the same as that of the rainfall intensity.

4.2.2 Stormwater Detention/Attenuation

The Brooker Method is a storage-routing approach used to size attenuation ponds/tanks or route storms through an existing pond/dam (storage facility).

Instead of just using the Rational Method peak directly, Brooker's approach:

- Generates an inflow hydrograph (often from Rational or unit hydrograph).
- Routes it through a storage facility.
- Checks the **attenuated outflow**.

Core concept

The Method balances:

- Inflow hydrograph – Outflow through control structure = Storage required.
- So, the attenuation volume is the temporary storage needed to "flatten" the peak.

Typical steps (Brooker-style detention design)

- **Select storm return period & duration**
  (Critical duration is key — often longer storms control storage, not the peak-intensity short storm.)
- **Generate inflow hydrograph**
  Often triangular or derived from Rational Method:

$$Q_{peak} = CiA$$

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- **Apply storage routing (level pool method)**

  Using:

$$\frac{dS}{dt} = I - O$$

  - Where:
  - S= storage
  - I= inflow
  - O= controlled outflow (orifice/weir)

Why is the Brooker approach used

- Works well for detention ponds and underground tanks.
- More realistic than just peak-flow comparison.
- Captures **attenuation of the hydrograph**, not just peak reduction.
- Common in South African and UK stormwater design practice.

A Microsoft Excel spreadsheet was used to perform the calculations for the Brooker Method (Attached as Annexures B and D).

4.2.3 Channel Sizing

The Manning's equation was used to calculate the bypass channel size required to convey the 1:50-year event peak flow. The Manning's equation is provided below:

$$Q = A\frac{1}{n}R^{2/3}S^{1/2}$$

Where:

- Q = Peak flow (m³/s).
- A = Cross sectional area of the channel (m²).
- R = Hydraulic radius (m).
- S = Longitudinal slope of channel (m/m).
- n = Manning's roughness coefficient 'n'.

Calculations were undertaken using a Microsoft Excel spreadsheet. The typical proposed design for clean and dirty water channels is shown in Figure 13: Typical proposed design for clean and dirty water channels.

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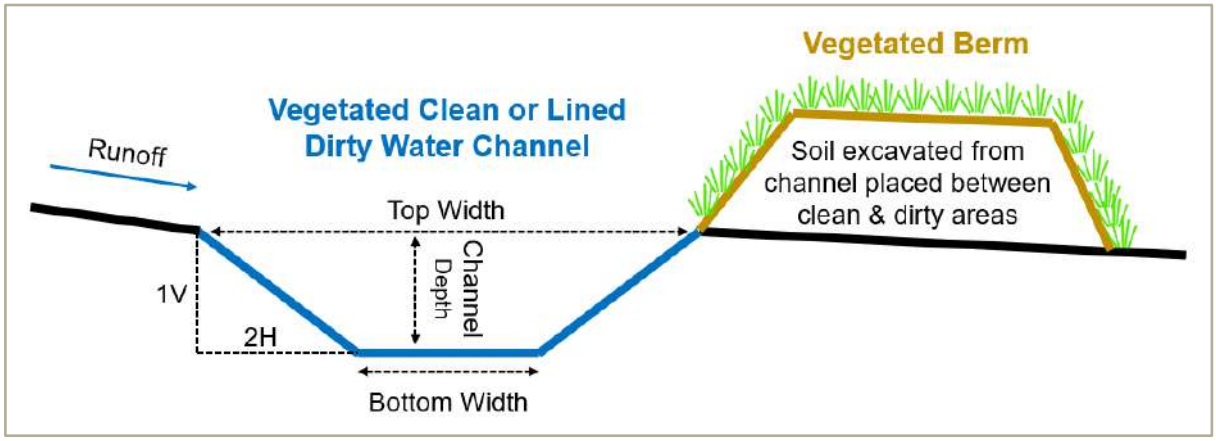


Figure 13: Typical proposed design for clean and dirty water channels

4.3 Surface Water Runoff

4.3.1 General

4.3.1.1 Jelani Project Area

The Jelani Project Area has 3 catchment areas impacting on the surface water hydrology (See Figure 14):

- The Swartpan Catchment Area – the biggest catchment area of size approximately 8.3 km^2 including the area to the east of the Target 1 TSF. There is overland flow to the Swartpan, and a natural watercourse below Swartpan to Pan A.
- Pan B Catchment Area – area of size approximately 1.5 km^2. There is no defined watercourse, just overland flow into the Pan.
- Pan C Catchment Area – area of size approximately 2.5 km^2. There is no defined watercourse, just overland flow into the Pan.
- Balance of Jelani Project Area – flows in a westerly direction into Pan A or the Losdoringspruit.

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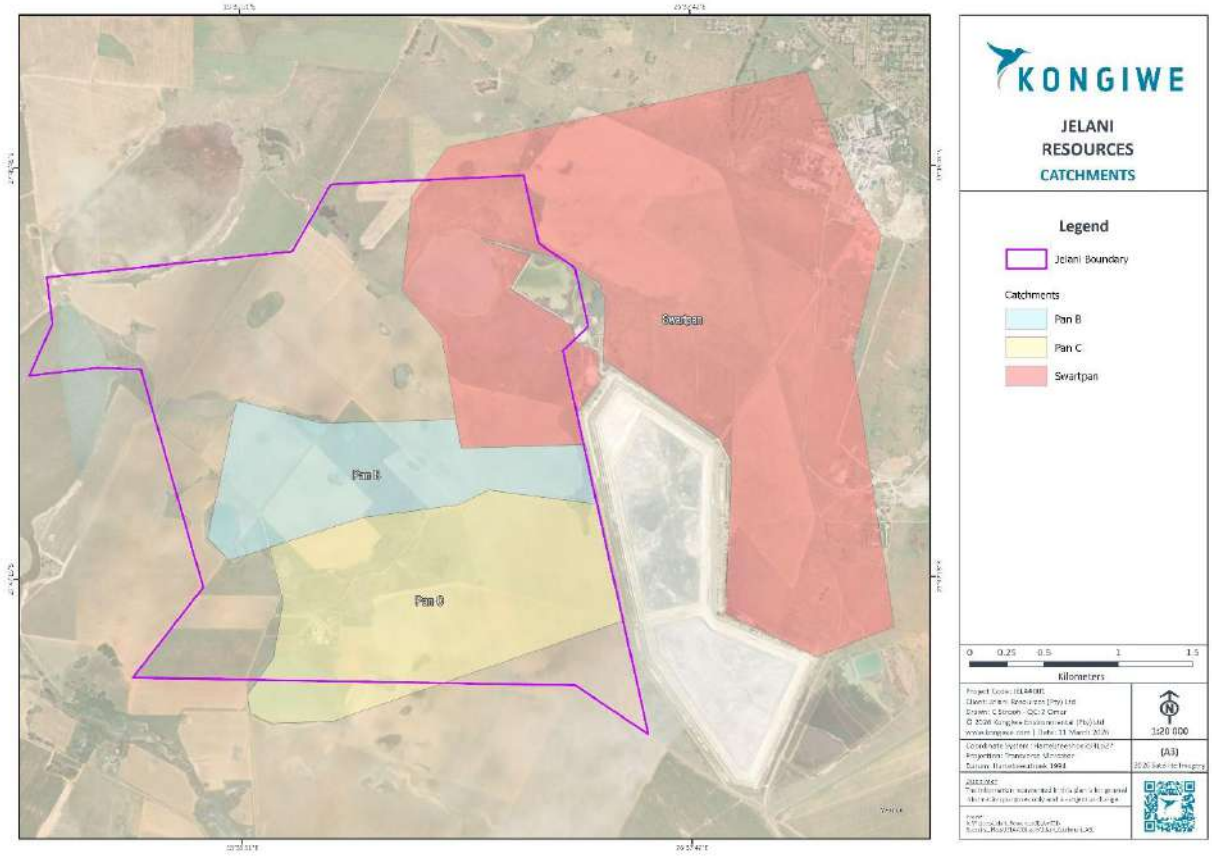


Figure 14: Catchment areas affecting the Jelani Project

4.3.1.2 Topography of area

Figure 15 shows that the project area has a high lying area to the east of the project site and just west of the R30. The area drains in a westerly direction where the Target 1 and 2 TSFs act as a barrier and deflects the runoff in a northerly direction, concentrating the flow in the North-west Return Water Dam area.

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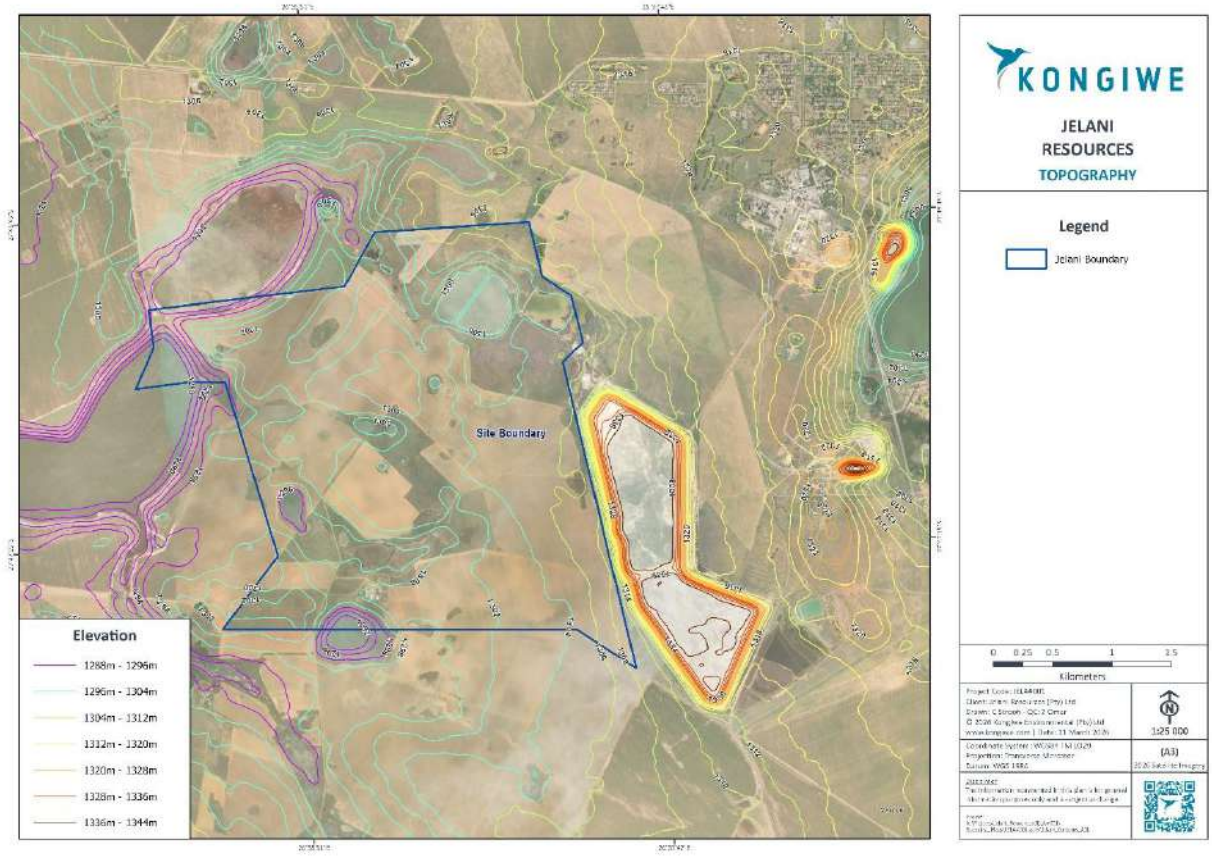


Figure 15: Contour map of area

4.3.1.3 Catchment Areas

Swartpan Catchment Area

An open bypass channel has been constructed around the North-west (Old) Return Water Dam (RWD), the Blue RWD and the Emergency Overflow Ponds, ultimately discharging into Swartpan (See Figure 16). The purpose of the channel is assumed to be to bypass the “clean” stormwater runoff around the “dirty” mine infrastructure. This open channel is currently completely overgrown (See Figure 17).

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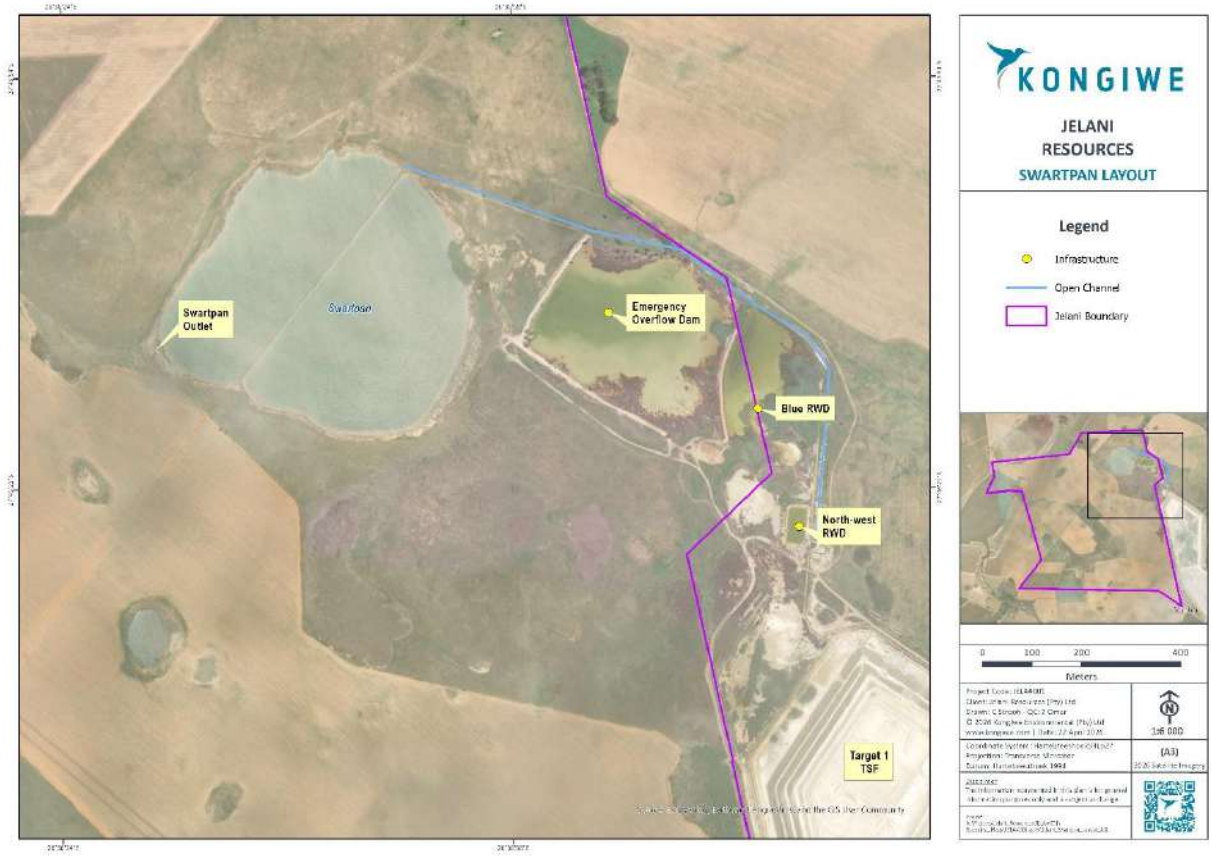


Figure 16: Swartpan area layout



Figure 17: Open Trench to Swartpan, completely overgrown

There is an area between the start of the open bypass channel and the end of the earth berm around Target 1 TSF where the stormwater runoff collects in the solution trenches and ends up in the North-west RWD, Blue RWD and the Emergency Overflow Dam (See Figure 18).

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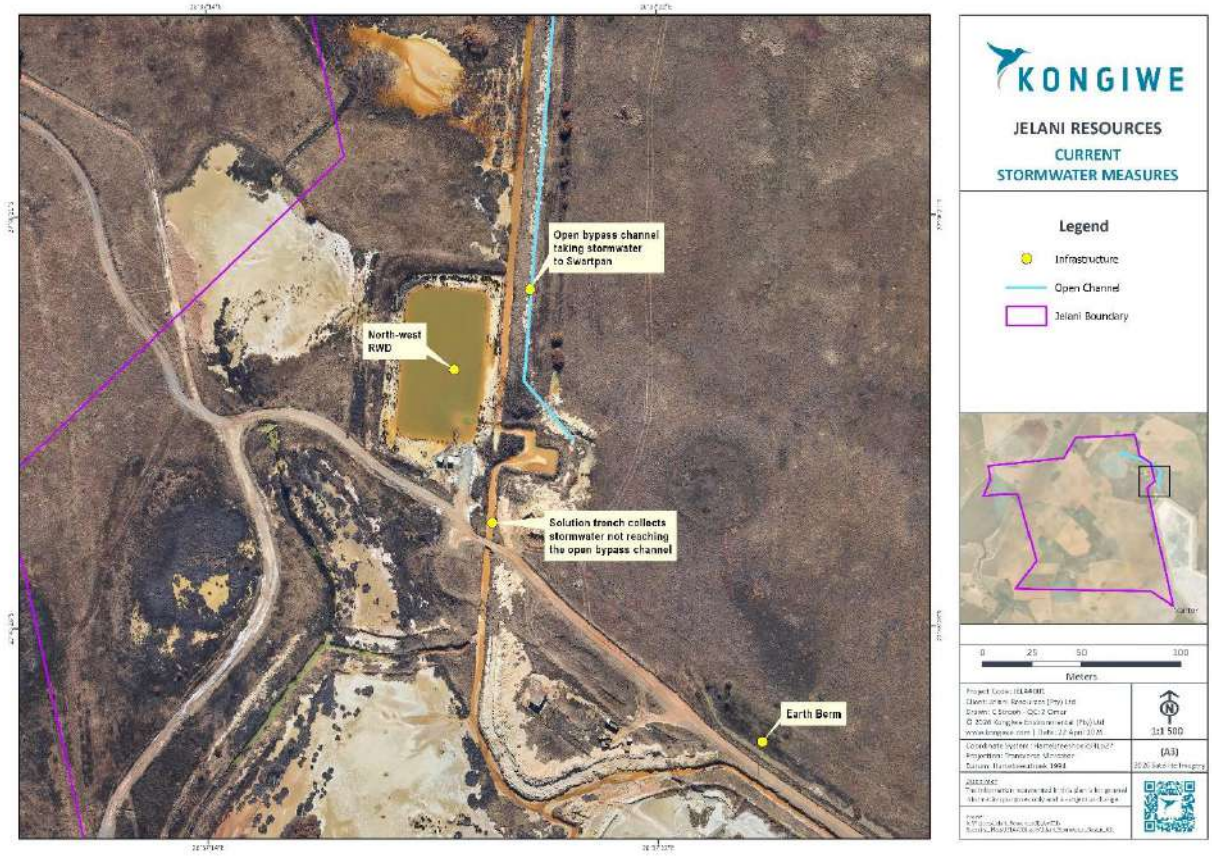


Figure 18: Area where stormwater is collected in the solution trenches

Swartpan appears to have a wall constructed across it to separate clean and dirty water, however at the site inspection in January 2026 this wall was not visible as the pan was full. Swartpan has no formal outlet structure and drains from its south-west corner down a natural channel which ends up in Pan A. The natural channel is crossed by a farm road however there are no formal stormwater structures under this road to allow any flow to pass. The Losdoringspruit also flows into Pan A, which in turn overflows into the Gelukspan (See Figure 4).

Pan B Catchment Area

There is no formal outlet structure from Pan B (See Figure 4). When full, the Pan will overflow into the surrounding lands, and ultimately into the Losdoringspruit.

Pan C Catchment Area

There is a formal open trench outlet channel from Pan C, fed by a 600 mm dia pipe from Pan C under the Farm Road (See Figure 4). The outlet channel takes the overflow down to the Losdoringspruit.

4.3.2 Wetland hydrology

The wetland and pan systems within the study area are sustained primarily by direct rainfall, surface-water runoff from their respective upstream catchments and, where applicable, shallow subsurface or groundwater contributions. The existing drainage configuration allows runoff from the contributing catchments to flow along natural drainage lines, overland flow paths and existing channels towards the relevant wetland or pan systems, including Swartpan and Pans A–C. Runoff from areas associated with mining infrastructure may also be intercepted by the existing solution trenches, the North-west RWD, the Blue RWD and the Emergency Overflow Dam before reaching downstream receiving areas.

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4.4 Swartpan

4.4.1 Existing Scenario

The catchment areas contributing to Swartpan are shown in Figure 19 below.

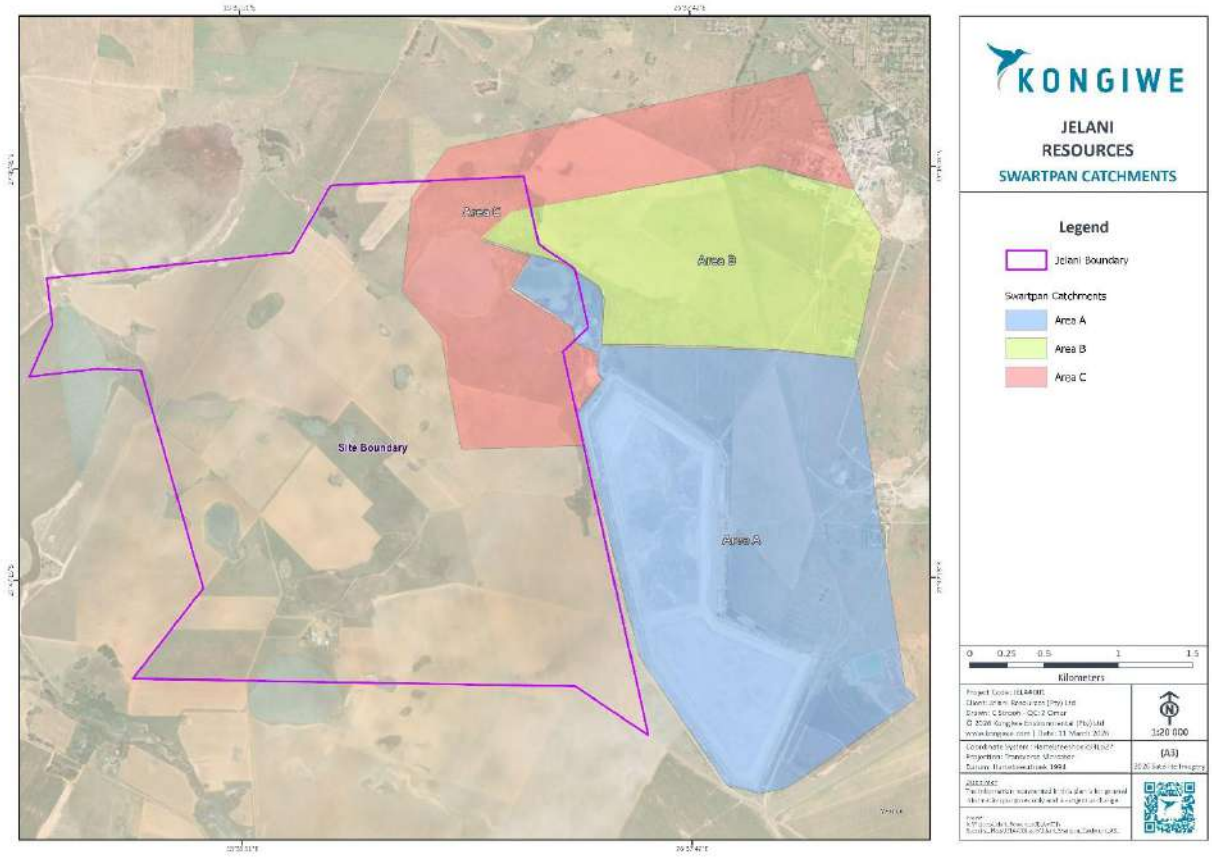


Figure 19: Swartpan Catchment Areas

4.4.1.1 Catchment Area A

Catchment Area A collects the "dirty" water from the solution trenches from Target 1 TSF to the North-west RWD, and floods the North-west RWD, the Blue RWD and the Emergency Overflow Dam which are all interconnected. It then overflows from the Emergency Overflow Dam into Swartpan.

Table 5: Catchment A Existing Scenario

Description	Value
MAP	502 mm
Size of catchment	3.124 km^2
Time of Concentration	2.11 hours
Run-off coefficient (C) 1:50-year event	0.335
Run-off coefficient (C) 1:100-year event	0.373

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Point rainfall 1:50-year event	74.660 mm
Point Rainfall 1: 100-year event	83.437 mm
Peak Flow (Rational Formula) 1:50-year event	10.182 m^3/s
Peak Flow (Rational Formula) 1: 100-year event	12.930 m^3/s
Peak Inflow (Brooker) 1:50-year event	9.87 m^3/s
Peak Outflow (Brooker) 1:50-year event	1.69 m^3/s
Peak Inflow (Brooker) 1: 100-year event	13.53 m^3/s
Peak Outflow (Brooker) 1: 100-year event	2.59 m^3/s

The North-west RWD, Blue RWD and Emergency Overflow Dam will have an attenuation effect on the runoff, even if they are full at the time. Assuming that they are full, the hydrograph (Brooker) (Figure 20) below shows the normal and attenuated flows for the 1:50-year event over a period of time, with the 1:50-year event peak flow reducing from 9.87 m^3/s to 1.69 m^3/s, and the 1:100-event peak flow reducing from 13.53 m^3/s to 2.59 m^3/s.

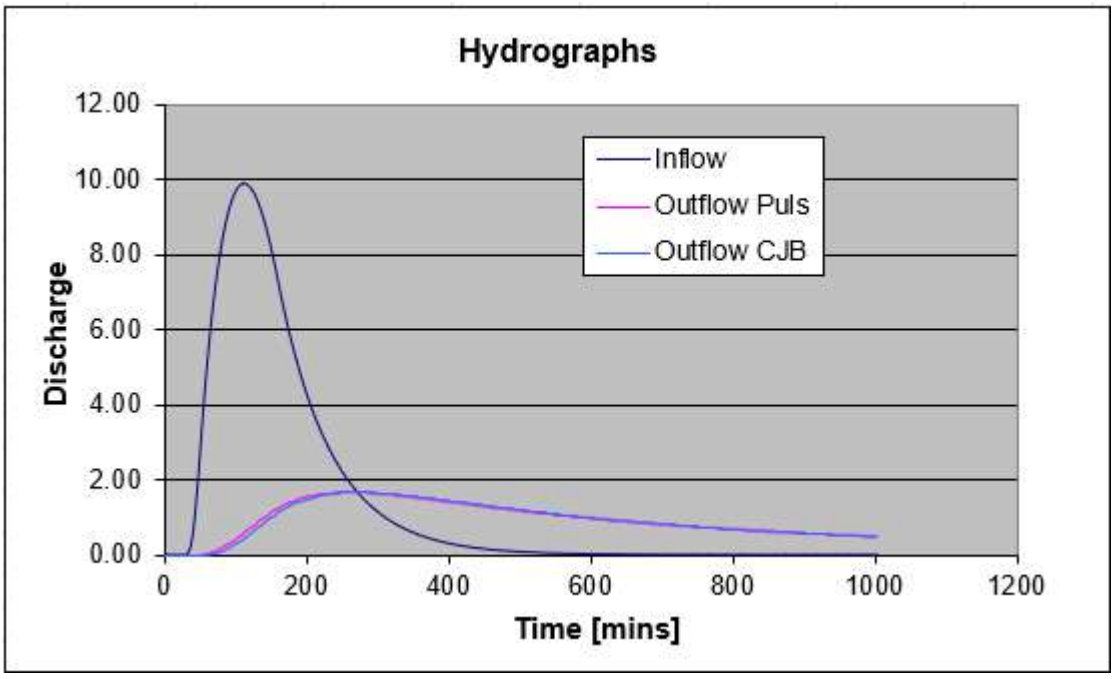


Figure 20: Attenuated 1:50-year event hydrograph from Catchment A

This attenuated hydrograph is the inflow of runoff from Catchment A into Swartpan.

4.4.1.2 Catchment Area B

Catchment Area B collects in the open bypass channel around the North-west RWD, the Blue RWD and the Emergency Overflow Dam and flows directly into Swartpan.

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Table 6: Catchment B Existing Scenario

Description	Value
MAP	502 mm
Size of catchment	2.318 km^2
Time of Concentration	2.38 hours
Run-off coefficient (C) 1: 50-year event	0.354
Run-off coefficient (C) 1: 100-year event	0.373
Point rainfall 1: 50-year event	76.280 mm
Point Rainfall 1: 100-year event	85.246 mm
Peak Flow (Rational Formula) 1: 50-year event	7.291 m^3/s
Peak Flow (Rational Formula) 1: 100-year event	8.395 m^3/s
Peak Flow (Brooker) 1: 50-year event	6.99 m^3/s
Peak Flow (Brooker) 1: 100-year event	9.07 m^3/s

The 1:50-year event hydrograph (Brooker) (Figure 21) below shows the flow over a period.

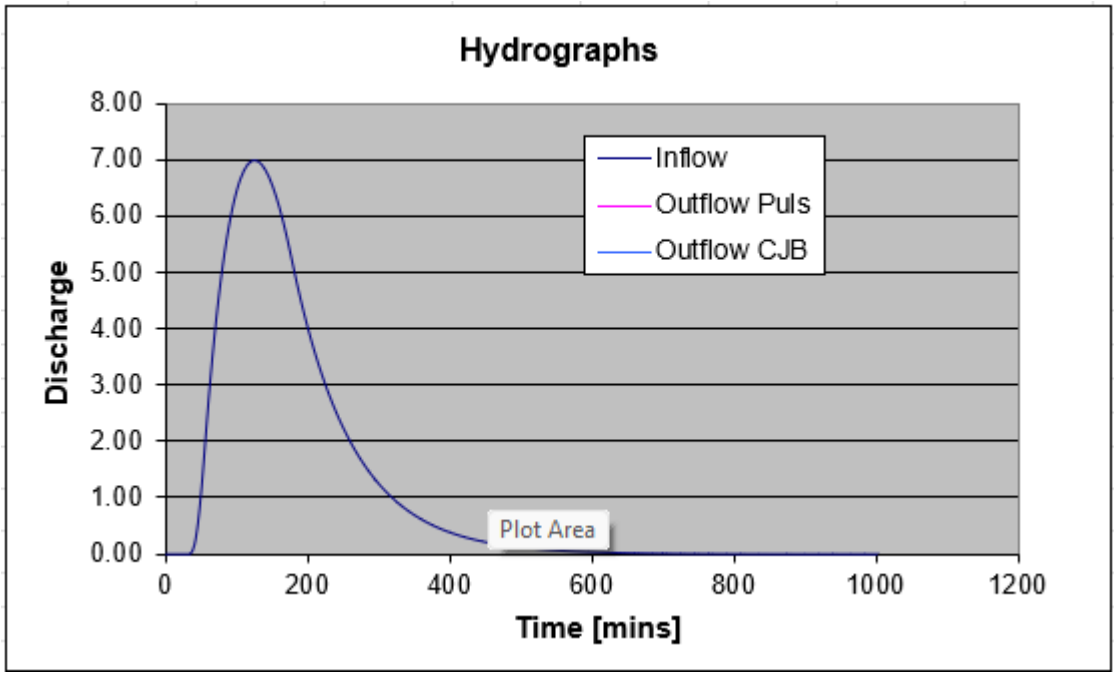


Figure 21: 1:50-year event hydrograph from Catchment B

This hydrograph is the inflow of runoff from Catchment B into Swartpan.

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4.4.1.3 Catchment Area C

Catchment Area C flows directly into Swartpan, and the inflow hydrograph includes the outflow hydrographs from Catchment Areas A and B.

Table 7: Catchment C Existing Scenario

Description	Value
MAP	502 mm
Size of catchment	2.960 km^2
Time of Concentration	2.04 hours
Run-off coefficient (C) 1: 50-year event	0.214
Run-off coefficient (C) 1: 100-year event	0.225
Point rainfall 1: 50-year event	74.240 mm
Point Rainfall 1: 100-year event	82.968 mm
Peak Flow (Rational Formula) 1: 50-year event	6.327 m^3/s excluding external hydrographs
Peak Flow (Rational Formula) 1: 100-year event	7.585 m^3/s excluding external hydrographs
Peak Inflow (Brooker) 1: 50-year event	13.82 m^3/s – all flows
Peak Outflow (Brooker) 1: 50-year event	3.11 m^3/s – all flows
Peak Inflow (Brooker) 1: 100-year event	17.80 m^3/s – all flows
Peak Outflow (Brooker) 1: 100-year event	4.15 m^3/s – all flows

Swartpan has an outlet into a natural channel at its southwestern corner. The hydrograph (Brooker) for Catchment Area C plus the output hydrographs from Catchment Areas A and B are routed though Swartpan, which is assumed to be full (the worst-case scenario). The hydrograph (Figure 22) below shows the 1:50-year event attenuated flow over a period.

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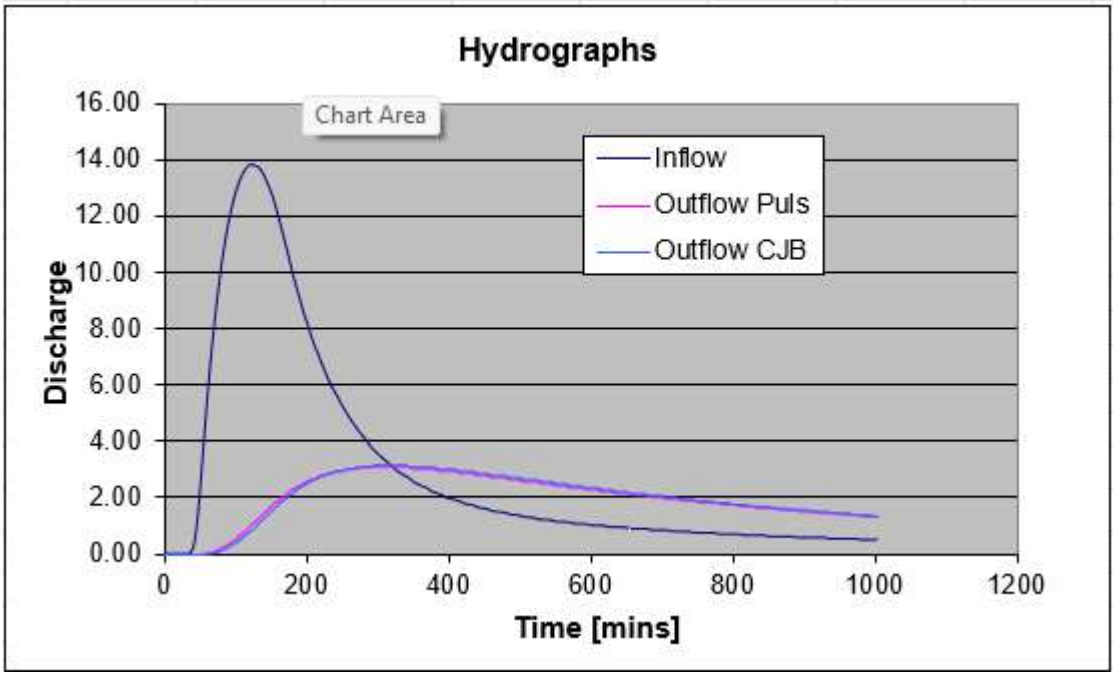


Figure 22: Attenuated 1:50-year event hydrograph from Swartpan

This attenuated 1:50-year event hydrograph is the outflow from Swartpan.

4.4.1.4 Open Bypass Channel to Swartpan

The open bypass channel was found to be completely overgrown, see Figure 17. Where it was visible the channel was measured and found to be 2 m wide at its base, 1 vertical to 2 horizontal side slopes, and 2 m deep, and this cross section has been assumed for the whole length. Table 8 gives the results for the Existing Scenario.

Table 8: Swartpan Open Bypass Channel Existing Scenario

Description	As designed	Current state
Length	1 315 m	1 315 m
Slope	0.0038 m/m	0.0038 m/m
Channel type	Earth straight and uniform	Channel not maintained
Condition	Clean after weathering	Dense brush high stage
Design Flow (1:50-year event)	7.291 m^3/s	7.291 m^3/s
Manning's n	0.022	0.1
Depth of flow	1.2 m	>2.0 m (channel overflows)
Velocity	1.41 m/s	0.66 m/s

As designed (clean, maintained) the bypass channel has the capacity to handle the 1:50-year event, although the velocity exceeds the allowable velocity of 1.2 m/s and some erosion damage will occur. However, in its present state

(overgrown, not maintained) the bypass channel does not have the capacity for the 1:50-year event, and it will overflow.

4.4.1.5 Discussion of Existing Scenario

The biggest problem for the Swartpan Catchment Area is that the clean and dirty water are not adequately separated, due to the open bypass channel around the dirty water facilities not extending far enough and clean water ending up in the “dirty” solution trenches.

At the site visit on 28/29 January 2026, it was noted that the North-west RWD, the Blue RWD and the Emergency Overflow Dam were all full, and there was evidence that the area had been subjected to flooding. At a site visit on 2-4 December 2025 with DWS officials for the Harmony Integrated IWULA Project, the area could not be accessed as it was under water.

The wall across Swartpan seems to indicate that at some stage the eastern section of Swartpan was used to contain “dirty” water. The open bypass channel around the infrastructure terminates in the “clean” water area of Swartpan, indicating that at some stage there may have been an attempt to separate the clean and dirty water.

The Emergency Overflow Dam was full, and this indicates that it is not operating as an emergency dam but as part of the normal operating infrastructure of the area.

The open bypass channel around the mine infrastructure has sufficient capacity to handle the 1:50-year event storm if adequately maintained. However, under its current unmaintained state (completely overgrown), the channel is likely to overflow under the 1:50-year event.

4.4.2 Proposed Swartpan Solution

4.4.2.1 Proposal

The following is proposed:

- Extend the open bypass channel /earth berm at the North-west RWD problem area to collect all clean water and bypass the mine infrastructure area to deposit the clean water directly into Swartpan.
- This results in the North-west RWD, Blue RWD and Emergency Overflow Dam handling “dirty” water only.
- Operate the North-west RWD, Blue RWD and Emergency Overflow Dam complex such that there is sufficient capacity to handle the 1:50-year event “dirty” water flow without overflowing.
- Construct containment berms around potential pollution-generating areas to prevent contamination of nearby water resources throughout the construction and operational phases of the Life of Mine.

4.4.2.2 Operational Capacity, Responsibility and Implementation

To finalise the proposed solution and demonstrate compliance with GN R704, the following information must be provided:

The North-west Return Water Dam, Blue Return Water Dam and Emergency Overflow Dam are operated by Target Operations. Target Operations should therefore be identified as the current operator responsible for routine inspection, maintenance, water-level management, storm-event preparedness, drawdown procedures, pollution prevention and emergency response, subject to confirmation of legal ownership and the applicable authorisations.

The North-west Return Water Dam and Emergency Overflow Dam are understood to have been constructed before 1998, while the Blue Return Water Dam is understood to be a lined dam constructed after 1998. The respective construction and commissioning dates, design capacities, as-built information and authorisation status must be

confirmed from Target Operations's records, historical aerial imagery, dam-safety records and applicable water-use authorisations.

The historical status of the North-west Return Water Dam and Emergency Overflow Dam does not exempt current operation, maintenance, rehabilitation or modification from applicable legal requirements. Similarly, the post-1998 Blue Return Water Dam should be assessed against the environmental, water-use and dam-safety requirements applicable at the time of its construction, as well as current requirements governing its operation and any proposed modification.

The report must further confirm whether the existing dams and proposed works are authorised under Target Operations's existing authorisations, the WU43378 application, the Harmony Integrated IWULA, the Jelani Project or a separate authorisation. It must also identify the party responsible for implementing and funding the proposed works.

Based on the above the revised catchment areas are shown in Figure 23.

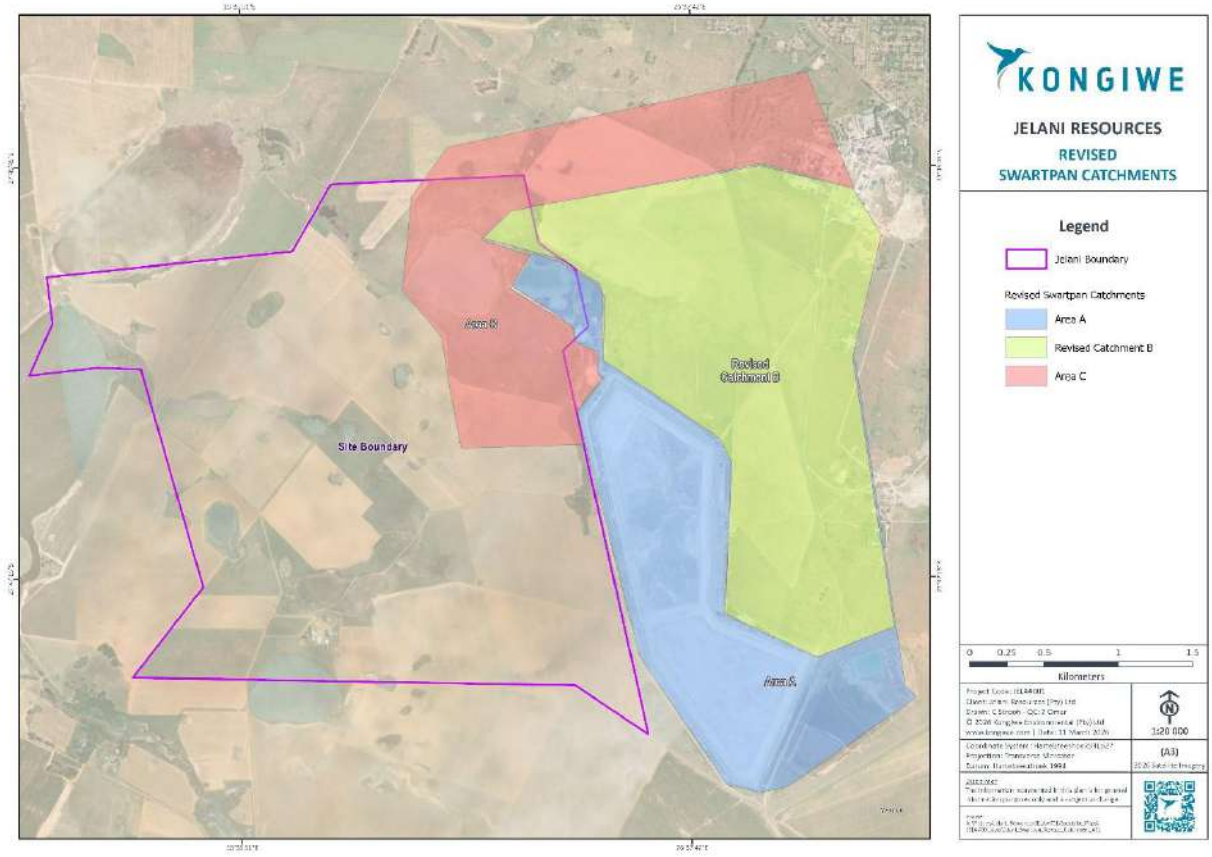


Figure 23: Revised Swartpan Catchment Areas

4.4.2.3 Catchment Area A

Catchment Area A collects stormwater in the solution trenches around Target 1 and 2 TSFs and flows to the North-west RWD, the Blue RWD and the Emergency Overflow Dam which are all interconnected. It excludes the rainfall falling on top of the TSFs, which will collect on the TSF and either evaporate or infiltrate. The results are given in Table 9.

Table 9: Catchment A Proposed Scenario

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Description	Value
MAP	502 mm
Size of catchment	0.926 km^2
Time of Concentration	3.30 hours
Run-off coefficient (C) 1:50-year event	0.335
Run-off coefficient (C) 1: 100-year event	0.373
Point rainfall 1: 50-year event	81.800 mm
Point Rainfall 1: 100-year event	91.410 mm
Peak Flow (Rational Formula) 1: 50-year event	2.156 m^3/s
Peak Flow (Rational Formula) 1: 100-year event	2.683 m^3/s
Peak Inflow (Brooker) 1: 50-year event	2.00 m^3/s
Peak Outflow (Brooker) 1: 50-year event	0 m^3/s (contained in the system)
Peak Inflow (Brooker) 1: 100-year event	2.74 m^3/s
Peak Outflow (Brooker) 1: 100-year event	0.702 m^3/s

As-built information for the relevant infrastructure was not available at the time of the assessment; therefore, the storage capacities, dimensions and operating levels presented in Table 9 could not be independently verified.

The North-west RWD, Blue RWD and Emergency Overflow Dam must be operated so that under the 1:50-year event, there is sufficient capacity in these dams to contain the inflow. The inflow excludes runoff on top of the TSFs, as this is kept on top of the TSFs and allowed to infiltrate or evaporate. A volume of 27 385 m^3 will have to be stored under the 1:50-year event. Under the 1:100-year event, there is a small overflow into Swartpan with a max flow of 0,702 m^3/s. (See Figure 24).

These facilities are currently being operated by Target Operations.

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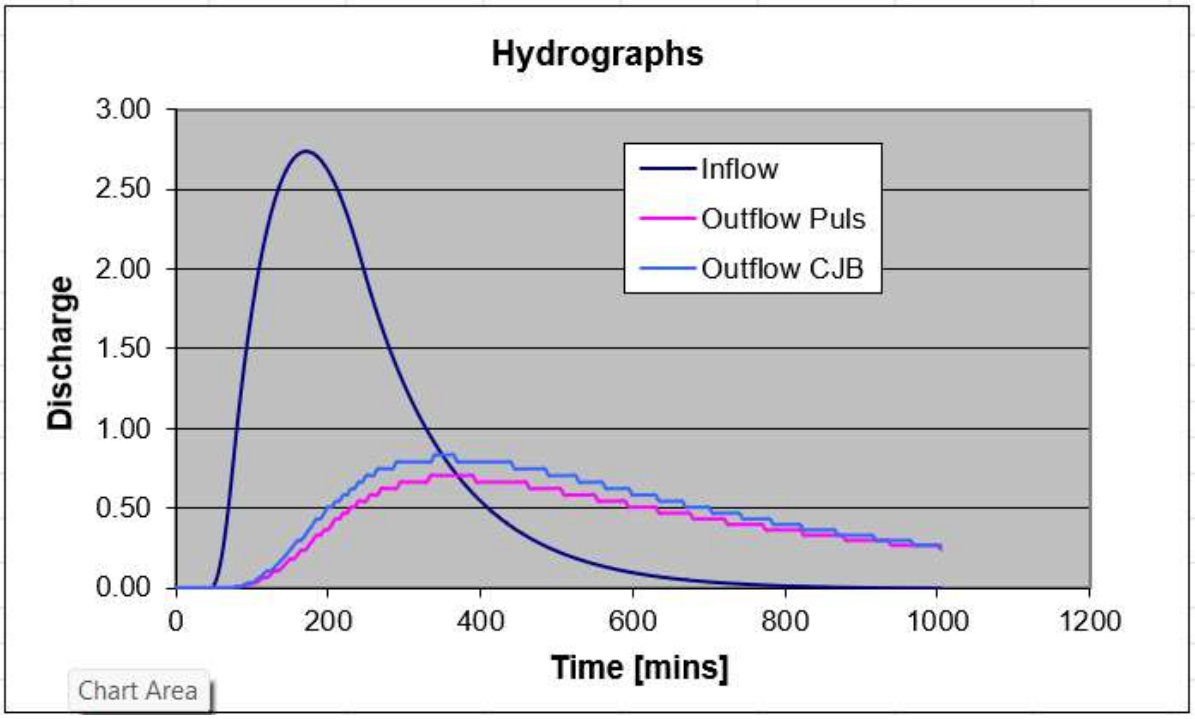


Figure 24: Attenuated 1:100-year event hydrograph - Catchment A – proposed scenario

This attenuated hydrograph under the 1:100-year event is the inflow of runoff from Catchment A into Swartpan.

4.4.2.4 Catchment Area B

Catchment Area B collects in the open bypass trench around the North-west RWD, the Blue RWD and the Emergency Overflow Dam and flows directly into Swartpan. The results are given in Table 10.

Table 10: Catchment B Proposed Scenario

Description	Value
MAP	502 mm
Size of catchment	4.516 km^2
Time of Concentration	2.90 hours
Run-off coefficient (C) 1: 50-year event	0.354
Run-off coefficient (C) 1: 100-year event	0.373
Point rainfall 1: 50-year event	79.40 mm
Point Rainfall 1: 100-year event	88.73 mm
Peak Flow (Rational Formula) 1: 50-year event	11.986 m^3/s
Peak Flow (Rational Formula) 1: 100-year event	14.486 m^3/s

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Peak Flow (Brooker) 1: 50-year event	11.512 m^3/s
Peak Flow (Brooker) 1:100-year event	14.923 m^3/s

The 1:50-year event hydrograph (Brooker) (Figure 25) below shows the flow over a period.

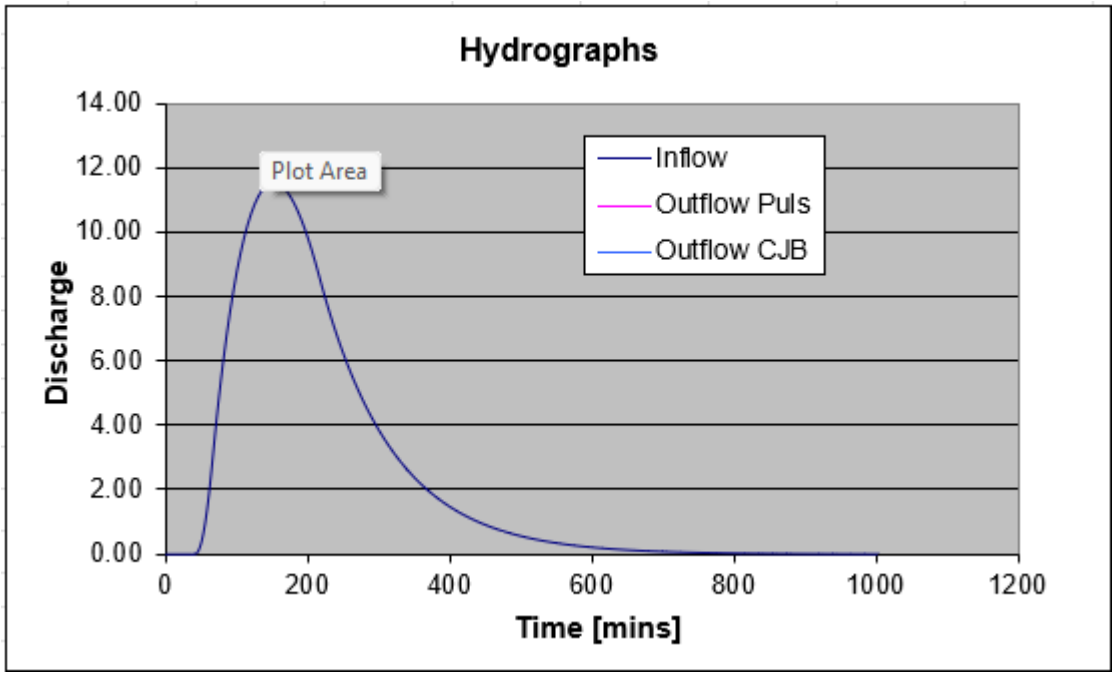


Figure 25: 1:50-year event hydrograph - Catchment B – proposed scenario

This hydrograph is the inflow of runoff from Catchment B into Swartpan.

4.4.2.5 Catchment Area C

Catchment Area C flows directly into Swartpan, and the inflow hydrograph includes the outflow hydrographs from Catchment Areas A and B. (See Table 10).

Table 11: Catchment C Proposed Scenario

Description	Value
MAP	502 mm
Size of catchment	2.960 km^2
Time of Concentration	2.04 hours
Run-off coefficient (C)	0.214
Point rainfall 1: 50-year event	74.240 mm
Point Rainfall 1: 100-year event	82.968 mm
Peak Flow (Rational Formula) 1: 50-year event	6.327 m^3/s excluding external hydrographs

Peak Flow (Rational Formula) 1: 100-year event	7.585 m^3/s excluding external hydrographs
Peak Inflow (Brooker) 1: 50-year event	17.023 m^3/s – all flows
Peak Outflow (Brooker) 1:50-year event	4.41 m^3/s – all flows
Peak Inflow (Brooker) 1: 100-year event	22.173 m^3/s – all flows
Peak Outflow (Brooker) 1: 100-year event	6.331 m^3/s – all flows

Swartpan has an outlet into a natural channel at its southwestern corner. The hydrograph (Brooker) for Catchment Area C plus the output hydrographs from Catchment Areas A and B are routed though Swartpan, which is assumed to be full (the worst case scenario). The hydrograph (Figure 26) below shows the 1: 50-year event attenuated flow over a period.

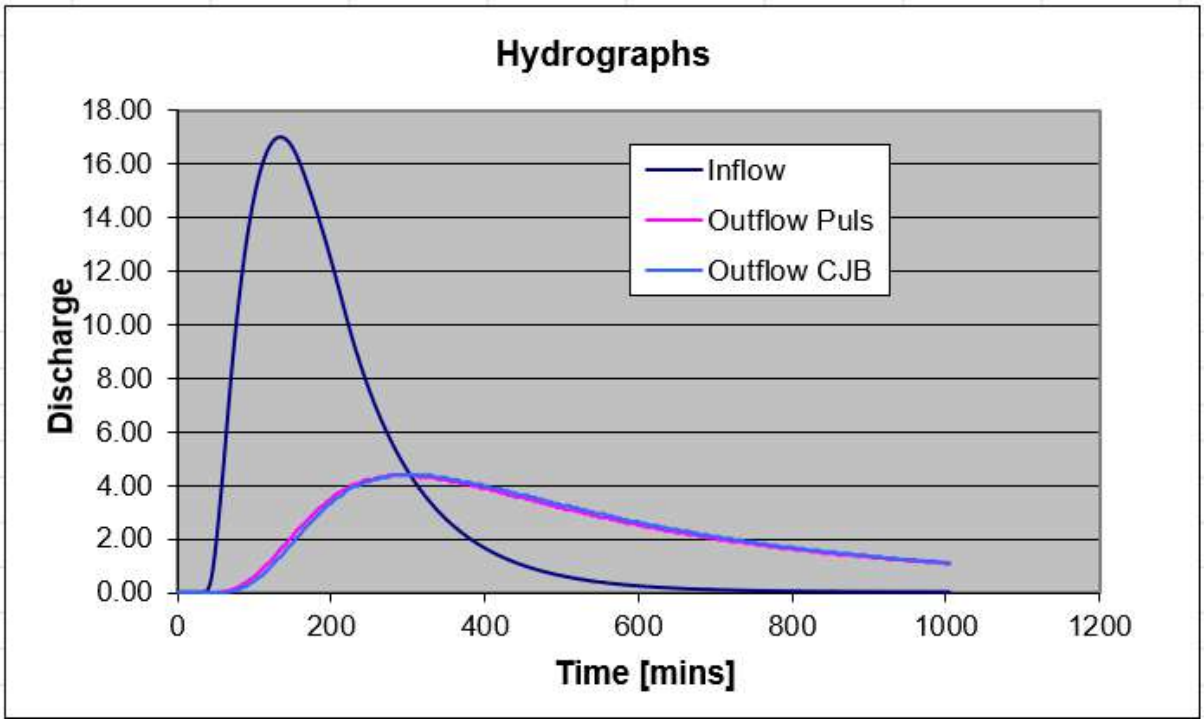


Figure 26: 1: 50-year event inflow and outflow hydrographs – Swartpan – proposed scenario

This attenuated 1:50-year event hydrograph is the outflow from Swartpan.

4.4.2.6 Open Bypass Channel around Mine Infrastructure

The open channel was found to be completely overgrown, see Figure 17. Where it was visible, the channel was measured and found to be 2 m wide at its base, 1 vertical to 2 horizontal side slopes, and 2 m deep. Table 12 presents the results.

Table 12: Swartpan Open Channel Proposed Scenario

Description	As proposed 1:50	As proposed 1:100
Length	1 315 m	1 315 m
Slope	0.0038 m/m	0.0038 m/m

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Channel type	Unreinforced concrete	Unreinforced concrete
Condition	Unreinforced concrete	Unreinforced concrete
Design Flow (1: 50-year event)	11.512 m^3/s	14.923 m^3/s
Manning's n	0.022	0.022
Depth of flow (without freeboard)	1.5 m	1.7 m
Velocity	2.24 m/s	2.44 m/s

As designed (clean, maintained) the bypass channel has the capacity to handle the 1:50-year event. However, the velocity exceeds the allowable velocity of 1.2 m/s, which will likely result in erosion damage. The way to overcome this is to line the channel with unreinforced concrete, which can withstand a velocity of up to 2.5 m/s. The channel must be cleaned out to remove accumulated sediment, vegetation and other obstructions before being lined with unreinforced concrete.

4.4.3 Floodlines

The floodlines for the natural watercourse downstream of Swartpan are shown in Figure 27. Contours were generated from Google Earth, and the 1:50-year and 1:100-year events were taken to be the attenuated outflows from Swartpan. Manning's formula was used to calculate flow widths. The floodlines presented are **indicative only** and should not be regarded as formal or final floodline delineations. They are intended to provide a preliminary indication of potential inundation areas and should be verified through a detailed topographical survey and hydraulic assessment.

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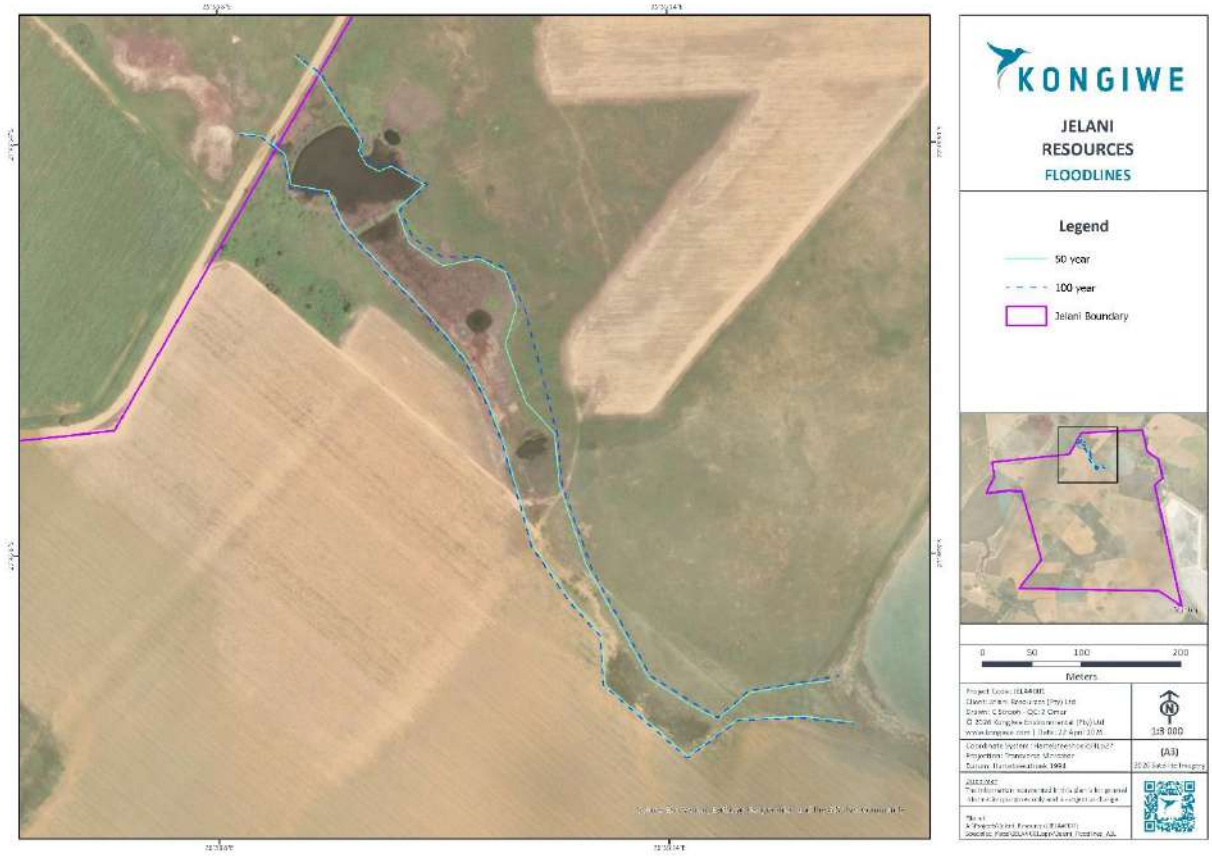


Figure 27: 1:50-year event (solid line) and 1:100-year event (dashed line) floodlines downstream of Swartpan

4.4.4 Discussion of Proposed Scenario

The proposed solution separates the “clean” and “dirty” water impacting the Jelani Project Area. The “clean” water from the catchment area is collected by means of earth berms and the open bypass channel and transferred to Swartpan, which is now a “clean” water pan. Swartpan has an attenuation effect even if it is full, and the resultant outflow hydrographs are routed down the natural watercourse downstream of Swartpan to Pan A. Floodlines are given for this natural watercourse.

The open bypass channel to Swartpan will have to be cleaned out and protected by unreinforced concrete lining to prevent scouring and erosion.

The “dirty” water in now confined to the North-west RWD, Blue RWD and Emergency Overflow Dam, which must be operated at a level to allow sufficient spare capacity to accommodate the 1:50-year event runoff. Containment berms must also be constructed around potential pollution-generating areas to prevent contamination of nearby water resources throughout the construction and operational phases of the Life of Mine.

Under the proposed stormwater-management system, clean runoff will be diverted through the proposed bypass channel towards Swartpan, while dirty or potentially contaminated runoff will be retained within the return-water-dam complex. This will alter the existing runoff routes and may change the volume, timing and quality of water reaching the relevant wetlands and pans. The final drainage layout should therefore clearly show the existing and proposed flow paths, catchment boundaries, diversion structures, discharge points and receiving wetlands or pans.

The proposed diversion is expected to reduce or delay runoff reaching wetlands or pans that currently receive flow from the dirty-water areas. Conversely, Swartpan may receive a greater proportion of clean runoff through the proposed bypass channel. The change in inflow volume and timing may affect the frequency, duration and extent of inundation, particularly during larger rainfall events. Reduced inflows could shorten the hydroperiod or reduce the frequency of wetting in downstream wetland areas, while concentrated discharges could increase flow velocities, erosion or localised sediment deposition at the discharge point.

The likely effects on the relevant wetland and pan systems should be assessed as shown in Table 13:

Table 13 – Likely Effects on relevant wetland and pan systems

Wetland or pan	Existing runoff route	Proposed runoff route	Potential hydrological effect
Swartpan	Receives runoff from its natural contributing catchment, together with any existing drainage that reaches the pan.	Receives clean runoff through the proposed bypass channel.	Potential increase in inflow volume during storm events, with possible changes to inundation frequency, peak water levels, erosion and sediment deposition at the discharge point.
Pan A	Receives runoff from its existing upstream catchment and natural overland flow paths.	Runoff route to be confirmed based on the final diversion and channel layout.	Potential reduction, delay or concentration of inflows, which may alter the pan's hydroperiod and seasonal water levels.
Pan B	Receives runoff from its existing upstream catchment and natural drainage features.	Runoff route to be confirmed based on the final diversion and channel layout.	Potential changes in the timing and volume of inflow, with possible effects on the duration and extent of inundation.
Pan C	Receives runoff from its existing upstream catchment and natural drainage features.	Runoff route to be confirmed based on the final diversion and channel layout.	Potential reduction or redistribution of inflows, together with possible localised erosion or sedimentation if flows are concentrated.
Other identified wetland units	Receive runoff from local catchments through natural drainage lines or diffuse overland flow.	Existing and proposed connections must be shown on the final drainage plan.	Effects may include altered wetting frequency, hydroperiod, flow concentration, sediment deposition or reduced diffuse runoff.

The proposed system should be designed to maintain appropriate clean-water inputs to wetlands and pans wherever these inputs are required to sustain their hydrological functioning. The discharge from the bypass channel should be

located and designed to prevent erosion, excessive flow concentration and sediment deposition. Energy dissipation, erosion protection and sediment-control measures should be incorporated at the discharge point where required.

A final assessment should quantify the existing and proposed runoff volumes and peak flows reaching each relevant wetland or pan for representative rainfall events, including the 1:2-year, 1:5-year, 1:10-year, 1:50-year and 1:100-year events where relevant. The assessment should also compare the timing of inflows, the duration of inundation and the expected change in peak water levels. The wetland-hydrology assessment must be based on the final surveyed drainage layout and confirmed catchment delineation. Where this information is not available, the potential effects should be identified as [TO CONFIRM] rather than presented as confirmed impacts.

5. WATER QUALITY

Harmony Gold Mine currently undertake water quality reporting for the Target Operations. Water-quality sampling is undertaken twice a year, with samples collected from the relevant monitoring points and analysed by an accredited laboratory.

5.1 Surface Water

5.1.1 Surface Water Monitoring Points

The surface water monitoring points are indicated on Figure 28 below:

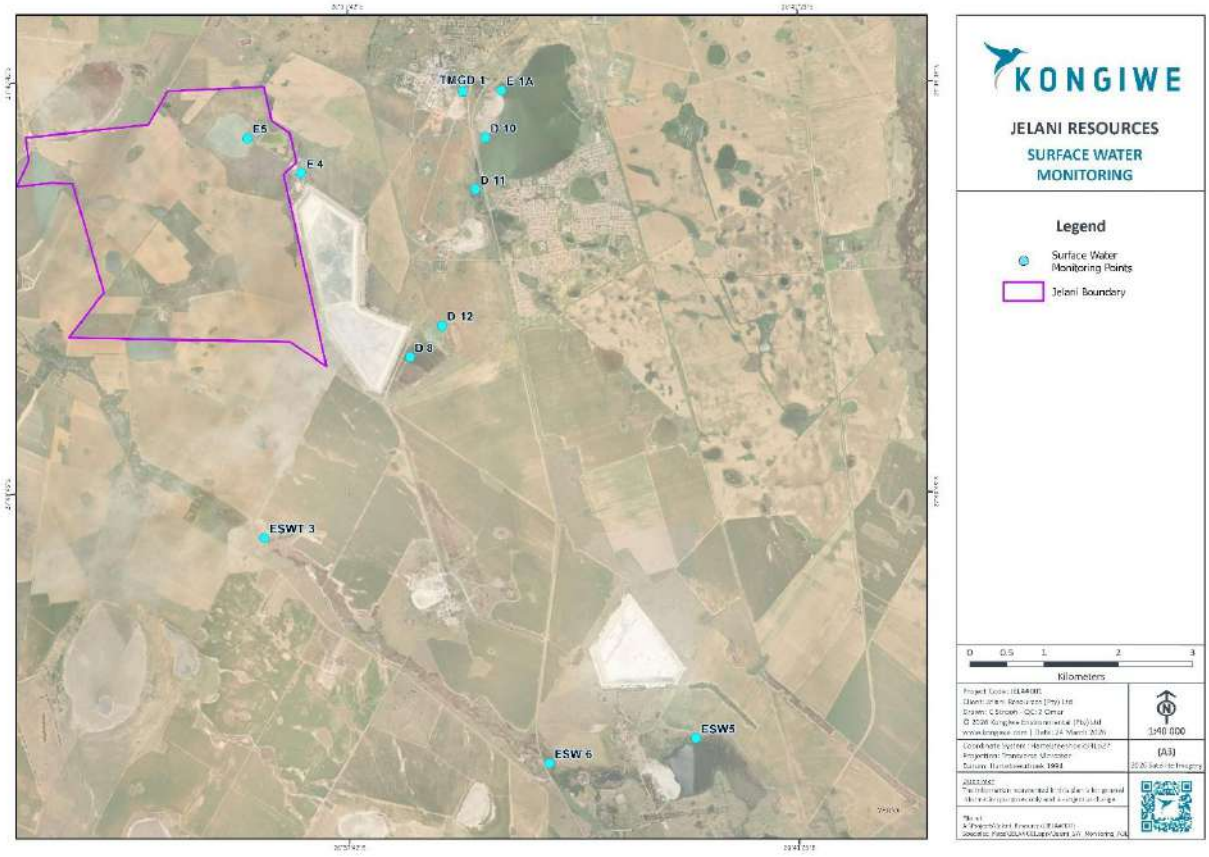


Figure 28: Surface Water Monitoring Points - Target Operations

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5.1.2 Surface Water Parameter Limits

The surface water quality results were compared to the South African Water Quality Guidelines and Resource Quality Objectives. These surface water parameter limits are shown in Table 14 below:

Table 14: Surface Water Parameter Limits

Parameter	Limit	Unit	Source
pH	6.5-8.5	*pH*	RQO 2016
EC	65	*mS/m*	RQO 2016
TDS	1 000	*Mg/L*	SAWQG 1996 – V5 Livestock
NH_3	1.5	*Mg/L*	SANA 241 : 2015
Cl	1 500	*Mg/L*	SAWQG 1996 – V5 Livestock
NO_2	100	*Mg/L*	SAWQG 1996 – V5 Livestock
PO_4	0.058	*Mg/L*	RQO 2016
SO_4	1 000	*Mg/L*	SAWQG 1996 – V5 Livestock
U	0.01	*Mg/L*	SAWQG 1996 – V4 Irrigation
TON		*Mg/L*	
*SAWQG – South African Water Quality Guidelines *RQO – Resource Quality Objectives			

The surface water parameter limits are specified as follows:

Good	Over/Under	Under detection limit	No limit

5.1.3 Surface Water Quality Results

The surface water quality results provided by Harmony are shown in Table 15 below:

Table 15: Surface Water Quality Results

	D 8		D 12		E 4		E5		ESW T3	
	Mar-24	Nov-24	Mar-24	Nov-24	Mar-24	Nov-24	Apr-24	Nov-24	Mar-24	Nov-24
pH	4.46	4.40	8.56	8.26	3.16	2.94	3.10	3.76	7.76	7.98
EC	1 130	881	786	759	876	867	673	7 255	985	367
TDS	8 858	6 872	5 114	5 688	6 642	6 744	5 382	61 196	6 630	2 374
NH_3	35.60	19.60	12.60	1.19	55.50	49.60	31.70	0.27	21.60	1.06
Cl	2 542	1 814	1 720	1 495	1 624	1 583	1 075	29 200	2 519	807
NO_2	0.232	4.380	14.000	5.650	0.415	2.730	0.390	5.620	0.194	1.320
PO_4	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.472	8.510	0.647

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SO_4	3 450	2 441	2 103	1 896	3 094	2 982	2 599	343	1 235	333
TON	0.23	4.38	14.00	5.65	0.42	2.73	0.39	5.62	0.19	1.32

5.1.4 Results and Discussion

- pH levels at D8, E4 and E5 show acidic conditions (pH<6), with E4 and E5 dropping to a pH as low as 2.94 and 3.10, respectively. These sample points show the effect of the TSF and the underground water pumped out and stored in the Emergency Overflow Dam.
- Electrical Conductivity (EC) measures water's ability to conduct electrical current, indicating the concentration of dissolved salts and ions. High EC can indicate pollution, high nutrient levels in irrigation, or excessive salts, which can cause toxicity in plants. All readings are high.
- Total dissolved solids (TDS) are the amount of organic and inorganic materials, such as metals, minerals, salts, and ions, dissolved in a particular volume of water. TDS are essentially a measure of anything dissolved in water that is not an H_2O molecule. When water encounters soluble material, particles of the material are absorbed into the water, creating total dissolved solids. Water containing TDS concentrations below 1 000 mg/litre is usually acceptable to consumers, although acceptability may vary according to circumstances. All readings exceed 1 000 mg/litre therefore are unsuitable for human consumption.
- Surface waters which are not contaminated with organic wastes, generally have a low ammonia nitrogen concentration, typically less than 0.2 mg/L. Ammonia (NH_3) and nitrite (NO_2) are discussed as separate parameters. Surface-water ammonia concentrations ranged from 0.27 mg/L to 55.50 mg/L. Against the stated limit of 1.5 mg/L NH_3, concentrations exceeded the limit at D8 during March 2024 and November 2024; D12, E4, E5 and ESW T3 during March 2024. The highest concentration was recorded at E4 in March 2024 at 55.50 mg/L. Results recorded at D12, E5 and ESW T3 during November 2024 were below the stated limit.
- Surface-water nitrite concentrations ranged from 0.194 mg/L to 14.000 mg/L. All reported concentrations were below the stated limit of 100 mg/L NO_2. The highest surface-water nitrite concentration was recorded at D12 in March 2024 at 14.000 mg/L.
- Groundwater nitrite concentrations ranged from 0.215 mg/L to 5.180 mg/L, which were below the stated groundwater limit of 9.1 mg/L NO_2. Monitoring point BH A1 was recorded as dry in March 2024, and no result was available for that sampling event. The results indicate elevated ammonia at several surface-water monitoring points, while the reported nitrite concentrations remained below the applicable limits. Further interpretation should consider the sampling locations, potential contaminant sources and temporal variation in the results.
- Chloride increases the electrical conductivity of water and thus increases its corrosivity. In metal pipes, chloride reacts with metal ions to form soluble salts (8), thus increasing levels of metals in drinking-water. The majority of the Chloride levels are high.
- Nitrite (NO_2) measures the concentration of nitrite ions (NO_2-) in water, providing valuable insights into nitrogen pollution levels and water quality. Nitrite can originate from various sources such as agricultural runoff, industrial discharges, and wastewater effluents. Elevated nitrite levels in water can pose health risks, particularly to infants, and may indicate pollution from fertilizers, septic systems, or industrial activities. Nitrite levels are acceptable.
- In appropriate quantities, phosphorus (PO_4) can be used by vegetation and soil microbes for normal growth. However, in excess quantities, phosphorus can lead to water quality problems such as eutrophication and harmful algal growth. Some aquatic resources, such as wetlands, naturally serve as sinks for phosphorus found in sediments or dissolved in water. However, since phosphorus generally occurs in small quantities in the natural environment, even small increases can negatively affect water

quality and biological condition. The phosphorus levels tend to be acceptable, except for ESW T3 (Losdoringspruit - Downstream of Target 3 Shaft).

- Sulphate is a common constituent of water and arises from the dissolution of mineral sulphates in soil and rock, particularly calcium sulphate (gypsum) and other partially soluble sulphate minerals. Since most sulphates are soluble in water, and calcium sulphate relatively soluble, sulphates when added to water tend to accumulate to progressively increasing concentrations. Sulphates are discharged from acid mine wastes and many other industrial processes such as tanneries, textile mills and processes using sulphuric acid or sulphates. The Sulphate values are high.
- Total Oxidised Nitrogen (TON) represents the combined concentration of nitrate and nitrite nitrogen in the water sample.
- It should be noted that it is expected that there will be several exceedances of the parameter limits due to some sampling points being in areas where dirty water is stored or generated. However, where applicable, interventions are needed to mitigate risks to the environment.

5.2 Groundwater

5.2.1 Groundwater Monitoring Points

The groundwater monitoring points are indicated on Figure 29 below:

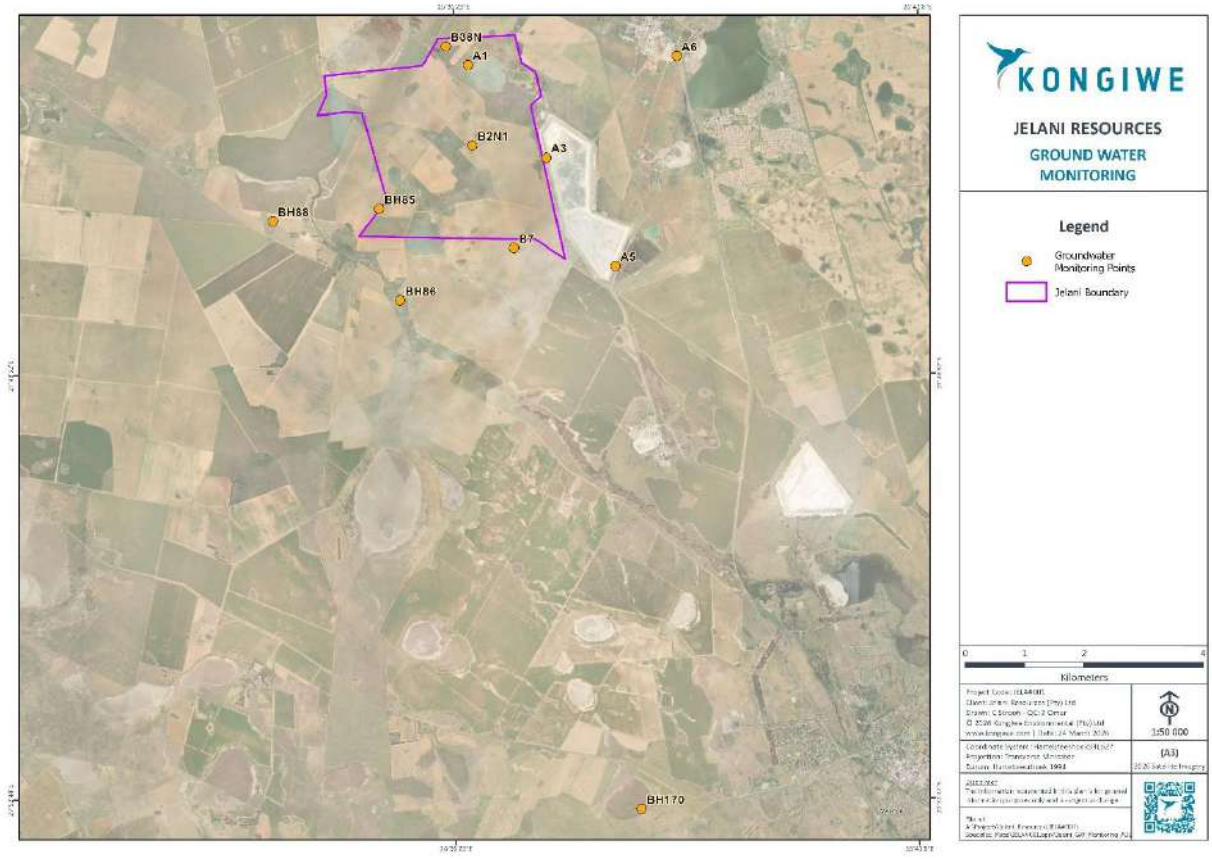


Figure 29: Groundwater Monitoring Points - Target Operations

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5.2.2 Groundwater Parameter Limits

The groundwater quality results were compared to the Preliminary Ground Water Quality Reserve. These groundwater parameter limits are shown in Table 16: Groundwater Parameter Limits below:

Table 16: Groundwater Parameter Limits

Parameter	Limit	Unit	Source
pH	5-9.7	*pH*	PGWQR 2013 (GRU 3a)
EC	141.2	*mS/m*	PGWQR 2013 (GRU 3a)
$CaCO_3$	228.4	*Mg/L*	PGWQR 2013 (GRU 3a)
Cl	1 113.2	*Mg/L*	PGWQR 2013 (GRU 3a)
NO_2	9.1	*Mg/L*	PGWQR 2013 (GRU 3a)
SO_4	486.1	*Mg/L*	PGWQR 2013 (GRU 3a)
Ca	197.5	*Mg/L*	PGWQR 2013 (GRU 3a)
Mg	149.4	*Mg/L*	PGWQR 2013 (GRU 3a)
K	587.6	*Mg/L*	PGWQR 2013 (GRU 3a)
Na	587.6	*Mg/L*	PGWQR 2013 (GRU 3a)
TON		*Mg/L*	PGWQR 2013 (GRU 3a)
*PGWQR – Preliminary Ground Water Quality Reserve			

The groundwater parameter limits are specified as follows:

Good	Over/Under	Under detection limit	No limit

5.2.3 Groundwater Quality Results

The groundwater quality results from Harmony are shown in Table 17 below:

Table 17: Groundwater Quality Results

	BH A1		BH B38N		BH A3		BH A5		BH B7	
	Mar-24	Nov-24	Jun-24	Nov-24	Mar-24	Nov-24	Mar-24	Nov-24	Mar-24	Nov-24
pH	Dry	8.32	8.29	7.84	6.70	5.13	6.94	7.12	8.50	8.35
EC	Dry	2 241	402	505	640	631	1 113	1 094	305	310
$CaCO_3$	Dry	784	416	401	161	29.4	283	334	258	281
Cl	Dry	5 078	1 234	1 178	1 194	1 205	2 356	2 016	714	757
NO_2	Dry	0.945	2.250	2.170	4.450	5.180	0.215	1.410	0.558	1.690
SO_4	Dry	4 053	321	324	1 696	1 572	3 463	2 971	183	83.7
Ca	Dry	243	134	134	634	596	809	622	71.4	79.1
Mg	Dry	344	84.2	90.5	134	124	403	375	84.7	93.1
K	Dry	19	12.9	9.95	38.3	33.7	43.8	40.7	32.6	34.7
Na	Dry	4 675	780	781	794	677	1 841	1 577	478	431

TON	Dry	0.945	2.25	2.17	4.45	5.18	0.215	1.41	0.558	1.69

5.3 Results and Discussion

- pH levels at BH A3 show acidic conditions (pH<6), with BH A3 dropping to a pH as low as 5.13. Generally, the pH levels of the borehole water are acceptable.
- Electrical Conductivity (EC) measures water's ability to conduct electrical current, indicating the concentration of dissolved salts and ions. High EC can indicate pollution, high nutrient levels in irrigation, or excessive salts, which can cause toxicity in plants. All readings are high.
- Borehole water $CaCO_3$ levels (total hardness) vary significantly based on geology, with levels often ranging from 29.4 to 784. While water below is generally acceptable, levels exceeding 120 are considered hard, causing scale in pipes, appliance damage, and potential health risks like kidney stones. The $CaCO_3$ concentration at BH A3 is within the applicable groundwater guideline limit.
- Chloride increases the electrical conductivity of water and thus increases its corrosivity. In metal pipes, chloride reacts with metal ions to form soluble salts (8), thus increasing levels of metals in drinking-water. The majority of the Chloride levels are high.
- Nitrite (NO_2) measures the concentration of nitrite ions (NO_2-) in water, providing valuable insights into nitrogen pollution levels and water quality. Nitrite can originate from various sources such as agricultural runoff, industrial discharges, and wastewater effluents. Elevated nitrite levels in water can pose health risks, particularly to infants, and may indicate pollution from fertilizers, septic systems, or industrial activities. Nitrite levels are acceptable.
- Sulphate is a common constituent of water and arises from the dissolution of mineral sulphates in soil and rock, particularly calcium sulphate (gypsum) and other partially soluble sulphate minerals. Since most sulphates are soluble in water, and calcium sulphate relatively soluble, sulphates when added to water tend to accumulate to progressively increasing concentrations. Sulphates are discharged from acid mine wastes and many other industrial processes such as tanneries, textile mills and processes using sulphuric acid or sulphates. The Sulphate values in proximity to the Target Operations infrastructure are high.
- Magnesium (Mg) levels in borehole water contribute to water hardness without posing significant health risks. Magnesium concentrations were generally within the applicable groundwater guideline limit.
- Potassium (K) levels in borehole water generally are part of the total dissolved solids (TDS) that contribute to overall water hardness, with some areas showing higher, yet rarely hazardous, concentrations. Potassium concentrations were within the applicable groundwater guideline limit.
- Sodium (Na) levels in boreholes vary significantly based on geology and location. High-sodium (Na-Cl type) water is commonly found in deeper boreholes or areas with specific rock-water interactions. Potassium concentrations were within the applicable groundwater guideline limit.

6. HYDROLOGICAL IMPACT ASSESSMENT

The following Hydrological Impact Assessment has been conducted based on the assumption that the proposed conceptual Stormwater Management Plan will be fully implemented. At this stage, the timeline and sequence of Project activities remain preliminary. As a result, the potential for interactions or cumulative effects between different hydrological impacts cannot yet be fully assessed and may evolve as the Project design is refined.

6.1 Project Activities Assessed

The following key activities are likely to occur during the different phases of the project, and are assessed in the impact assessment:

Construction Phase:

- Setting up of mining activities.
- To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area

Operational Phase:

- Mining of Jelani JV Project Area using Target 2 and 3 Shafts for access.
- To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area

Closure and Rehabilitation Phase:

- Decommissioning of the Jelani Project at the end of life of the project.

6.2 Methodology for Determining the Significance of Impacts

This section of the report focuses on the identification and assessment of potential surface water impacts that may arise from the proposed project activities, processes, and actions. While the broader EIA Report will consolidate all identified environmental impacts, this Hydrological Study provides an evaluation of the project's interaction with surface water resources.

In line with the EIA Regulations of 2014, the significance of direct, indirect, cumulative, and residual impacts on surface water will be systematically assessed using the methodology outlined in Section 6.2. The findings of this assessment will be integrated into the EIA Report through the standardised impact tables (Table 18 and Table 19), ensuring consistency across all specialist studies.

For the purposes of this study, potential Hydrological Impacts associated with the proposed project are presented in Table 37. These impacts will be subject to a comprehensive risk assessment and risk mitigation planning process, as required under NEMA. The recommended mitigation measures will address all phases of the project (Construction, Operational, Closure and Rehabilitation).

Table 18 : Typical tables used to identify and classify the significance of identified impacts

Nature of The Impact: ***Describe the Impact in Respect to The Activity to be Undertaken***		
	Impact Rating Without Mitigation	Impact Rating With Mitigation
Impact Status: (positive or negative)		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		

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Nature of The Impact: *Describe the Impact in Respect to The Activity to be Undertaken*		
Calculated Significance Rating *(Low, Medium, High)*		
Reversibility: (Reversible or Irreversible)		
Irreplaceable loss of resources: (Yes or No)		
Residual Impacts • (List these below)		
Cumulative Impacts • (List these below)		
Mitigation measures • (List these below)		

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; and secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impact significance rating system is presented in Table 19 and Table 20 and it involves three parts:

- **Part A:** Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration.
- **Part B:** Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A.
- **Part C:** Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequences in Part B:

Table 19 : Consequence Rating Definitions

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold;

Impact Characteristics	Definition	Criteria
		or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration:

Table 20 : Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
MAGNITUDE					
Minor	**Duration**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**Duration**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**Duration**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability:

Table 21 : Significance Rating Methodology

Probability (of exposure to impacts)	Consequence Negative			Consequence Positive		
	Low	Medium	High	Low	Medium	High
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

6.3 Possible Impacts Identified

Table 37 below identifies the impacts associated with each alternative identified for the Proposed Project.

6.4 Impact Assessment and Mitigation

6.4.1 Construction Phase

During the construction phase the earth berm/open bypass channel to carry "clean" water to Swartpan will be constructed by Harmony. This will involve the removal of all vegetation from the existing open channel and then forming the channel to its correct dimensions before lining the channel with concrete. The activities and impacts that are likely to occur during the construction phase are summarised in Table 22.

Table 22 : Summary of activities and impacts for the construction phase

Activity	Impact Description
Removal of vegetation and alteration to the local topography	**Impact 1:** Erosion and wash from exposed soils leading to siltation in nearby surface water runoff areas and/or Swartpan.
Site preparation and land rehabilitation before forming and construction of lining to bypass channel	**Impact 2:** Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality.
Use of construction equipment	**Impact 3:** Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.
Forming of bypass channel and construction of concrete lining to bypass channel	**Impact 4:** Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of concrete lining to bypass channel
Forming of earth berm connecting existing earth berm to bypass channel	**Impact 5:** Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of earth berm
Major storm event during forming and construction of bypass channel	**Impact 6:** Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.

The ratings and proposed mitigation measures for the construction phase are provided in Table 23 to Table 28.

Table 23 : Significance rating of construction impact 1

NATURE OF IMPACT 1: Erosion and wash from exposed soils leading to siltation in nearby surface water runoff areas and/or Swartpan.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	

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Residual impacts • Siltation of Swartpan
Cumulative impacts • Siltation of Swartpan
Mitigation measures • Clearance of vegetation for the new earth berms/open bypass channel must be limited as far as possible. • Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. • The SWMP must be implemented as a first step during the construction phase. • Water quality monitoring must be implemented upstream and downstream of construction sites.

Table 24: Significance rating of construction impact 2

NATURE OF IMPACT 2: Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen		
Cumulative impacts • None foreseen		
Mitigation measures • Waste piles to be bermed off to prevent stormwater erosion. • The SWMP must be implemented as a first step during the construction phase. • Rehabilitation plan to be implemented accurately and monitored closely.		

Table 25: Significance rating of construction impact 3

NATURE OF IMPACT 3: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local

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NATURE OF IMPACT 3: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.		
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Moderate	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Water quality monitoring must be implemented upstream and downstream of construction sites. • Maintain all construction equipment. • Maintenance of construction equipment should be prohibited at or near the watercourse. • Train staff in spill response and deploy spill kits at active zones. • Drip trays shall be placed beneath leaking sections of construction equipment.		

Table 26 : Significance rating of construction impact 4

NATURE OF IMPACT 4: Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of concrete lining to bypass channel.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • SWMP must be implemented as a first step during the construction phase. • Phase construction to minimise exposed areas		

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Table 27 : Significance rating of construction impact 5

NATURE OF IMPACT 5: Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of earth berm.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • The SWMP must be implemented as a first step during the construction phase. • Monitor runoff during and after construction. • Water quality monitoring must be implemented upstream and downstream of construction sites.		

Table 28: Significance rating of construction impact 6

NATURE OF IMPACT 6: Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		

NATURE OF IMPACT 6: Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.
Mitigation measures • Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. • The SWMP must be implemented as a first step during the construction phase. • Water quality monitoring must be implemented upstream and downstream of construction sites.

6.4.2 Operational Phase

During the operational phase, the proposed "dirty" water and "clean" water system will operate for the LoM of both the Jelani Project and the Target Operation.

It is of utmost importance that the "dirty" water system (Emergency Overflow Dam, Blue RWD, and North-west RWD) are operated at the designed "operational" level allowing capacity in the system to accommodate the 1:50-year event. All stormwater infrastructure must be regularly monitored and maintained.

The activities and impacts that could potentially occur during the operational phase are summarised in Table 29.

Table 29 : Summary of activities and impacts for the operational phase

Activity	Impact Description
Maintenance of stormwater infrastructure, including berms and channels	**Impact 1:** Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality
"Dirty" water infrastructure (Emergency Overflow Dam, Blue RWD and North-west RWD) not operated at optimum level, resulting in insufficient capacity to retain the 1:50-year event runoff	**Impact 2:** "Dirty" water infrastructure will overflow during extreme rainfall and contaminate Swartpan and the natural watercourse downstream of Swartpan.

The ratings and proposed mitigation measures for the operational phase are indicated in Table 30 to

Table 31.

Table 30 : Significance rating of operational impact 1

NATURE OF IMPACT 1: Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Positive
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Moderate	Minor

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NATURE OF IMPACT 1: Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality.		
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if maintenance is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if maintenance is done correctly.		
Mitigation measures • Implementation of the proposed SWMP. It must be ensured that stormwater measures (e.g. Berms) are designed, constructed, operated and maintained, to ensure that stormwater does not spill more than once in 50 years, to be compliant with GN R704 regulations. • Undertake regular inspections and maintenance on the bypass channel and earth berms.		

Table 31 : Significance rating of operational impact 2

NATURE OF IMPACT 2: "Dirty" water infrastructure will overflow during extreme rainfall and contaminate Swartpan and the natural watercourse downstream of Swartpan.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Positive
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating *(Low, Medium, High)*	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if the "dirty" water infrastructure is operated correctly.		
Cumulative impacts • None foreseen, as the impact will cease if "dirty" water infrastructure is operated correctly.		
Mitigation measures • Regular inspections and maintenance of "dirty" water infrastructure. • Harmony to operate the infrastructure at the designed operating level.		

6.4.3 Closure and Rehabilitation Phase

Once the Jelani Project is complete, the fate of the "dirty" water infrastructure (Emergency Overflow Dam, Blue RWD and North-west RWD) will depend on if the Target Operation owned by Harmony is still in operation. Assuming that it is, the operation and maintenance of the infrastructure will continue to be the responsibility of Harmony.

The activities and impacts that are likely to occur during the closure and rehabilitation phase are summarised in Table 32.

Table 32 : Summary of activities and impacts for the closure and rehabilitation phase

Activity	Impact Description
Demolition of existing "dirty" water infrastructure, and open bypass channel	**Impact 1:** Effluents residues containing alkaline or heavy metals pollutes nearby soil and water resources
Rehabilitation of the existing "dirty" water infrastructure, and open bypass channel	**Impact 2:** Erosion and wash off soils resulting in water quality issues in the surrounding watercourses
Reprofiling of land to restore original topography	**Impact 3:** Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns

The ratings and proposed mitigation measures for the closure and rehabilitation phase are indicated in Table 33 to Table 35

Table 33 : Significance rating of closure and rehabilitation impact 1

NATURE OF IMPACT 1: Effluents residues containing alkaline or heavy metals pollutes nearby soil and water resources		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • Possible, unless potential spills are rehabilitated		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Remove and treat effluent before demolition begins. • Neutralise pH to environmentally acceptable limits before discharge or containment. • Stormwater infrastructure to be implemented once end land use has been determined.		

• Post-Rehabilitation monitoring.

Table 34 : Significance rating of closure and rehabilitation impact 2

NATURE OF IMPACT 2: Erosion and wash off soils resulting in water quality issues in the surrounding watercourses		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Mitigation measures • Stormwater infrastructure to be implemented once end land use has been determined. • Design reprofiled areas with stable drainage patterns. • Post-Rehabilitation monitoring.		

Table 35 : Significance rating of closure and rehabilitation impact 3

NATURE OF IMPACT 3: Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		

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NATURE OF IMPACT 3: Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns
Mitigation measures • Stormwater infrastructure to be implemented once end land use has been determined. • Design reprofiled areas with stable drainage patterns. • Post-Rehabilitation monitoring.

6.4.4 Post Closure Phase

Should rehabilitation be successfully implemented, then it is unlikely that any negative impacts will occur during the post closure phase. The removal of the "dirty" water infrastructure at the end of life is likely to result in a long-term positive impact on the surrounding watercourses, if rehabilitation is successfully implemented.

6.5 Cumulative Impacts

Cumulative impacts are impacts that result from the incremental impact of the proposed activities on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

The project is in a catchment that is highly impacted by mining activities. The implementation of a sound SWMP is crucial to separate "clean" and "dirty" water systems in the project area. The monitoring and maintenance of the implemented SWMP is of utmost importance, to ensure that spillages into the downslope watercourses do not occur.

The removal of the "dirty" water infrastructure and the open bypass channel and the successful implementation of a rehabilitation plan could enhance the catchment baseline water quality. Should the rehabilitation plan not be followed, then in the long term, the proposed project has the potential to cumulatively add to the already deteriorated water quality within the Losdoringspruit catchment.

The cumulative impact of the proposed project on the surface water quality of the catchment is rated in Table 36.

Table 36 : Cumulative impact rating for surface water quality

NATURE OF IMPACT: Should dirty water runoff not be contained and an appropriate rehabilitation plan for the area not be undertaken and successfully implemented, then the proposed project has the potential to add cumulatively to the already deteriorated surface		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.		

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NATURE OF IMPACT: Should dirty water runoff not be contained and an appropriate rehabilitation plan for the area not be undertaken and successfully implemented, then the proposed project has the potential to add cumulatively to the already deteriorated surface
Cumulative impacts • None foreseen, as the impact will cease if rehabilitation is done correctly.
Mitigation measures • Effective stormwater management that captures and contains all site runoff as proposed in this report, and in accordance with GN R704. • Effective monitoring of the stormwater management system to ensure it is operational and maintained. • Successful removal of the “dirty” water infrastructure and the open bypass channel and rehabilitation of the areas • Water quality monitoring must be implemented upstream and downstream of site.

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6.6 Impact Summary Table

The impacts and mitigation measures are summarised in Table 37.

Table 37 : Summary of the potential surface water impacts and proposed mitigation measures

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
Construction Phase													
1	Removal of vegetation and alteration to the local topography	Erosion and wash from exposed soils leading to siltation in nearby surface water runoff areas and/or Swartpan.	Minor	Short term	Local	Possible	**Low**	Clearance of vegetation for the new earth berms/open bypass channel must be limited as far as possible. Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. The SWMP must be implemented as a first step during the construction phase. Water quality monitoring must be implemented upstream and downstream of construction sites.	Minor	Short term	Local	Possible	**Low**

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Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
2	Site preparation and land rehabilitation before forming and construction of lining to bypass channel	Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality.	Minor	Short term	Local	Possible	**Low**	Waste piles to be bermed off to prevent stormwater erosion. The SWMP must be implemented as a first step during the construction phase. Rehabilitation plan to be implemented accurately and monitored closely.	Minor	Short term	Local	Unlikely	**Low**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
3	Use of construction equipment	Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water.	Minor	Short term	Local	Possible	**Low**	Water quality monitoring must be implemented upstream and downstream of construction sites. Maintain all construction equipment. Maintenance of construction equipment at or near the watercourse must be prohibited. Train staff in spill response and deploy spill kits at active zones. Drip trays shall be placed beneath leaking sections of construction equipment.	Minor	Short term	Local	Unlikely	**Low**

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Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
4	Forming of bypass channel and construction of concrete lining to bypass channel	Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of concrete lining to bypass channel	Minor	Short term	Local	Possible	**Low**	Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. The SWMP must be implemented as a first step during the construction phase. Water quality monitoring must be implemented upstream and downstream of construction sites.	Minor	Short term	Local	Unlikely	**Low**

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Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
5	Forming of earth berm connecting existing earth berm to bypass channel	Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of earth berm.	Minor	Short term	Local	Possible	**Low**	The SWMP must be implemented as a first step during the construction phase. Monitor runoff during and after demolition.	Minor	Short term	Local	Unlikely	**Low**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
6	Major storm event during forming and construction of bypass channel	Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.	Minor	Short term	Local	Possible	**Low**	Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working area. The SWMP must be implemented as a first step during the construction phase. Water quality monitoring must be implemented upstream and downstream of construction sites.	Minor	Short term	Local	Unlikely	**Low**
Operational Phase													
1	Maintenance of stormwater infrastructure including berms and channels	Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby	Moderate	Short term	Regional	Possible	**Medium**	Implementation of the proposed SWMP. It must be ensured that stormwater measures (e.g. Berms) are designed, constructed, operated and maintained, to ensure that stormwater does not spill more than once in 50 years, to be compliant with GN R704 regulations.	Minor	Short term	Local	Unlikely	**Low**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
		watercourses, degrading water quality						Undertake regular inspections and maintenance on the bypass channel and earth berms.					
2	"Dirty" water infrastructure (Emergency Overflow Dam, Blue RWD and North-west RWD) not operated at optimum level, resulting in insufficient capacity to retain the 1:50-year event runoff	"Dirty" water infrastructure will overflow during extreme rainfall and contaminate Swartpan and the natural watercourse downstream of Swartpan	Minor	Short term	Local	Possible	**Low**	Regular inspections and maintenance of "dirty water" infrastructure. Harmony to operate the infrastructure at the designed operating level.	Minor	Short term	Local	Unlikely	**Low**
Closure & Rehabilitation Phase													
1	Demolition of existing "dirty" water infrastructure	Effluents residues containing alkaline or heavy metals pollutes nearby	Minor	Short term	Local	Possible	**Low**	Remove and treat effluent before demolition begins.	Minor	Short term	Local	Unlikely	**Low**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
	and open bypass channel	soil and water resources						Neutralise pH to environmentally acceptable limits before discharge or containment. Stormwater infrastructure to be implemented once end land use has been determined. Post-rehabilitation monitoring.					
2	Rehabilitation of the existing "dirty" water infrastructure and open bypass channel	Erosion and wash off soils resulting in water quality issues in the surrounding watercourses	Minor	Short term	Local	Possible	**Low**	Stormwater infrastructure to be implemented once end land use has been determined. Design reprofiled areas with stable drainage patterns. Post-Rehabilitation monitoring	Minor	Short term	Local	Unlikely	**Low**

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Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
3	Reprofiling of land to restore original topography	Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns	Minor	Short term	Local	Possible	**Low**	Stormwater infrastructure to be implemented once end land use has been determined. Design reprofiled areas with stable drainage patterns. Post-Rehabilitation monitoring.	Minor	Short term	Local	Unlikely	**Low**

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7. MONITORING PLANS

The following monitoring plans are recommended:

- It is recommended that stormwater infrastructure be inspected once a month by the operator during the dry season and wet season. They should also be observed right away following any extreme rainfall events. Any identified damage, or maintenance issues should be addressed promptly to ensure the continued functionality of the stormwater infrastructure. The maintenance manager or onsite Environmental Officer should oversee monitoring. The following should be included in inspections that are documented:
  - The date of the examination.
  - Rainfall quantity received before inspection.
  - Photos of any identified damage or maintenance issue observed.
  - The steps taken to resolve problems.
  - Time required to do so.
  - Photos taken after action was performed.
- A surface water quality monitoring programme plays a critical role in managing potential impacts by identifying water quality deterioration early and guiding the implementation of appropriate mitigation measures. Sampling must be conducted in line with the DWS Best Practice Guideline G3: Water Monitoring Systems. All samples should be stored at approximately 4°C, shielded from direct sunlight, and delivered to an accredited laboratory within 24 hours for analysis. Monitoring results must be evaluated against previous sampling data to identify any significant deviations or emerging trends. Should trend analysis reveal a decline in water quality from the established baseline, an immediate investigation is required to determine whether the operation is the source. If found responsible, corrective actions must be promptly implemented to prevent further contamination. Monitoring reports should be compiled monthly, or as otherwise directed by the DWS, and should include trend analyses. It is also recommended that upstream and downstream monitoring points be compared to assess the potential influence of site activities on surface water quality.

8. REFERENCES

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9. APPENDICES (As Indicated on the Next Page/s)

Appendix A

Rational Formula Calculations – Existing Scenario

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Rational Method

Description of catchment :	Catchment Area A	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	12-Feb-26

Physical characteristics

Size of catchment (A)	3.1240	km^2	Mean annual Rainfall (MAP)	502	mm
Longest watercourse (L)	2.893	km	2-year return period rainfall (M)		mm
$H_{85\%}$	9	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	0	MSL	Weather Service station	Odendaalsrus	
Average slope (S_{av})	0.00415	m/m	Weather Service number	364322	
Over landflow length	0.59	km	Area distribution factors		
$H_{100\%}$	4	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	0	MSL	100%	0%	0%
Average slope (S_{av})	0.00678	m/m	Notes:	Catchment area flowing into North-west RWD, Blue RWD and Emergency Overflow Dam	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	0	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	0%	0.01	0
Flat areas (3% - 10%)	100%	0.06	0.06
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	0%	0.22	0
Total	**100%**		**0.06**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0.045	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	0%	0.09	0
Semi-permeable (C)	50%	0.12	0.06
Semi-permeable (C/D)	50%	0.165	0.0825
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.1425**
Vegetation	%	Factor	C_v
Thick bush and plantation	0%	0.03	0
Light bush and farm-lands	0%	0.07	0
Grassland	100%	0.17	0.17
Cultivated land, contoured	0%	0.03	0
Cultivated land	0%	0.02	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.373**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	50%	0.05	0.025
Sandy, Steep (>7%)	0%	0.15	0.000
Heavy soil, flat (<2%)	0%	0.13	0.000
Heavy soil, Steep (>7%)	0%	0.25	0.000
Residential areas			
Houses	30%	0.3	0.090
Flats	0%	0.5	0.000
Industry			
Light industry	0%	0.5	0.000
Heavy industry	0%	0.6	0.000
Business			
City centre	0%	0.7	0.000
Suburban	0%	0.5	0.000
Streets	20%	0.7	0.140
Maximum Flood	0%	1	0.000
	100%		
Total (C_2)			**0.255**

Time of Concentration (Tc)

Overland flow

$$T_c = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

0.863 Hours

Defined watercourse

$$T_c = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

1.242 Hours

Notes:

$T_{C-TOTAL}$ **2.11** Hours V= **0.38** m/s

Run-off Coefficient

Return period (years), T	2	5	10	20	50	100	200
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted factor for initial saturation, F_t	0.513	0.563	0.613	0.683	0.900	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.191	0.210	0.228	0.254	0.335	0.373	0.373
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.191*	*0.210*	*0.228*	*0.254*	*0.335*	*0.373*	*0.373*

Rainfall

Return period (years), T	2	5	10	20	50	100	200
Point Rainfall - SCS data (mm) P_T	34.503	46.613	54.990	63.361	74.660	83.437	92.520
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	16.388	22.140	26.119	30.095	35.461	39.630	43.944
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*16.000*	*22.000*	*26.000*	*30.000*	*35.000*	*40.000*	*44.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***2.651***	***4.000***	***5.148***	***6.618***	***10.182***	***12.930***	***14.223***

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Rational Method

Description of catchment :	Catchment Area B	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	12-Feb-26

Physical characteristics

Size of catchment (A)	2.3180	km^2	Mean annual Rainfall (MAP)	502	mm
Longest watercourse (L)	1.28	km	2-year return period rainfall (M)		mm
$H_{85\%}$	4	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	0	MSL	Weather Service station	Odendaalsrus	
Average slope (S_{av})	0.00417	m/m	Weather Service number	364322	
Over landflow length	2.601	km	Area distribution factors		
$H_{100\%}$	18	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	0	MSL	100%	0%	0%
Average slope (S_{av})	0.00692	m/m	Notes:	Catchment area flowing into North-west RWD, Blue RWD and Emergency Overflow Dam	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	0	%			

Rural				Urban			
Surface slope	%	Factor	C_s	**Description**	%	Factor	C_2
Vleis and pans (< 3%)	0%	0.01	0	**Lawns**			
Flat areas (3% - 10%)	100%	0.06	0.06	Sandy, flat (<2%)	0%	0.05	0.000
Hilly (10% - 30%)	0%	0.12	0	Sandy, Steep (>7%)	0%	0.15	0.000
Steep areas (> 30%)	0%	0.22	0	Heavy soil, flat (<2%)	0%	0.13	0.000
Total	**100%**		**0.06**	Heavy soil, Steep (>7%)	0%	0.25	0.000
Permeability	%	Factor	C_p	**Residential areas**			
Very permeable (A)	0%	0.03	0	Houses	0%	0.3	0.000
Very Permeable (A/B)	0%	0	0	Flats	0%	0.5	0.000
Permeable (B)	0%	0.06	0				
Permeable (B/C)	0%	0.09	0	**Industry**			
Semi-permeable (C)	50%	0.12	0.06	Light industry	0%	0.5	0.000
Semi-permeable (C/D)	50%	0.165	0.0825	Heavy industry	0%	0.6	0.000
Impermeable (D)	0%	0.21	0				
Total	**100%**		**0.1425**				
Vegetation	%	Factor	C_v	**Business**			
Thick bush and plantation	0%	0.03	0	City centre	0%	0.7	0.000
Light bush and farm-lands	0%	0.07	0	Suburban	0%	0.5	0.000
Grassland	100%	0.17	0.17	Streets	0%	0.7	0.000
Cultivated land, contoured	0%	0.03	0	Maximum Flood	0%	1	0.000
Cultivated land	0%	0.02	0				
No vegetation	0%	0.26	0				
Total	**100%**		**0.17**		**0%**		
Total (C_1)			**0.373**	**Total (C_2)**			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_c = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.718 Hours

Defined watercourse

$$T_c = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.662 Hours

Notes:

$T_{C\text{ - TOTAL}}$ **2.38** Hours V= **0.15** m/s

Run-off Coefficient

Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted factor for initial saturation, F_t	0.513	0.563	0.613	0.683	0.950	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.191	0.210	0.228	0.254	0.354	0.373	0.373
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.191*	*0.210*	*0.228*	*0.254*	*0.354*	*0.373*	*0.373*

Rainfall

Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	35.245	47.625	56.191	64.738	76.280	85.246	94.531
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	14.810	20.012	23.612	27.203	32.053	35.821	39.722
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*15.000*	*20.000*	*24.000*	*27.000*	*32.000*	*36.000*	*40.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***1.844***	***2.698***	***3.526***	***4.420***	***7.291***	***8.635***	***9.594***

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Rational Method

Description of catchment :	Catchment C	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	12-Feb-26

Physical characteristics

Size of catchment (A)	2.9600	km^2	Mean annual Rainfall (MAP)	502	mm
Longest watercourse (L)	0	km	2-year return period rainfall (M)		mm
$H_{85\%}$	20	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	0	MSL	Weather Service station	Odendaalsrus	
Average slope (S_{av})	#DIV/0!	m/m	Weather Service number	364322	
Over landflow length	3.494	km	Area distribution factors		
$H_{100\%}$	21	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	0	MSL	100%	0%	0%
Average slope (S_{av})	0.00601	m/m	Notes:	Catchment area flowing directly into Swartpan, excluding Catchments A and B	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	0	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	15%	0.01	0.0015
Flat areas (3% - 10%)	85%	0.06	0.051
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	0%	0.22	0
Total	**100%**		**0.0525**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	0%	0.09	0
Semi-permeable (C)	50%	0.12	0.06
Semi-permeable (C/D)	50%	0.165	0.0825
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.1425**
Vegetation	%	Factor	C_v
Thick bush and plantation	0%	0.03	0
Light bush and farm-lands	0%	0.07	0
Grassland	0%	0.17	0
Cultivated land, contoured	100%	0.03	0.03
Cultivated land	0%	0.02	0
No vegetation	0%	0.26	0
Total	**100%**		**0.03**
Total (C_1)			**0.225**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.05	0.000
Sandy, Steep (>7%)	0%	0.15	0.000
Heavy soil, flat (<2%)	0%	0.13	0.000
Heavy soil, Steep (>7%)	0%	0.25	0.000
Residential areas			
Houses	0%	0.3	0.000
Flats	0%	0.5	0.000
Industry			
Light industry	0%	0.5	0.000
Heavy industry	0%	0.6	0.000
Business			
City centre	0%	0.7	0.000
Suburban	0%	0.5	0.000
Streets	0%	0.7	0.000
Maximum Flood	0%	1	0.000
	0%		
Total (C_2)			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_c = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

2.038 Hours

Defined watercourse

$$T_c = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.000 Hours

Notes:

$T_{C-TOTAL}$ **2.04** Hours V= **0.00** m/s

Run-off Coefficient

Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.225	0.225	0.225	0.225	0.225	0.225	0.225
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(\text{sum}(D_{factor} \times C_{5\%}))$	0.225	0.225	0.225	0.225	0.225	0.225	0.225
Adjusted factor for initial saturation, F_t	0.513	0.563	0.613	0.683	0.950	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.115	0.127	0.138	0.154	0.214	0.225	0.225
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.115*	*0.127*	*0.138*	*0.154*	*0.214*	*0.225*	*0.225*

Rainfall

Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	34.310	46.350	54.678	63.004	74.240	82.968	91.998
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	16.835	22.742	26.829	30.914	36.427	40.710	45.140
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*17.000*	*23.000*	*27.000*	*31.000*	*36.000*	*41.000*	*45.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***1.612***	***2.393***	***3.059***	***3.914***	***6.327***	***7.585***	***8.325***

Appendix B

Brooker Method – Existing Scenario

Project		**Catchment Area A 1:50 year existin**				**2026/02/12**			
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	158.2	min		2.6	hr	
RI	**50**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	312.4	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	127	min	31.0	mm/h					
Rational C	0.34		Peak Rainfall Intensity		Triangular Hyetograph				
			62.1	mm/h	At time		47	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	85592	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	1	1	No	Crest Len	1306	m	$C_{d(unsub)}$	0.75	
Dia	0.100	0.1	m	Crest Lvl	1306	m	$C_{d(sub)}$	0.62	
Invert Lvl	1304	1304	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	3.0			Width	100.0				
Invert Lvl	1304.00			Invert Lvl	1306.00				
Free board	2.00			Free board	0.20				

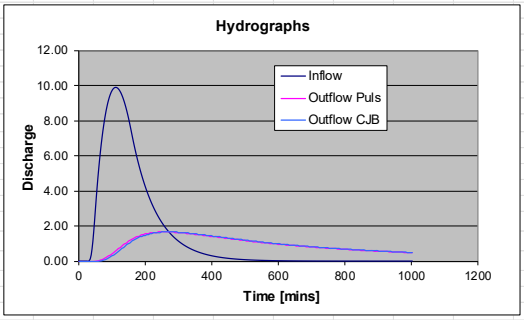
Reservoir Data

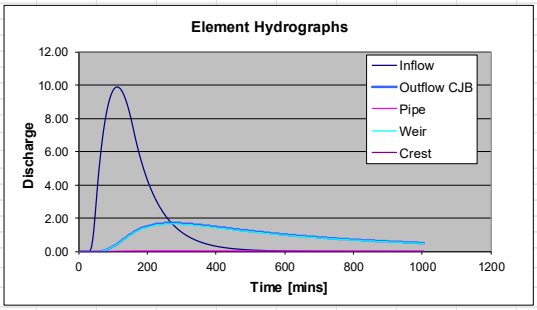
Stage	Depth	Area	Volume
1304.00	0.00	136000	0
1304.50	0.50	136300	68075
1305.00	1.00	136600	136300
1305.50	1.50	136600	204600
1306.00	2.00	136600	272900
1306.50	2.50	136600	341200
1307.00	3.00	136600	409500
1307.50	3.50	136600	477800

Initial Conditions		
Stage	1304.00	m
Depth	0.00	m
Vol	0	m^3
Area	136000	m^2
Discharge	0.00	m^3/s

Results Summary	**Peaks**					
	Q_{in}	9.869	m^3/s			
	Q_{out} CJB	1.685	m^3/s	Q_{pipe}	0.014	m^3/s
	Q_{out} Puls	1.685	m^3/s	Q_{weir}	1.672	m^3/s
	Stage	1304.498	m	Q_{crest}	0.000	m^3/s
	Stored Vol	67394	m^3			

Developed by Chris Brooker PrEng
Version 5.0
Chris Brooker & Associates
cbrooker@iafrica.com





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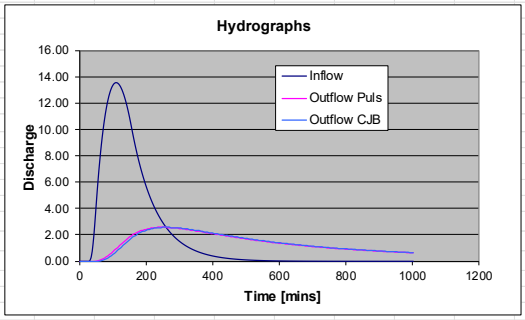
Project		**Catchment Area A 1:100 year existi**			**2026/02/12**				
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	155.9	min		2.6	hr	
RI	**100**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	312.4	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	127	min	38.6	mm/h					
Rational C	0.37		Peak Rainfall Intensity		Triangular Hyetograph				
			77.3	mm/h	At time		47	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	117024	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	1	1	No	Crest Len	1306	m	$C_{d(unsub)}$	0.75	
Dia	0.100	0.1	m	Crest Lvl	1306	m	$C_{d(sub)}$	0.62	
Invert Lvl	1304	1304	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	3.0			Width	100.0				
Invert Lvl	1304.00			Invert Lvl	1306.00				
Free board	2.00			Free board	0.20				

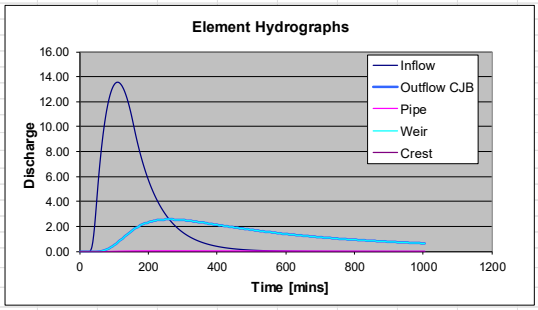
Reservoir Data

Stage	Depth	Area	Volume
1304.00	0.00	136000	0
1304.50	0.50	136300	68075
1305.00	1.00	136600	136300
1305.50	1.50	136600	204600
1306.00	2.00	136600	272900
1306.50	2.50	136600	341200
1307.00	3.00	136600	409500
1307.50	3.50	136600	477800

Initial Conditions							
Stage	1304.00	m					
Depth	0.00	m					
Vol	0	m^3					
Area	136000	m^2					
Discharge	0.00	m^3/s					
Results Summary	**Peaks**						
	Q_{in}	13.528	m^3/s				
	Q_{out} CJB	2.590	m^3/s	Q_{pipe}	0.016	m^3/s	
	Q_{out} Puls	2.590	m^3/s	Q_{weir}	2.574	m^3/s	
	Stage	1304.661	m	Q_{crest}	0.000	m^3/s	
	Stored Vol	89907	m^3				

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Chris Brooker & Associates
cbrooker@iafrica.com





Project		**Catchment B 1:50 year existing**				**2026/02/12**			
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	177.1	min	3.0	hr		
RI	**50**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	231.8	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	143	min	28.3	mm/h					
Rational C	0.35		Peak Rainfall Intensity		Triangular Hyetograph				
			56.6	mm/h	At time	53	mins		
Storm									
Time to peak	0.3	ratio	Runoff Vol	68498	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	0	m	$C_{d(unsub)}$	0.75	
Dia	0.000	0	m	Crest Lvl	0	m	$C_{d(sub)}$	0.62	
Invert Lvl	0	0.0001	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	0.0			Width	0.0				
Invert Lvl	0.00			Invert Lvl	0.40				
Free board	0.40			Free board	0.20				

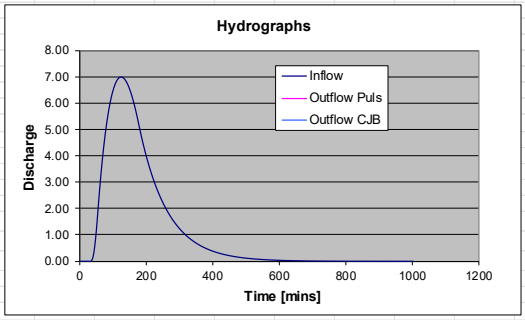
Reservoir Data

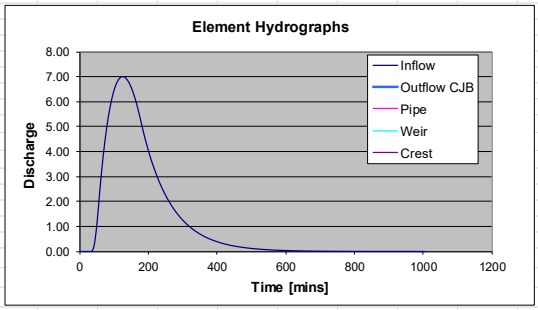
Stage	Depth	Area	Volume
0.00	0.00	0	0
0.50	0.50	0	0
1.00	1.00	0	0
1.50	1.50	0	0
2.00	2.00	0	0
2.50	2.50	0	0
3.00	3.00	0	0
3.50	3.50	0	0

Initial Conditions		
Stage	0.00	m
Depth	0.00	m
Vol	#N/A	m^3
Area	#N/A	m^2
Discharge	#N/A	m^3/s

Results Summary	**Peaks**					
	Q_{in}	6.985	m^3/s			
	Q_{out} CJB	#N/A	m^3/s	Q_{pipe}	#N/A	m^3/s
	Q_{out} Puls	#N/A	m^3/s	Q_{weir}	#N/A	m^3/s
	Stage	#N/A	m	Q_{crest}	#N/A	m^3/s
	Stored Vol	#N/A	m^3			

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Project		**Catchment B 1:100 year existing**				**2026/02/12**			
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	175.9	min		2.9	hr	
RI	**100**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	231.8	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	143	min	35.0	mm/h					
Rational C	0.37		Peak Rainfall Intensity		Triangular Hyetograph				
			70.0	mm/h	At time		53	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	88747	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	0	m	$C_{d(unsub)}$	0.75	
Dia	0.000	0	m	Crest Lvl	0	m	$C_{d(sub)}$	0.62	
Invert Lvl	0	0.0001	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	0.0			Width	0.0				
Invert Lvl	0.00			Invert Lvl	0.40				
Free board	0.40			Free board	0.20				

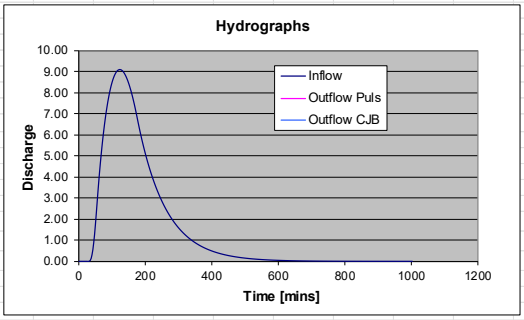
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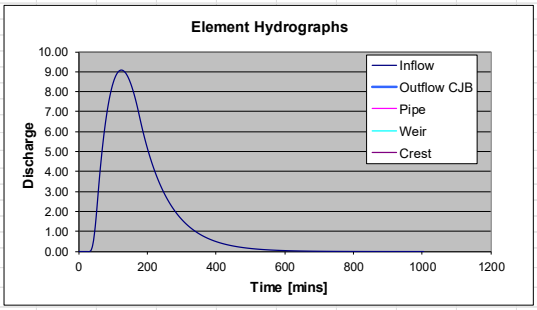
Stage	Depth	Area	Volume
0.00	0.00	0	0
0.50	0.50	0	0
1.00	1.00	0	0
1.50	1.50	0	0
2.00	2.00	0	0
2.50	2.50	0	0
3.00	3.00	0	0
3.50	3.50	0	0

Initial Conditions		
Stage	0.00	m
Depth	0.00	m
Vol	#N/A	m^3
Area	#N/A	m^2
Discharge	#N/A	m^3/s

Results Summary	**Peaks**					
	Q_{in}	9.067	m^3/s			
	Q_{out} CJB	#N/A	m^3/s	Q_{pipe}	#N/A	m^3/s
	Q_{out} Puls	#N/A	m^3/s	Q_{weir}	#N/A	m^3/s
	Stage	#N/A	m	Q_{crest}	#N/A	m^3/s
	Stored Vol	#N/A	m^3			

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Chris Brooker & Associates
cbrooker@iafrica.com





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Project		**Catchment C 1:50 year existing**				**2026/02/12**			
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	160.2	min		2.7	hr	
RI	**50**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	296.0	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	122	min	30.7	mm/h					
Rational C	0.21		Peak Rainfall Intensity			Triangular Hyetograph			
			61.4	mm/h		At time	48	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	51927	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	2	m	$C_{d(unsub)}$	0.75	
Dia	0.525	0.525	m	Crest Lvl	2	m	$C_{d(sub)}$	0.62	
Invert Lvl	1301	1301	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	10.0			Width	40.0				
Invert Lvl	1301.00			Invert Lvl	1301.10				
Free board	0.10			Free board	1.00				

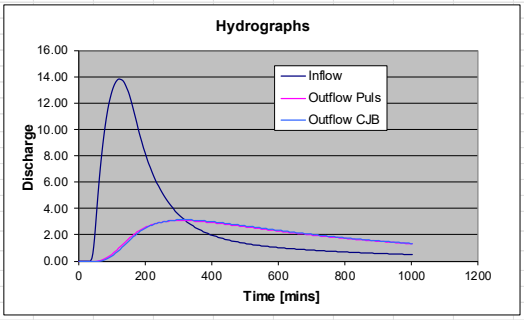
Reservoir Data

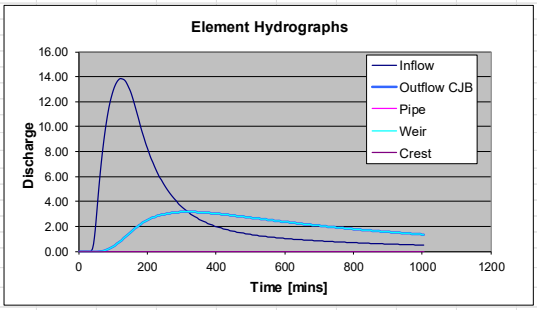
Stage	Depth	Area	Volume
1301.00	0.00	293756	0
1301.50	0.50	331823	156395
1302.00	1.00	364804	330552
1302.50	1.50	397785	521199
1303.00	2.00	430766	728337
1303.50	2.50	463747	951965
1304.00	3.00	496728	1192084
1304.50	3.50	529709	1448693

Initial Conditions		
Stage	1301.00	m
Depth	0.00	m
Vol	0	m^3
Area	293756	m^2
Discharge	0.00	m^3/s

Results Summary	**Peaks**					
	Q_{in}	13.816	m^3/s			
	Q_{out} CJB	3.186	m^3/s	Q_{pipe}	0.000	m^3/s
	Q_{out} Puls	3.109	m^3/s	Q_{weir}	3.186	m^3/s
	Stage	1301.342	m	Q_{crest}	0.000	m^3/s
	Stored Vol	106661	m^3			

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cbrooker@iafrica.com





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Project		**Catchment C 1:100 year existing**				**2026/02/12**			
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	159.5	min		2.7	hr	
RI	**100**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	296.0	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	122	min	37.9	mm/h					
Rational C	0.23		Peak Rainfall Intensity		Triangular Hyetograph				
			75.9	mm/h	At time		48	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	67163	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	2	m	$C_{d(unsub)}$	0.75	
Dia	0.525	0.525	m	Crest Lvl	2	m	$C_{d(sub)}$	0.62	
Invert Lvl	1301	1301	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	10.0			Width	40.0				
Invert Lvl	1301.00			Invert Lvl	1301.10				
Free board	0.10			Free board	1.00				

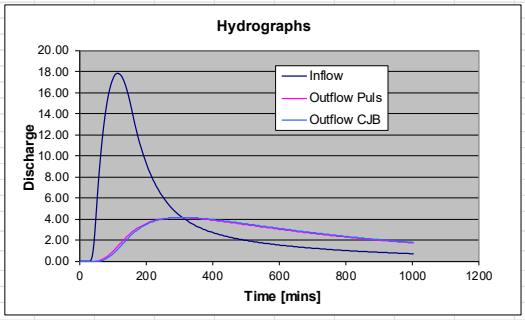
Reservoir Data

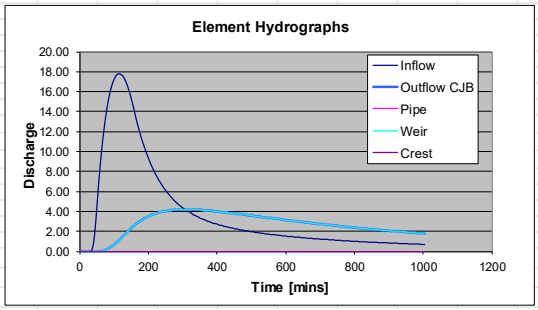
Stage	Depth	Area	Volume
1301.00	0.00	293756	0
1301.50	0.50	331823	156395
1302.00	1.00	364804	330552
1302.50	1.50	397785	521199
1303.00	2.00	430766	728337
1303.50	2.50	463747	951965
1304.00	3.00	496728	1192084
1304.50	3.50	529709	1448693

Initial Conditions		
Stage	1301.00	m
Depth	0.00	m
Vol	0	m^3
Area	293756	m^2
Discharge	0.00	m^3/s

Results Summary	**Peaks**					
	Q_{in}	17.799	m^3/s			
	Q_{out} CJB	4.154	m^3/s	Q_{pipe}	0.000	m^3/s
	Q_{out} Puls	4.154	m^3/s	Q_{weir}	4.154	m^3/s
	Stage	1301.411	m	Q_{crest}	0.000	m^3/s
	Stored Vol	127305	m^3			

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Chris Brooker & Associates
cbrooker@iafrica.com





Appendix C

Rational Formula Calculations – Proposed Scenario

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Rational Method

Description of catchment :	Catchment A proposed	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	12-Feb-26

Physical characteristics

Size of catchment (A)	0.9260	km^2	Mean annual Rainfall (MAP)	502	mm
Longest watercourse (L)	3.451	km	2-year return period rainfall (M)		mm
$H_{85\%}$	5	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	0	MSL	Weather Service station	Odendaalsrus	
Average slope (S_{av})	0.00193	m/m	Weather Service number	364322	
Over landflow length	1.261	km	Area distribution factors		
$H_{100\%}$	5	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	0	MSL	100%	0%	0%
Average slope (S_{av})	0.00397	m/m	Notes:	Area draining to North-west RWD, Blue RWD and Emergency Overflow ponds	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	0	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	0%	0.01	0
Flat areas (3% - 10%)	100%	0.06	0.06
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	0%	0.22	0
Total	**100%**		**0.06**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0.045	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	0%	0.09	0
Semi-permeable (C)	50%	0.12	0.06
Semi-permeable (C/D)	50%	0.165	0.0825
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.1425**
Vegetation	%	Factor	C_v
Thick bush and plantation	0%	0.03	0
Light bush and farm-lands	0%	0.07	0
Grassland	100%	0.17	0.17
Cultivated land, contoured	0%	0.03	0
Cultivated land	0%	0.02	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.373**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	50%	0.05	0.025
Sandy, Steep (>7%)	0%	0.15	0.000
Heavy soil, flat (<2%)	0%	0.13	0.000
Heavy soil, Steep (>7%)	0%	0.25	0.000
Residential areas			
Houses	30%	0.3	0.090
Flats	0%	0.5	0.000
Industry			
Light industry	0%	0.5	0.000
Heavy industry	0%	0.6	0.000
Business			
City centre	0%	0.7	0.000
Suburban	0%	0.5	0.000
Streets	20%	0.7	0.140
Maximum Flood	0%	1	0.000
	100%		**0.255**

Time of Concentration (Tc)

Overland flow

$$T_c = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.395 Hours

Defined watercourse

$$T_c = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

1.909 Hours

Notes:

$T_{C-TOTAL}$ **3.30** Hours V= **0.29** m/s

Run-off Coefficient

Return period (years), T	2	5	10	20	50	100	200
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%})$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted factor for initial saturation, F_t	0.513	0.563	0.613	0.683	0.900	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.191	0.210	0.228	0.254	0.335	0.373	0.373
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.191*	*0.210*	*0.228*	*0.254*	*0.335*	*0.373*	*0.373*

Rainfall

Return period (years), T	2	5	10	20	50	100	200
Point Rainfall - SCS data (mm) P_T	37.775	51.075	60.285	69.430	81.800	91.410	101.385
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	11.431	15.456	18.243	21.011	24.754	27.662	30.681
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*11.000*	*15.000*	*18.000*	*21.000*	*25.000*	*28.000*	*31.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***0.540***	***0.808***	***1.056***	***1.373***	***2.156***	***2.683***	***2.970***

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Rational Method

Description of catchment :	Catchment Area B	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	12-Feb-26

Physical characteristics

Size of catchment (A)	4.5160	km^2	Mean annual Rainfall (MAP)	502	mm
Longest watercourse (L)	1.218	km	2-year return period rainfall (M)		mm
$H_{85\%}$	4	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	0	MSL	Weather Service station	Odendaalsrus	
Average slope (S_{av})	0.00438	m/m	Weather Service number	364322	
Over landflow length	3.396	km	Area distribution factors		
$H_{100\%}$	12	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	0	MSL	100%	0%	0%
Average slope (S_{av})	0.00353	m/m	Notes:	Catchment area flowing into North-west RWD, Blue RWD and Emergency Overflow Dam	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	0	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	0%	0.01	0
Flat areas (3% - 10%)	100%	0.06	0.06
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	0%	0.22	0
Total	**100%**		**0.06**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	0%	0.09	0
Semi-permeable (C)	50%	0.12	0.06
Semi-permeable (C/D)	50%	0.165	0.0825
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.1425**
Vegetation	%	Factor	C_v
Thick bush and plantation	0%	0.03	0
Light bush and farm-lands	0%	0.07	0
Grassland	100%	0.17	0.17
Cultivated land, contoured	0%	0.03	0
Cultivated land	0%	0.02	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.373**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.05	0.000
Sandy, Steep (>7%)	0%	0.15	0.000
Heavy soil, flat (<2%)	0%	0.13	0.000
Heavy soil, Steep (>7%)	0%	0.25	0.000
Residential areas			
Houses	0%	0.3	0.000
Flats	0%	0.5	0.000
Industry			
Light industry	0%	0.5	0.000
Heavy industry	0%	0.6	0.000
Business			
City centre	0%	0.7	0.000
Suburban	0%	0.5	0.000
Streets	0%	0.7	0.000
Maximum Flood	0%	1	0.000
	0%		
Total (C_2)			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_c = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

2.277 Hours

Defined watercourse

$$T_c = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.625 Hours

Notes:

$T_{C-TOTAL}$ **2.90** Hours V= **0.12** m/s

Run-off Coefficient

Return period (years), T	2	5	10	20	50	100	200
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%})$)	0.373	0.373	0.373	0.373	0.373	0.373	0.373
Adjusted factor for initial saturation, F_t	0.513	0.563	0.613	0.683	0.950	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.191	0.210	0.228	0.254	0.354	0.373	0.373
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.191*	*0.210*	*0.228*	*0.254*	*0.354*	*0.373*	*0.373*

Rainfall

Return period (years), T	2	5	10	20	50	100	200
Point Rainfall - SCS data (mm) P_T	36.675	49.575	58.505	67.390	79.400	88.730	98.405
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	12.640	17.086	20.164	23.226	27.365	30.581	33.915
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*13.000*	*17.000*	*20.000*	*23.000*	*27.000*	*31.000*	*34.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***3.113***	***4.468***	***5.724***	***7.335***	***11.986***	***14.486***	***15.888***

Appendix D

Brooker Method - Proposed Scenario

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Project		**Catchment Area A 1:50 year propos**				**2026/02/12**		
Engineer		Hilton Sparks						
Summary of Results			No data input on this sheet					
	Input		**Computed**					
Region								
MAP	502	mm/year	Storm Td	247.3	min		4.1	hr
RI	**50**	**year**		= concentration time plus time to start runoff				
Catchment			Average Rainfall Intensity					
Area	92.6	ha	Op ten Noord & Stephenson			Inland		
Conc time Tc	198	min	21.4	mm/h				
Rational C	0.34		Peak Rainfall Intensity	Triangular Hyetograph				
			42.8	mm/h	At time		74	mins
Storm								
Time to peak	0.3	ratio	Runoff Vol	27385	m^3	= C x P x A		
Time step	5	min						
Reservoir and Outlet Data								
Pipe	**U/S**	**D/S**		**Tower**				
No off	0	0	No	Crest Len	0	m	$C_{d(unsub)}$	0.75
Dia	0.100	0.1	m	Crest Lvl	0	m	$C_{d(sub)}$	0.62
Invert Lvl	0	0	m				C_h	0.85
Spillway				**Crest**				
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$		
Width	0.0			Width	0.0			
Invert Lvl	0.00			Invert Lvl	2.00			
Free board	2.00			Free board	0.20			

Reservoir Data

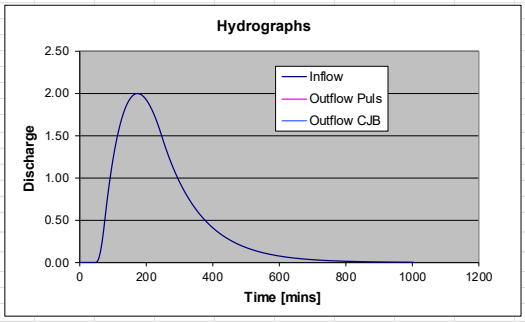
Stage	Depth	Area	Volume
1304.00	1304.00	0	0
1304.50	1304.50	0	0
1305.00	1305.00	0	0
1305.50	1305.50	0	0
1306.00	1306.00	0	0
1306.50	1306.50	0	0
1307.00	1307.00	0	0
1307.50	1307.50	0	0

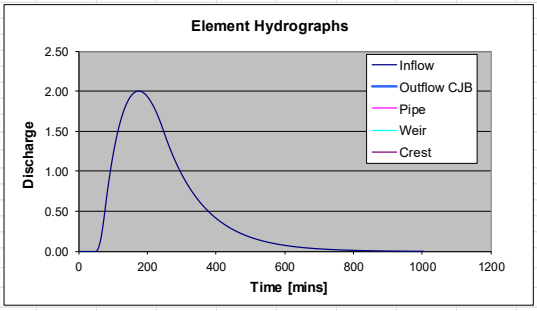
Initial Conditions

Stage	1304.00	m
Depth	1304.00	m
Vol	#N/A	m^3
Area	#N/A	m^2
Discharge	0.00	m^3/s

Results Summary	**Peaks**					
	Q_{in}	1.996	m^3/s			
	Q_{out} CJB	#N/A	m^3/s	Q_{pipe}	#N/A	m^3/s
	Q_{out} Puls	#N/A	m^3/s	Q_{weir}	#N/A	m^3/s
	Stage	#N/A	m	Q_{crest}	#N/A	m^3/s
	Stored Vol	#N/A	m^3			

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Project		**Catchment Area A 1:100 year propc**			**2026/02/12**			
Engineer		Hilton Sparks						
Summary of Results			No data input on this sheet					
	Input		**Computed**					
Region								
MAP	502	mm/year	Storm Td	243.9	min		4.1	hr
RI	**100**	**year**		= concentration time plus time to start runoff				
Catchment			Average Rainfall Intensity					
Area	92.6	ha	Op ten Noord & Stephenson			Inland		
Conc time Tc	198	min	26.7	mm/h				
Rational C	0.37		Peak Rainfall Intensity		Triangular Hyetograph			
			53.4	mm/h	At time		73	mins
Storm								
Time to peak	0.3	ratio	Runoff Vol	37455	m^3	= C x P x A		
Time step	5	min						
Reservoir and Outlet Data								
Pipe	**U/S**	**D/S**		**Tower**				
No off	1	1	No	Crest Len	1306	m	$C_{d(unsub)}$	0.75
Dia	0.100	0.1	m	Crest Lvl	1306	m	$C_{d(sub)}$	0.62
Invert Lvl	1304	1304	m				C_h	0.85
Spillway				**Crest**				
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$		
Width	3.0			Width	100.0			
Invert Lvl	1304.00			Invert Lvl	1306.00			
Free board	2.00			Free board	0.20			

Reservoir Data

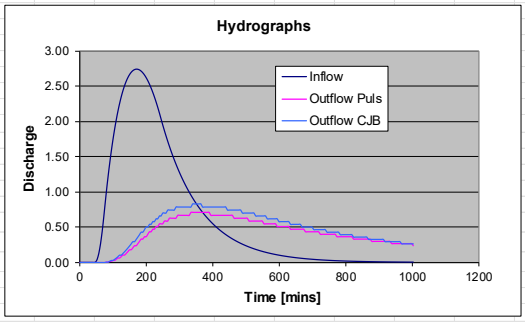
Stage	Depth	Area	Volume
1303.00	-1.00	0	0
1304.00	0.00	54770	27385
1304.50	0.50	136300	75153
1305.00	1.00	136600	143378
1305.50	1.50	136600	211678
1306.00	2.00	136600	279978
1306.50	2.50	136600	348278
1307.00	3.00	136600	416578

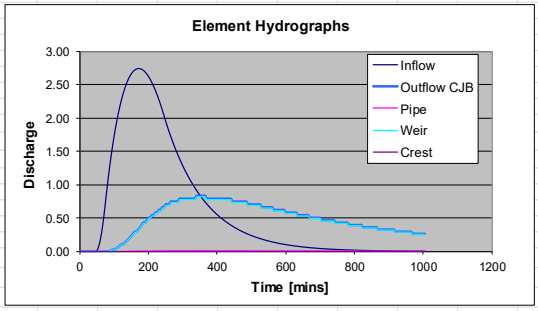
Initial Conditions		
Stage	1304.00	m
Depth	0.00	m
Vol	27385	m^3
Area	54770	m^2
Discharge	0.00	m^3/s

Results Summary	**Peaks**					
	Q_{in}	2.737	m^3/s			
	Q_{out} CJB	0.831	m^3/s	Q_{pipe}	0.010	m^3/s
	Q_{out} Puls	0.702	m^3/s	Q_{weir}	0.820	m^3/s
	Stage	1304.309	m	Q_{crest}	0.000	m^3/s
	Stored Vol	56810	m^3			

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Project		**Catchment B 1:50 year proposed**			**2026/02/12**				
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	215.8	min		3.6	hr	
RI	**50**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	451.6	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	174	min	24.0	mm/h					
Rational C	0.35		Peak Rainfall Intensity		Triangular Hyetograph				
			48.0	mm/h	At time		65	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	138041	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	0	m	$C_{d(unsub)}$	0.75	
Dia	0.000	0	m	Crest Lvl	0	m	$C_{d(sub)}$	0.62	
Invert Lvl	0	0.0001	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	0.0			Width	0.0				
Invert Lvl	0.00			Invert Lvl	0.40				
Free board	0.40			Free board	0.20				

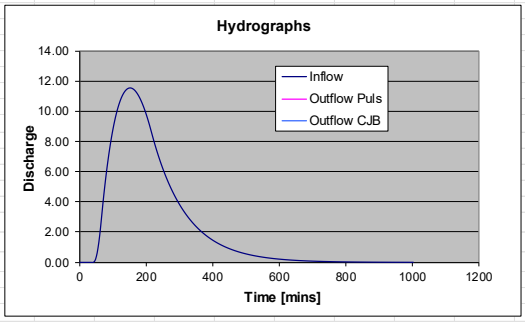
Reservoir Data

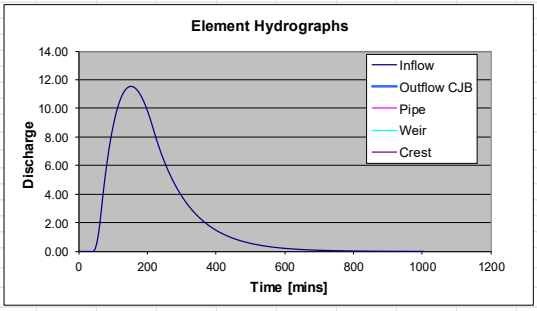
Stage	Depth	Area	Volume
0.00	0.00	0	0
0.50	0.50	0	0
1.00	1.00	0	0
1.50	1.50	0	0
2.00	2.00	0	0
2.50	2.50	0	0
3.00	3.00	0	0
3.50	3.50	0	0

Initial Conditions		
Stage	0.00	m
Depth	0.00	m
Vol	#N/A	m^3
Area	#N/A	m^2
Discharge	#N/A	m^3/s

Results Summary	**Peaks**					
	Q_{in}	11.512	m^3/s			
	Q_{out} CJB	#N/A	m^3/s	Q_{pipe}	#N/A	m^3/s
	Q_{out} Puls	#N/A	m^3/s	Q_{weir}	#N/A	m^3/s
	Stage	#N/A	m	Q_{crest}	#N/A	m^3/s
	Stored Vol	#N/A	m^3			

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Project		**Catchment B 1:100 year proposed**			**2026/02/12**				
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	214.3	min		3.6	hr	
RI	**100**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	451.6	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	174	min	29.7	mm/h					
Rational C	0.37		Peak Rainfall Intensity		Triangular Hyetograph				
			59.5	mm/h	At time		64	mins	
Storm									
Time to peak	0.3	ratio	Runoff Vol	178861	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	0	m	$C_{d(unsub)}$	0.75	
Dia	0.000	0	m	Crest Lvl	0	m	$C_{d(sub)}$	0.62	
Invert Lvl	0	0.0001	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	0.0			Width	0.0				
Invert Lvl	0.00			Invert Lvl	0.40				
Free board	0.40			Free board	0.20				

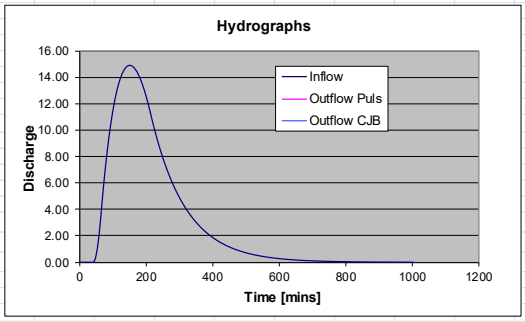
Reservoir Data

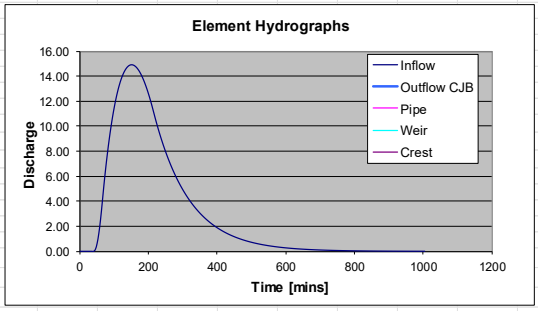
Stage	Depth	Area	Volume
0.00	0.00	0	0
0.50	0.50	0	0
1.00	1.00	0	0
1.50	1.50	0	0
2.00	2.00	0	0
2.50	2.50	0	0
3.00	3.00	0	0
3.50	3.50	0	0

Initial Conditions		
Stage	0.00	m
Depth	0.00	m
Vol	#N/A	m^3
Area	#N/A	m^2
Discharge	#N/A	m^3/s

Results Summary	**Peaks**					
	Q_{in}	14.923	m^3/s			
	Q_{out} CJB	#N/A	m^3/s	Q_{pipe}	#N/A	m^3/s
	Q_{out} Puls	#N/A	m^3/s	Q_{weir}	#N/A	m^3/s
	Stage	#N/A	m	Q_{crest}	#N/A	m^3/s
	Stored Vol	#N/A	m^3			

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Catchment C 1:50 year proposed 2026/02/12

Hilton Sparks

No data input on this sheet

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Computed

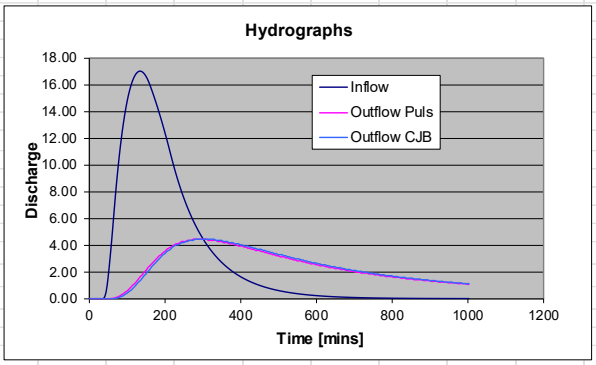
mm/year	Storm Td	160.2	min	2.7	hr	
year	= concentration time plus time to start runoff					
	Average Rainfall Intensity					
ha	Op ten Noord & Stephenson			Inland		
min	30.7	mm/h				
	Peak Rainfall Intensity Triangular Hyetograph					
	61.4	mm/h	At time	48	mins	
ratio	Runoff Vol	51927	m^3	= C x P x A		
min						
a						

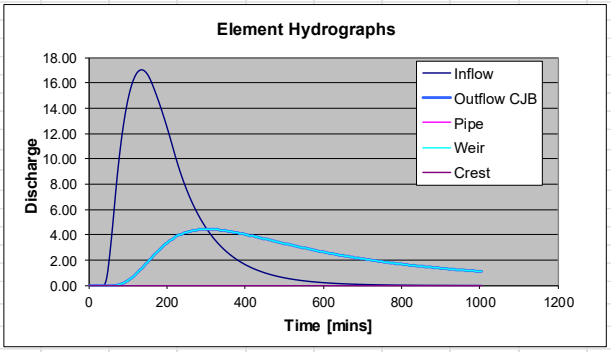
D/S		**Tower**				
0	No	Crest Len	2	m	$C_{d(unsub)}$	0.75
0.525	m	Crest Lvl	2	m	$C_{d(sub)}$	0.62
1301	m				C_h	0.85
		Crest				
for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$		
		Width	40.0			
		Invert Lvl	1301.10			
		Free board	1.00			

Area	Volume
293756	0
331823	156395
364804	330552
397785	521199
430766	728337
463747	951965
496728	1192084
529709	1448693

Initial Conditions		
Stage	1301.00	m
Depth	0.00	m
Vol	0	m^3
Area	293756	m^2
Discharge	0.00	m^3/s

Peaks					
Q_{in}	17.023	m^3/s			
Q_{out} CJB	4.410	m^3/s	Q_{pipe}	0.000	m^3/s
Q_{out} Puls	4.410	m^3/s	Q_{weir}	4.410	m^3/s
Stage	1301.427	m	Q_{crest}	0.000	m^3/s
Stored Vol	132466	m^3			





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Project		**Catchment C 1:100 year proposed**				**2026/02/12**			
Engineer		Hilton Sparks							
Summary of Results			No data input on this sheet						
	Input		**Computed**						
Region									
MAP	502	mm/year	Storm Td	159.5	min		2.7	hr	
RI	**100**	**year**		= concentration time plus time to start runoff					
Catchment			Average Rainfall Intensity						
Area	296.0	ha	Op ten Noord & Stephenson			Inland			
Conc time Tc	122	min	37.9	mm/h					
Rational C	0.23		Peak Rainfall Intensity		Triangular	Hyetograph			
			75.9	mm/h	At time	48	mins		
Storm									
Time to peak	0.3	ratio	Runoff Vol	67163	m^3	= C x P x A			
Time step	5	min							
Reservoir and Outlet Data									
Pipe	**U/S**	**D/S**		**Tower**					
No off	0	0	No	Crest Len	2	m	$C_{d(unsub)}$	0.75	
Dia	0.525	0.525	m	Crest Lvl	2	m	$C_{d(sub)}$	0.62	
Invert Lvl	1301	1301	m				C_h	0.85	
Spillway				**Crest**					
Cd	1.60	for Q = Cd x L x $h^{1.5}$		Cd	1.40	for Q = Cd x L x $h^{1.5}$			
Width	10.0			Width	40.0				
Invert Lvl	1301.00			Invert Lvl	1301.10				
Free board	0.10			Free board	1.00				

Reservoir Data

Stage	Depth	Area	Volume
1301.00	0.00	293756	0
1301.50	0.50	331823	156395
1302.00	1.00	364804	330552
1302.50	1.50	397785	521199
1303.00	2.00	430766	728337
1303.50	2.50	463747	951965
1304.00	3.00	496728	1192084
1304.50	3.50	529709	1448693

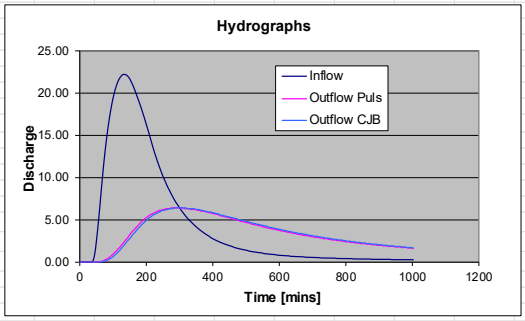
Initial Conditions

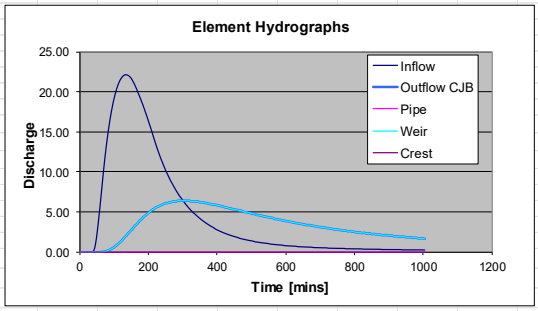
Stage	1301.00	m
Depth	0.00	m
Vol	0	m^3
Area	293756	m^2
Discharge	0.00	m^3/s

Results Summary	**Peaks**				
	Q_{in}	22.173	m^3/s		
	Q_{out} CJB	6.331	m^3/s	Q_{pipe}	0.000 m^3/s
	Q_{out} Puls	6.331	m^3/s	Q_{weir}	6.331 m^3/s
	Stage	1301.541	m	Q_{crest}	0.000 m^3/s
	Stored Vol	169979	m^3		

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cbrooker@iafrica.com

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Appendix E

Curriculum Vitae – H D N Sparks



HILTON SPARKS

Professional Engineer
Kongiwe Environmental

HSPARKS@KONGIWE.COM
+27 (10) 140 6508
150 BRYANSTON DRIVE
BRYANSTON, SANDTON, 2191
SOUTH AFRICA

PROFESSIONAL REGISTRATIONS

Engineering Council of South Africa
Pr Eng 740604

South African Council for the Project and Construction Management Professions
PrCPM D/202/2004

Member of the South African Institute of Civil Engineers

Member of South African Institute of Municipal Engineers

EDUCATION

1977 - Business Management, Damelin

Year - NQF 7 Advanced Diploma Labour Based Construction, University of Natal

1969 - BSc Civil Engineering, University of Natal

KEY SKILLS

- Civil Engineering
- Project Management
- Risk Assesment
- Mentorship

LANGUAGES

English – Fluent Afrikaans – Fluent

KONGIWE

LEADERSHIP & IMPACT

Hilton is a registered Professional Engineer and Construction Project Manager with over 50 years of experience in the built environment. His career includes a decade at a parastatal water utility, where he was responsible for the design and construction of large-scale water treatment works (up to 800 Ml/d) and bulk pipelines (450 mm to 3500 mm diameter). He has extensive experience in the consulting sector, delivering infrastructure across civil engineering disciplines, including rural and urban water and sanitation, housing, and township development. Hilton applies PMBOK-aligned project management methodologies and has led multidisciplinary teams on projects from planning through to implementation. Throughout his career, he has also played a key role in mentoring young professionals, supporting skills development and knowledge transfer within project teams. His focus on technical quality, regulatory compliance, and efficient delivery has contributed to the successful implementation of a wide range of infrastructure programmes.

AWARDS

Masimanyane Award for innovation and excellence in engineering (1997)
Repairs to Damaged Houses Project, Katorus

Impumelelo Award for innovative dedicated work in the field of poverty reduction and community development (2000)
Repairs to Damaged Houses Project, Katorus

SELECTED PROJECT EXPERIENCE

Environmental Engineering & Infrastructure Projects – South Africa (2024–2025)

Senior Project Manager
Undertook investigation, civil design, and project management of environmental infrastructure, including surface water studies for multiple tailings storage facilities and as-built documentation for Gold operations. Implemented project management systems across environmental portfolios.

National Housing & Urban Upgrading Projects – Various Provinces (1994–2010)

Director & Project Manager
Managed diverse engineering projects from township developments and bulk services to high-profile assignments including Soccer City (2010 FIFA World Cup), SAFA House, Alexandra Renewal, and the award-winning Katorus housing repair programme. Delivered thousands of low-income erven and coordinated national housing subsidies.

Appendix D6 - Hydrogeological Assessment

Jelani JV ESIA – Groundwater Impact Assessment – Impact Assessment Report

Final for Submission

Date: 21-09-2026

Prepared For: Kongiwe Environmental (Pty) Ltd.

Prepared By: Hydro-B (Pty) Ltd.

Executive Summary

This report presents the groundwater impact assessment for the proposed Jelani Joint Venture (JV) underground mine (Jelani Operation), undertaken as part of an Environmental Impact Assessment (EIA) and Water Use Licence Application (WULA). The assessment establishes the hydrogeological baseline for the Study Area, identifies groundwater receptors and provides an assessment of potential groundwater impacts associated with the proposed underground mining activities.

The proposed Jelani Operation will be developed as separate mining operation but will utilise the existing underground mining and surface water management infrastructure of the existing Harmony Target Mine. The proposed underground workings overlap with the current Target 2 mining area and will extend approximately 140 m deeper than the existing workings. The project will therefore be developed within an area that has already been impacted by historical and ongoing underground mining.

The hydrogeological setting comprises a shallow weathered and fractured Karoo aquifer overlying a deep fractured Ventersdorp/Witwatersrand aquifer. Available investigations indicate that hydraulic connectivity between the shallow and deep aquifers is limited. Groundwater inflows to the underground workings are mainly derived from the deep fractured Witwatersrand aquifer and inter-mine flow from adjacent underground workings, while groundwater levels within the shallow Karoo aquifer remain close to surface and continue to follow topography.

The hydrocensus identified third-party groundwater users surrounding the proposed development, with groundwater mainly used for domestic purposes. Groundwater sampled from domestic boreholes contained no detectable cyanide or uranium, while sulphate concentrations remained below the SANS 241 drinking water limit. Existing groundwater quality impacts are mainly associated with the Target No. 1 and 2 Tailings Storage Facilities (TSFs) and associated RWDs, where elevated salinity and sulphate were observed in groundwater in proximity of these facilities.

The impact assessment identified two construction-phase impacts associated with site preparation and the use of construction equipment. Both impacts are expected to be of low significance after mitigation, provided that clearance, stormwater management, vehicle servicing and spill response measures are implemented.

During the operational phase, abstraction from the deep Witwatersrand aquifer is not expected to result in significant additional impacts on the shallow Karoo aquifer. The potential impacts on shallow groundwater availability and groundwater levels are assessed as low significance before and after mitigation, subject to continued monitoring of abstraction volumes and shallow groundwater levels, with alternative water supply to be provided where a reduction in third-party borehole yield is proven to be the result of mining activities.

The main groundwater-quality impact identified during the operational phase is contaminant plume migration from existing mine waste and water infrastructure. Modelling indicates that the plume will migrate mainly westwards, with third-party boreholes B38N and B8 potentially affected by the end of the Life of Mine. This impact is assessed as medium significance after mitigation and needs continued process-water and groundwater-quality monitoring, improved process water containment and a geochemical assessment and source-term modelling for the Target TSF.

Post-closure, recovery of groundwater levels in the deep Witwatersrand aquifer is expected to remain well below groundwater levels in the shallow Karoo aquifer, and the potential for hydraulic connection and decant into the shallow aquifer is assessed as low significance. Long-term contaminant plume migration from the Target TSF will remain an impact with medium significance, with modelling results indicating that four third-party boreholes may be within the plume extent 50 and 100 years after closure. Continued monitoring, rehabilitation of process-water infrastructure and the Target TSF, and provision of alternative water supply where mining-related impacts are proven are therefore required.

Groundwater management should include continued monitoring of groundwater levels, abstraction volumes and groundwater quality, using the existing Harmony Target monitoring network with locations, frequency and parameters updated for the Jelani Operation. Third-party boreholes B38N and B8 should be noted, which are potential receptors projected to be within the simulated contaminant plume.

Pollution prevention, stormwater management and spill-response measures should be implemented during construction and operation, while process-water containment should be maintained and rehabilitated at closure. The groundwater model should be updated at least every two years, or when significant new information or changes to the mine layout or schedule become available.

Post-closure groundwater-level and quality monitoring should continue, with the transport model updated as new data become available. Where a mining-related reduction in third-party borehole yield or groundwater quality is proven, an alternative water supply should be provided. Jelani Resources should co-operate with Harmony Gold to undertake source-term characterisation and geochemical modelling of the existing Target TSF for refinement of the contaminant transport assessment.

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Appendix A. Hydrocensus Photos

Appendix B. Curriculum Vitae

1 Introduction

Hydro B (Pty) Ltd. was appointed by Kongiwe Environmental (Pty) Ltd. to carry out a groundwater impact assessment for the proposed Jelani underground mine that will be used as input into an Environmental Impact Assessment (EIA) and Water Use License application (WULA).

The proposed underground mine (Figure 5-1) is a Joint Venture project between Harmony Gold Mining Company Limited (Harmony Gold) and White Rivers Exploration (Jelani Resources (Pty) Ltd.), planning to apply for Mining Rights for a proposed underground mine over an area currently held under a Prospecting Right (Jelani Resources). The EIA and WULA will support this application. No additional surface infrastructure is planned for the proposed mine, and all mining-related activities will be accessed through the existing infrastructure of Harmony's Target Mine (Harmony Gold contribution). The application will entail underground mining activities and the use of existing Harmony Target surface infrastructure for site water management.

This report entails the groundwater impact assessment. The scope of work and methodology for the assessment are detailed below.

2 Specialist Details

2.1 Details and Expertise

This Groundwater Impact Assessment was compiled by Hydro-B (Pty) Ltd. on behalf of Kongiwe Environmental (Pty) Ltd. in support of an Environmental Impact Assessment (EIA) and a Water Use Licence Application (WULA) for the proposed Jelani underground mine.

The assessment was undertaken by Arjan van 't Zelfde, a registered Professional Natural Scientist (Pr. Sci. Nat.) with the South African Council for Natural Scientific Professions (SACNASP), with an MSc in Soil Science from Wageningen University and more than 20 years of professional experience in hydrogeology, groundwater assessment, soil and water management, mine-water management and groundwater modelling.

The specialist has experience in groundwater investigations, hydrogeological assessments, numerical groundwater modelling, contaminant transport assessment, mine dewatering, mine closure and groundwater impact assessment in South Africa and other African countries.

2.2 Declaration

I, Arjan van 't Zelfde, declare that I am an independent specialist and that this Groundwater Impact Assessment has been undertaken objectively and without any bias towards the proposed Jelani Operation or any other party associated with the project.

The assessment has been based on the information made available for the project, site investigations, available groundwater monitoring data, numerical modelling and interpretation of the available information.

In this assessment I have disclosed relevant limitations, assumptions, uncertainties and data gaps that may influence the outcomes of this assessment. The opinions and conclusions presented in this report are those of the specialist and have not been influenced by the applicant or any other party.

I have no financial or other interest in the proposed activity other than the professional services provided for preparation of this specialist assessment.

My experience is included in the CV in Appendix B.



Arjan van 't Zelfde

Pr. Sci. Nat.

Hydro-B (Pty) Ltd.

Date: 21 September 2026

3 Data Quality, Age and Limitations

The groundwater assessment was based on, historical monitoring data, existing mine information, previous hydrogeological investigations (including (AquiSim Consulting, 2025), (MvB Consulting, 2026) and (Groundwater Square, 2016) and numerical modelling (AquiSim Consulting, 2025) undertaken for the Harmony Free State operations.

The available datasets vary in age, spatial coverage and temporal frequency. Recent project and mine information was used where available, while historical information was retained where it provides relevant information on long-term groundwater conditions, groundwater quality trends or mine-water behaviour. The principal limitations affecting the assessment are:

- Groundwater monitoring data are not available at all locations at the same spatial and temporal frequency;
- Existing groundwater-quality impacts associated with Target mine infrastructure pre-date the proposed Jelani Operation;
- Detailed site-specific seepage rates and source-term characterisation are not available for all existing surface water-management facilities; and
- The contaminant transport assessment therefore incorporates assumptions regarding contaminant source concentrations and seepage conditions.

These limitations have been considered in the conceptual and numerical models and in the interpretation of the impact assessment. Where uncertainty is deemed important to the assessment outcome additional monitoring or site-specific investigation has been recommended. The assessment is regarded suitable for identifying and assessing the potential groundwater impacts associated with the proposed development subject to monitoring, source-term characterisation and model-update requirements as identified in this report.

4 Scope of Work

The scope of work as part of this assessment was as follows:

- Data Review and Gap Analysis;
- Hydrocensus Survey;
- Baseline Hydrogeology Description;
- Conceptual Model;
- Numerical Model; and
- Impact Assessment.

5 Methodology

5.1 Data Review and Gap Analysis

Relevant hydrogeological data was reviewed and collated during a desktop study to establish a hydrogeological baseline for the proposed site. The following data was provided:

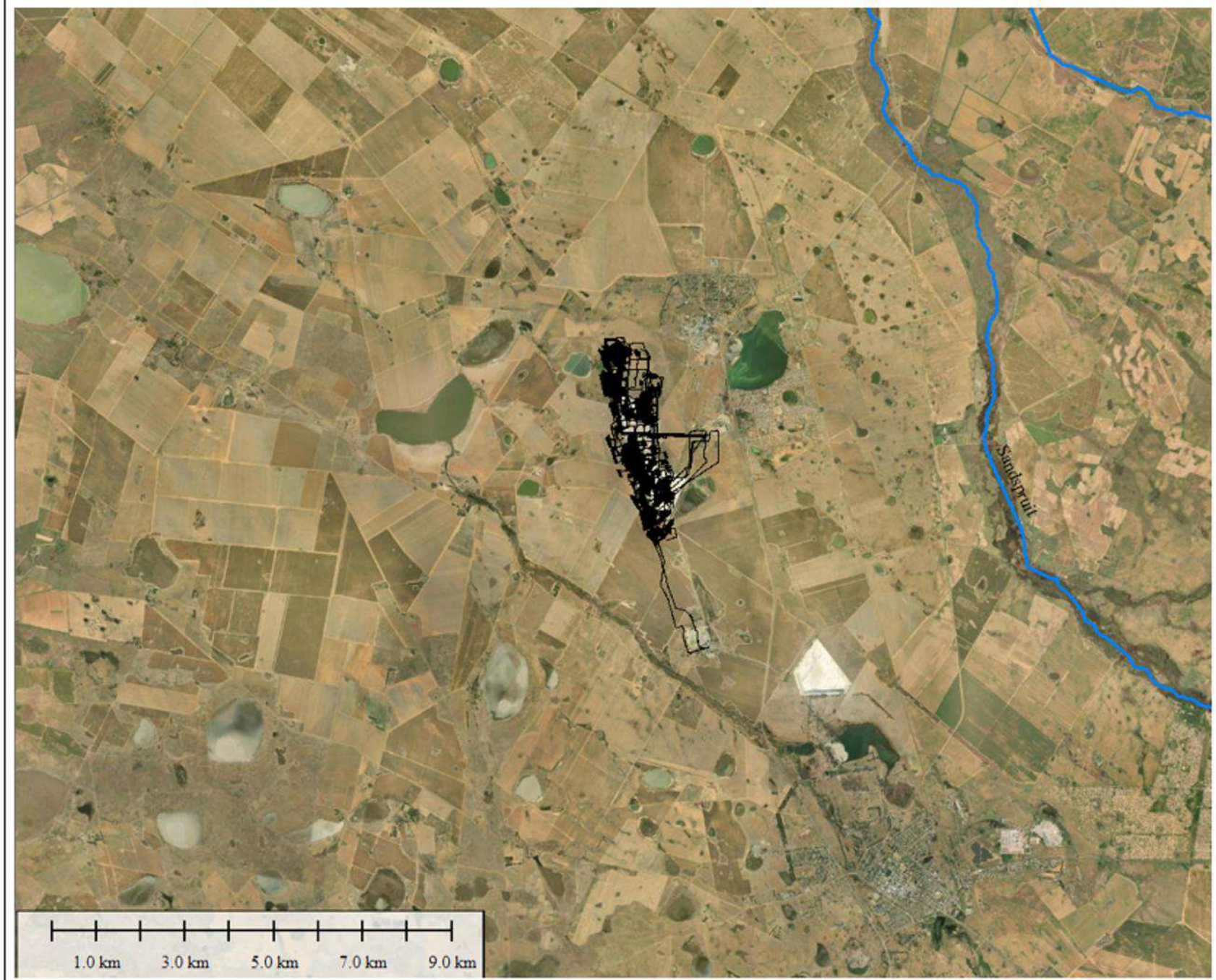
- Existing technical reports – hydrogeological, geological, geophysical and geotechnical;
- Input and background data:
  - site rainfall;
  - geophysical data for the proposed site;
  - geological data;
  - aquifer test data;
  - historical and future mine plans, including current Target Mine abstraction volumes;
  - site water management (for process/mine waters);
  - process/mine water, surface water and groundwater quality monitoring data; and
  - groundwater level data

5.2 Hydrocensus Survey

A hydrocensus survey was carried out over three days in the period 15 December 2025 to 12 January 2026 to identify groundwater users in an approximate 4 km radius surrounding the proposed development. 19 boreholes were assessed and seven boreholes were sampled. Seven samples (including a duplicate for borehole BHN) were submitted to SANAS-accredited Yanka Laboratories in Middelburg for analysis against SANS 241 drinking water specifications. The list of parameters included additional parameters, including cyanide and uranium, as the project involves development of an underground gold mine (Table 5-1). During the survey, details of source owners and groundwater level measurements (where possible) were also collected.

Table 5-1. List of Parameters

Parameter	
Conductivity at 25 °C	Zinc as Zn
Total dissolved solids	Antimony as Sb
Turbidity	Arsenic as As
pH at 25 °C	Barium as Ba
Calcium	Boron as B
Magnesium	Cadmium as Cd
Potassium	Total chromium as Cr
Sodium as Na	Copper as Cu
Total Alkalinity CaCO3	Lead as Pb
Bicarbonate as HCO3	Mercury as Hg
Chloride as Cl	Nickel as Ni
Sulphate as SO4	Selenium Se
Nitrate as NO3	Uranium as U
Nitrite as NO2	Aluminium as Al
Ammonia as NH3	Free, Total and WAD Cyanide as CN
Phosphate as PO4	Total coliforms
Fluoride as F	Faecal coliforms
Iron as Fe	*E. Coli*



Locality Map

Legend

Jelani JV Underground Operation

Cape LO27

hydro-b

Figure 5-1. Jelani Operation Locality Map Showing the Proposed Underground Mine Operation

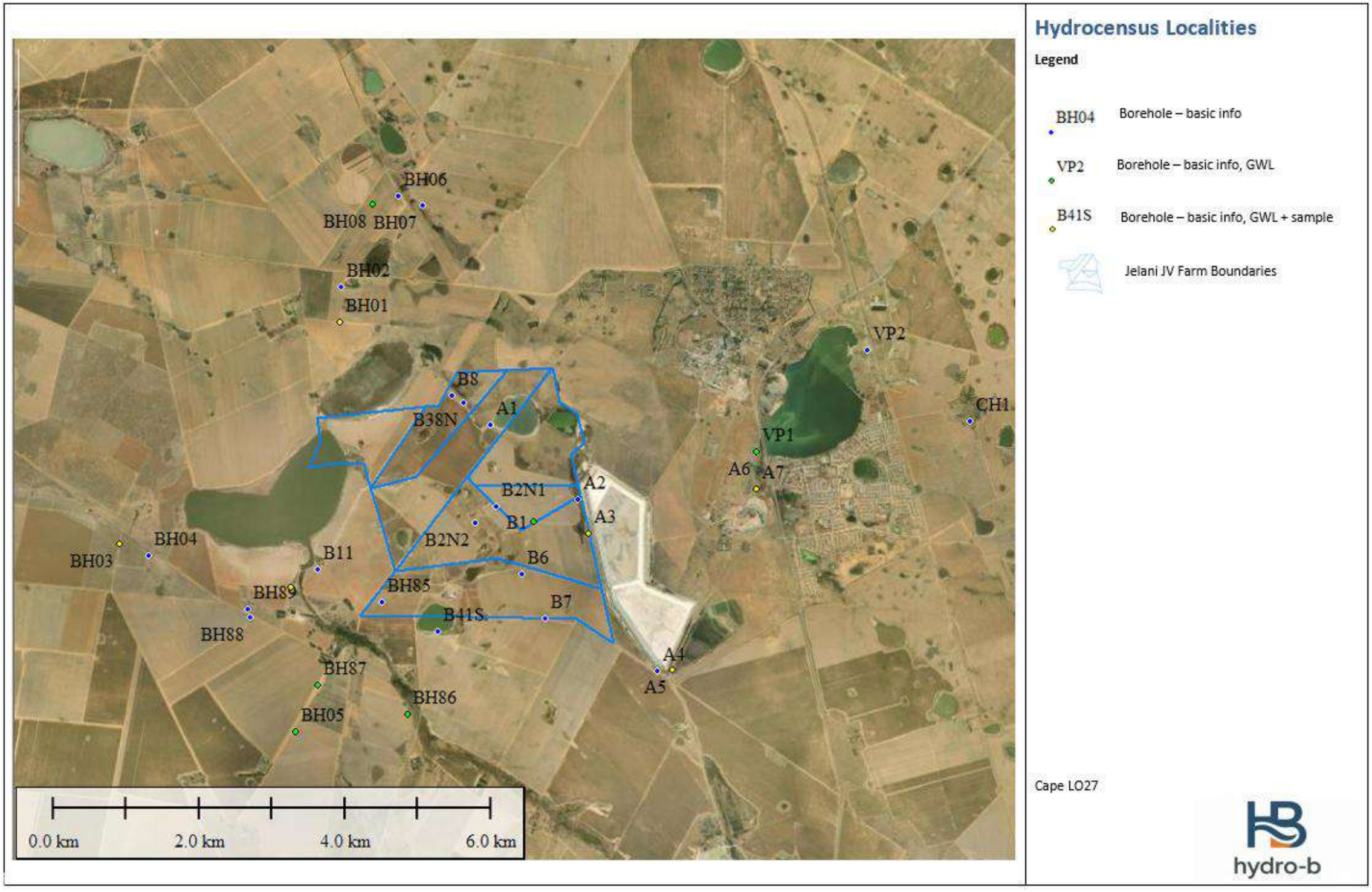


Figure 5-2. Hydrocensus Localities with Collected Data

5.3 Baseline Hydrogeology Description

Based on the available data for the area surrounding the proposed Jelani Operation the baseline hydrogeology was described in detail. Based on all available geological, geotechnical, hydrological and hydrogeological information.

5.4 Impact Description

Based on the hydrogeological baseline description and the proposed development an overview and description of potential impacts and their likelihood of occurrence is provided. These impacts will be described in more detail in the groundwater impact assessment.

5.5 Conceptual Model

Based on the available data for the Target 2 Mine and the project area site a conceptual model was built to include and combine all detailed geological, geotechnical and hydrogeological information. The conceptual model is based on the source-pathway-receptor approach and will describe the interactions between the geological, hydrogeological, hydrological and anthropogenic environments.

5.6 Numerical Model

A numerical model was built using the MODFLOW code and GMS as the Graphic User Interface (GUI) to quantify potential impacts on groundwater. The model focussed on impacts on existing groundwater users and drainage systems that interact with groundwater. An existing numerical model for all Harmony operations was made available and was used as a basis for the model as part of this assessment. As the existing Target Mine infrastructure is situated within the Project Area, the Target and Jelani mining areas overlap and the Jelani Operations will partially use existing Target Mine surface infrastructure, cumulative impacts were modelled. The scope for numerical model was as follows:

- update of an existing numerical model to include the proposed underground mining for the proposed Jelani Operation;
- steady state calibration of the updated model;
- construction of a transient model incorporating long-term contaminant migration from the Target mine surface infrastructures, including those proposed to be used for the Jelani Operation;
- estimate impacts on the shallow groundwater system.

5.7 Impact Assessment

Based on the outcomes of the desktop study, hydrocensus, data interpretation and the results from the conceptual and numerical models, the potential impacts on shallow aquifers will be determined in terms of severity using the impact assessment methodology as detailed in Section 12.2.

6 Proposed Activities

The Jelani Operation is a proposed underground mining operation located near Allanridge in the Free State Province of South Africa, approximately 30 km north of Welkom. The project is being developed by Jelani Resources, a joint venture between White Rivers Exploration (WRE) and Harmony Gold Mining Company Ltd. (Harmony Gold). The project area covers approximately 960 hectares and includes portions of both the Beisa Prospecting Right and adjacent Harmony Gold mining rights within the north-western Free State Goldfield. The project aims to exploit multiple gold-bearing reef horizons within the Witwatersrand Basin, including the Basal, B, A, ED and EA reef packages. Mining will be undertaken using conventional underground mining methods, including breast and shrinkage stoping.

The proposed mine development will make use of existing infrastructure associated with Harmony Gold's Target Mine. Mining activities will initially be supported through the refurbishment and recommissioning of Target No. 3 Shaft, followed by the refurbishment of Target No.2 Shaft. Underground access to deeper mining areas will be provided through the development of a new twin conveyor decline system extending below the existing shaft infrastructure. The decline system will be developed using mechanised trackless mining equipment.

The project includes the development and operation of underground as well as the operation of associated existing surface infrastructure. Surface facilities will include power supply systems, bulk water supply and distribution networks, workshops, fuel storage and handling facilities, offices, change houses, stores, security facilities, rock handling systems, return-water dams, and associated service infrastructure. Underground infrastructure will include water reticulation systems, return-water handling facilities, settling facilities, compressed air distribution, electrical reticulation, refuge chambers and materials handling systems.

Ore extracted from underground workings will be transported via rail-bound and conveyor systems to existing shaft infrastructure for hoisting to surface. Ore will then be processed through the existing Target processing plant. Tailings waste from the plant will be deposited at a new Tailings Storage Facility (TSF) to be constructed for this project. However, this new TSF will fall outside of the scope of this assessment.

The proposed operation overlaps substantially with the existing Harmony Gold Target 2 mine and will be developed within an area already impacted by existing mining. Mining at the Target 2 mine dips to the west with the deepest mining being at a depth of ~2 550 m above mean sea level (mamsl) or 1 250 m below ground level (mbgl). Mining at the Jelani project will extend to a maximum depth of ~2 700 mamsl (Figure 6-1, Figure 6-2 and Figure 6-3), some 140 m below the maximum Target 2 Mining depth.

The Target 3 mine, to the south of the Target 2 mine, extends across an area of approximately 8 km^2, with the Target 2 mine extending across an area of approximately 11 km^2. In comparison, the proposed operation covers about 2.8 km^2 with the majority aligning with the current Target 2 extent.

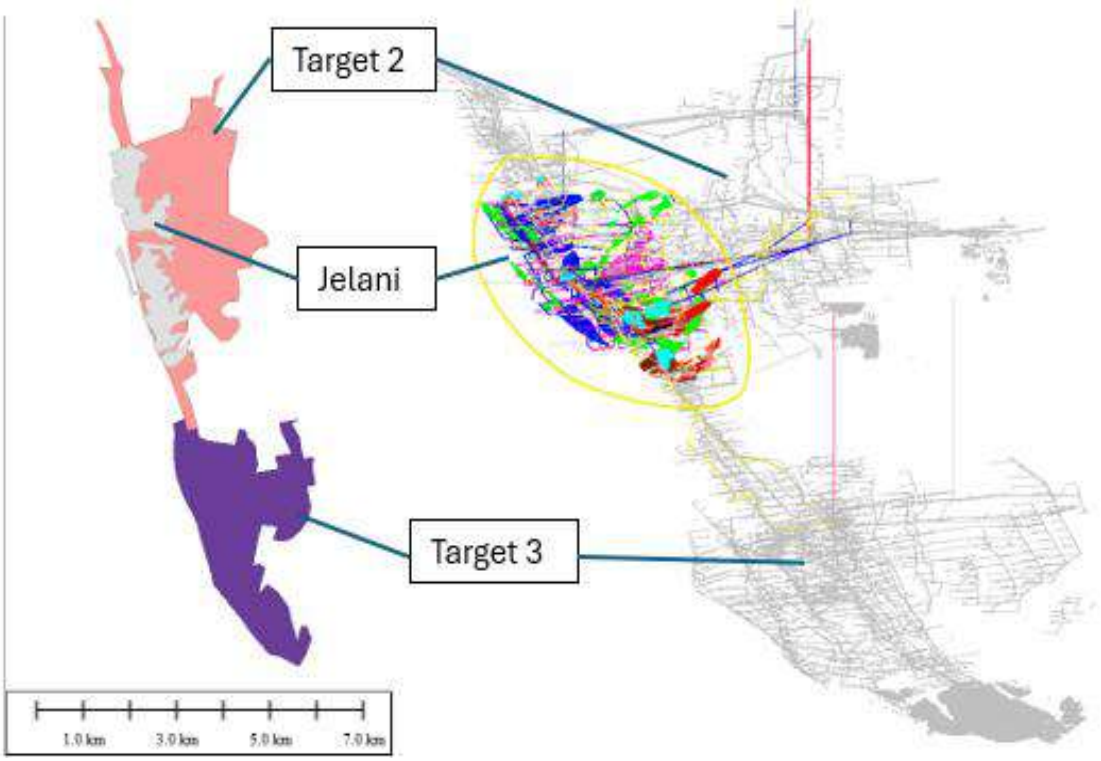


Figure 6-1. Proposed Operation in Relation to Existing Harmony Gold Target 2 and 3 Operations.

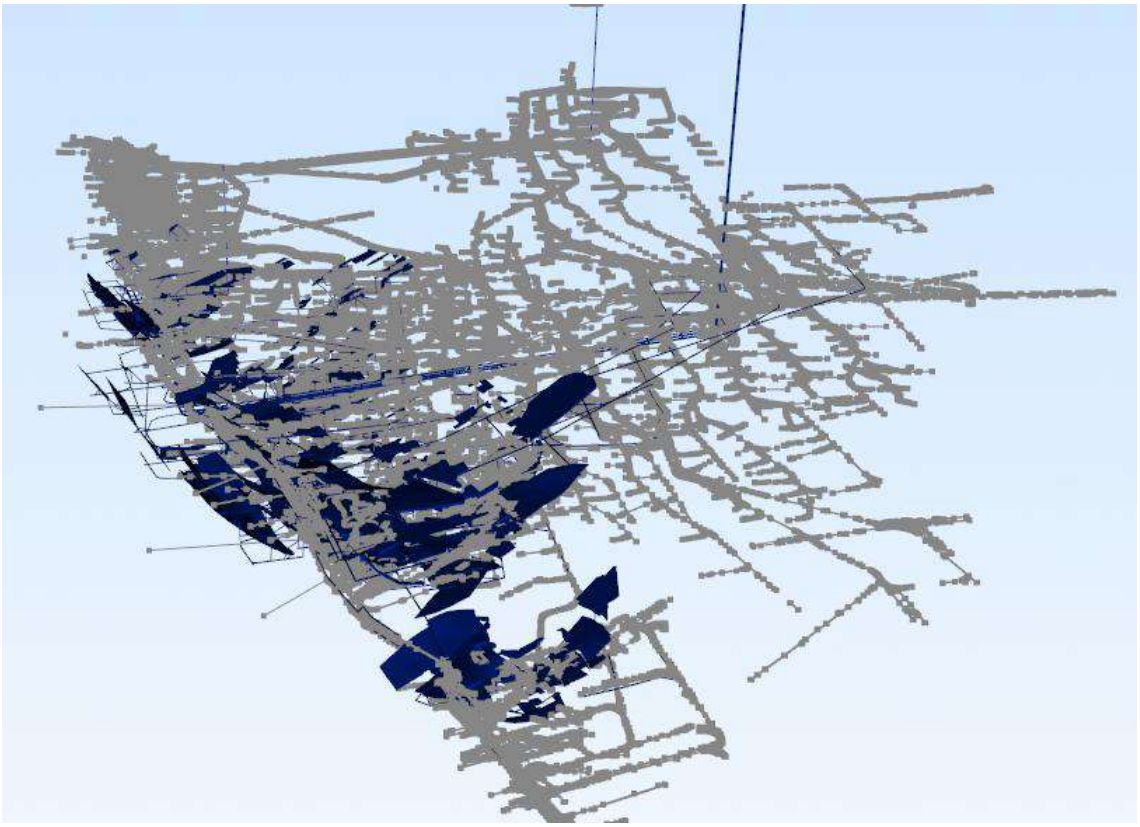


Figure 6-2. Oblique View of the Jelani (in Blue) and Harmony Gold Target 2 and 3 Operations (in Grey).

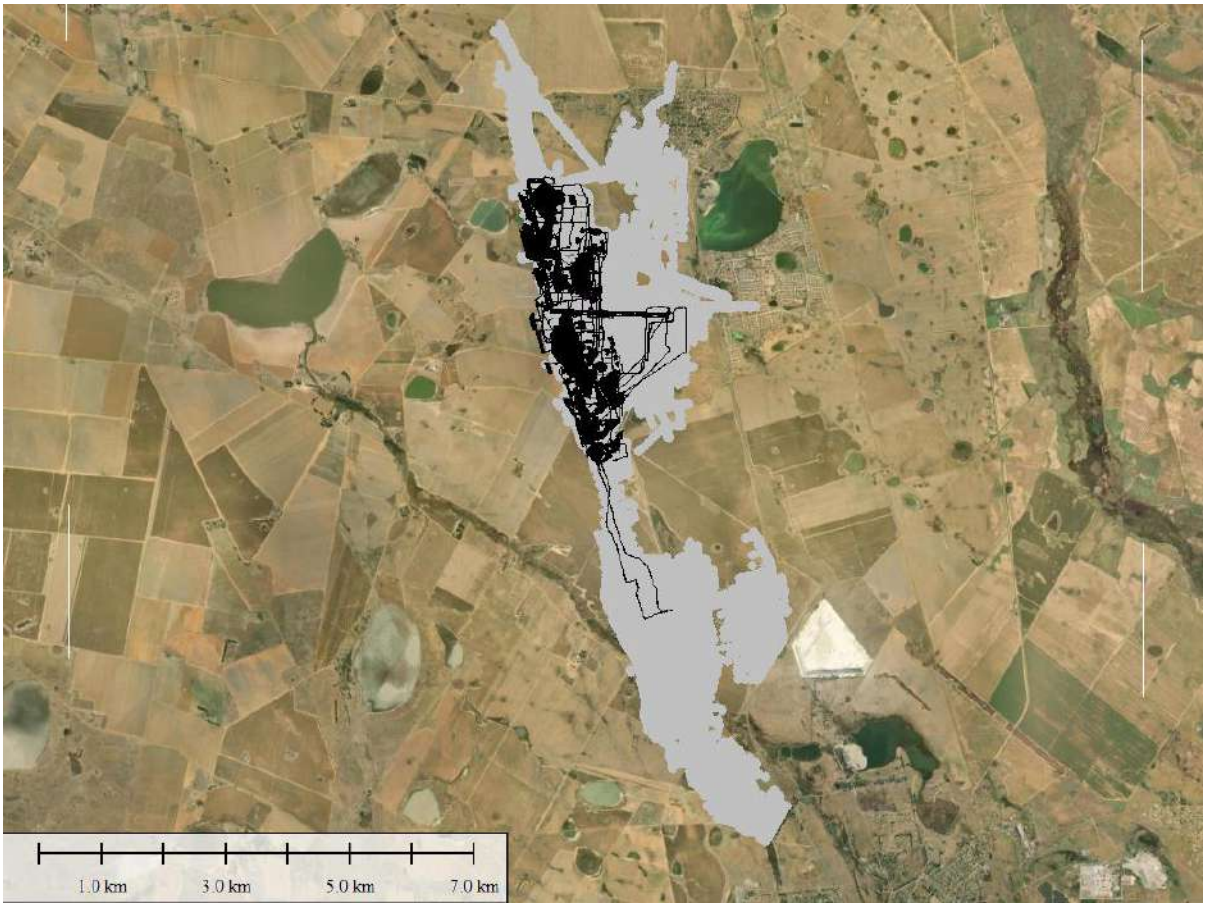


Figure 6-3. Jelani Proposed Operation (in Black) and Target 2 and 3 Operations (in Grey).

7 Existing Activities

The proposed Jelani Operation are situated near the existing Target 2 Mine operations, and within the Study Area relevant existing infrastructure relating to these operations is present. For the Study Area the most important and closely located infrastructures are Figure 7-1:

- the Target No 1 and 2 TSF;
- the North-West Return Water Dam (NW RWD);
- the Blue RWD and
- the emergency overflow ponds; and
- the Swartpan, which receives water from the process water dam as detailed in (Kongiwe Environmental, 2026);

Other related infrastructures in close proximity to the Study Area are:

- the South-East (SE) RWD and Evaporation Dam, southeast of the Target TSF; and
- the Target 2 shaft area;

Further away to the southeast of the Study Area the following infrastructures are present:

- Freddies No. 9 TSF and dam; and

- The Target 3 shaft area.

Concerning current underground mining activities, the following as described in (Groundwater Square, 2016) is currently still valid:

- the Target Gold Mine is currently in full operation from No.1 Shaft;
- the No.2 shaft is currently not working, although it is equipped with an emergency winder and used as a second means of pumping of water from the Target Mine; and
- the No.3 Shaft has been operating intermittently since the late 1990's and is currently closed on care and maintenance.

The approximate Life of Mine (LoM) for the current Target Mine operations is until 2030.

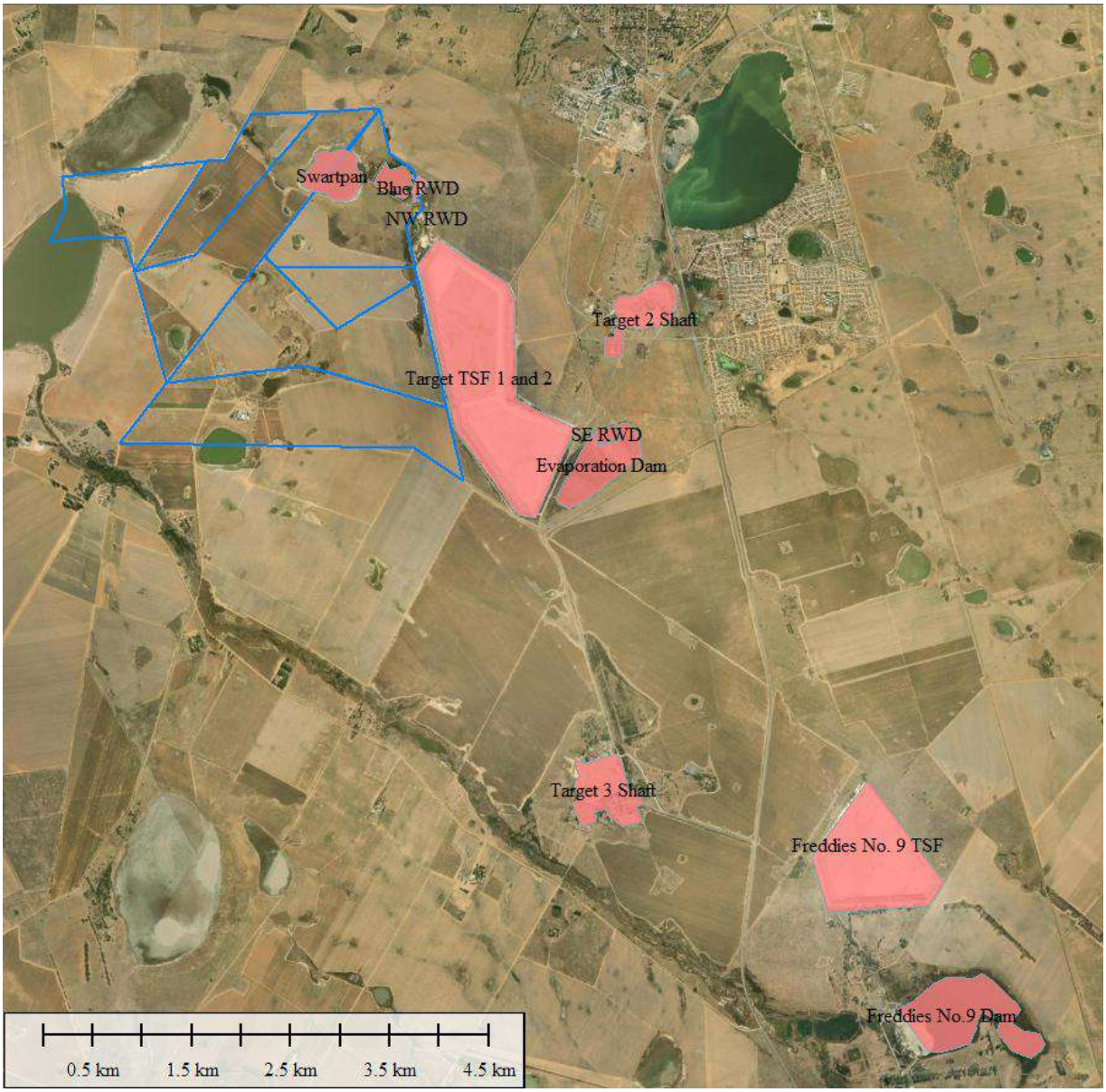


Figure 7-1. Study Area (Farm Boundaries in Blue) with Relevant Target Infrastructure (in Red).

8 Baseline Description

8.1 Rainfall

Mean Annual Rainfall (MAR) for the Welkom (0364300 W) weather station based on data between October 1920 – March 2022 was estimated at 492 mm/a. Rainfall is highest over the summer months of October to April, with December and January generally being the wettest months. Very little rainfall falls over the winter months (Kongiwe Environmental, 2026).

8.2 Topography and Drainage

The area is characterised by small elevation contrasts showing a generally flat, slightly undulating topography (AquiSim Consulting, 2025) with the main topographical gradient being to the northwest (Figure 8-2). Elevations for the Study Area vary between approximately 1 340 and 1 275 mamsl.

The main drainage features in the Study Area are the Sandspruit to the north and the Vet River to the south, both tributaries of the Vaal River. Both rivers follow the main topographical gradient and flow in a southeast-northwesterly orientation. Southwest of the proposed operation multiple pans are spread across the area, with many small non-perennial drainage lines feeding into these features.

According to (Kongiwe Environmental, 2026) The Jelani Operation Area has 4 catchment areas impacting on the surface water hydrology (Figure 8-1):

- The Swartpan Catchment Area – the biggest catchment area of size approximately 8.3 km2 including the area to the east of the Target 1 TSF. There is overland flow to the Swartpan, and a natural watercourse below Swartpan to Pan A.
- Pan B Catchment Area – area of size approximately 1.5 km2. There is no defined watercourse, just overland flow into the Pan.
- Pan C Catchment Area – area of size approximately 2.5 km2. There is no defined watercourse, just overland flow into the Pan.
- Balance of Jelani Project Area – flows in a westerly direction into Pan A or the Losdoringspruit.

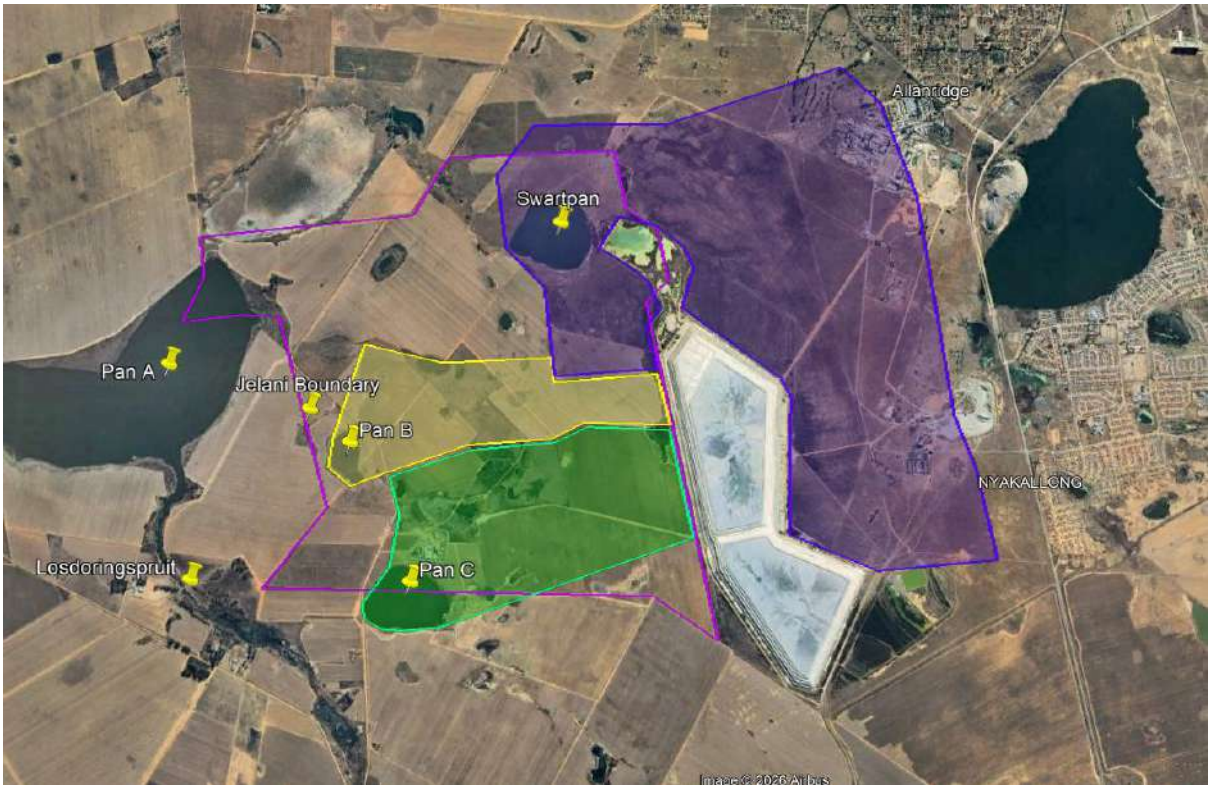


Figure 8-1. Catchment Areas affecting the Jelani Operation (Kongiwe Environmental, 2026).

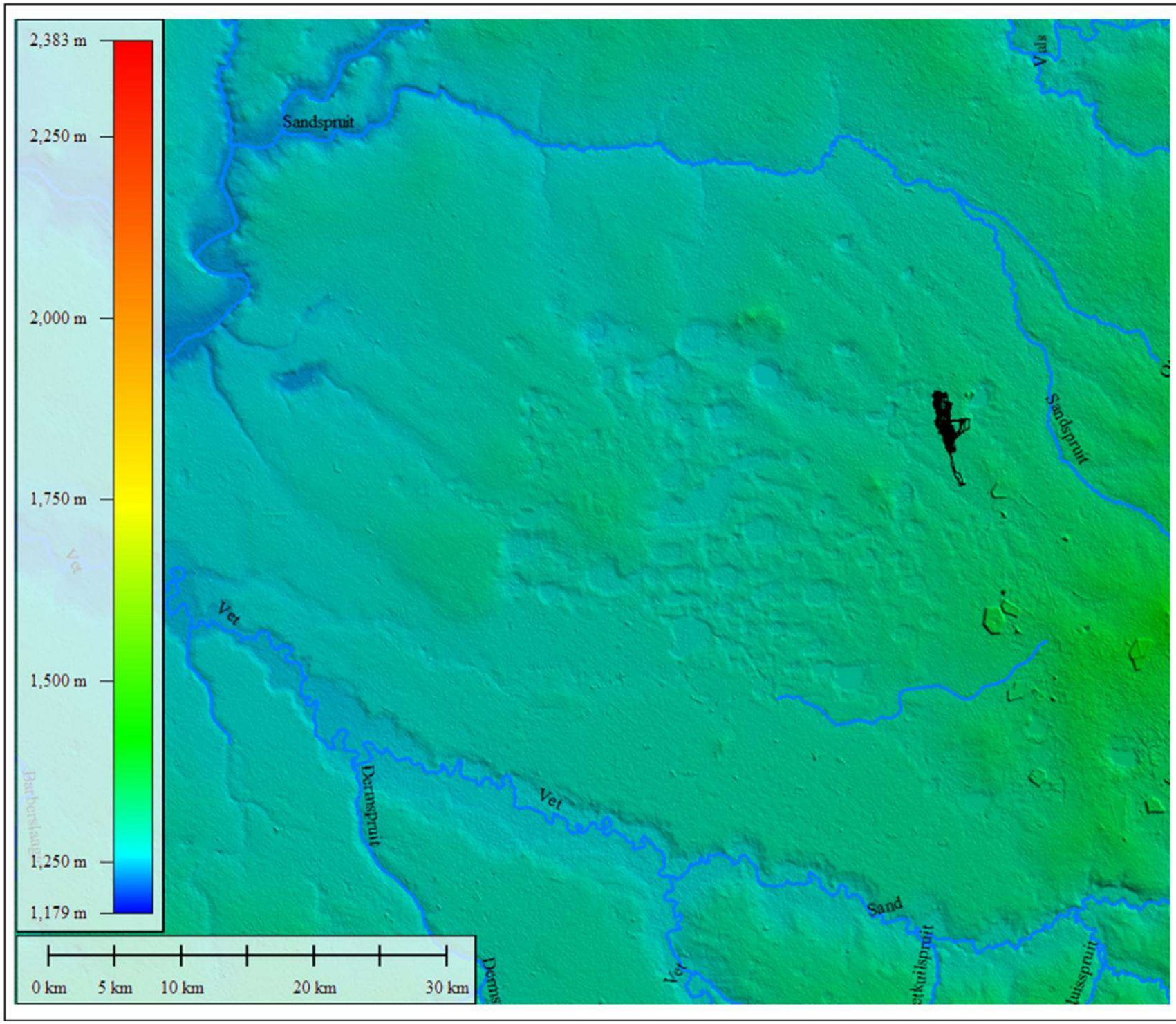


Figure 8-2. Regional Topography and Drainage

8.3 Geology

8.3.1 Regional Geology

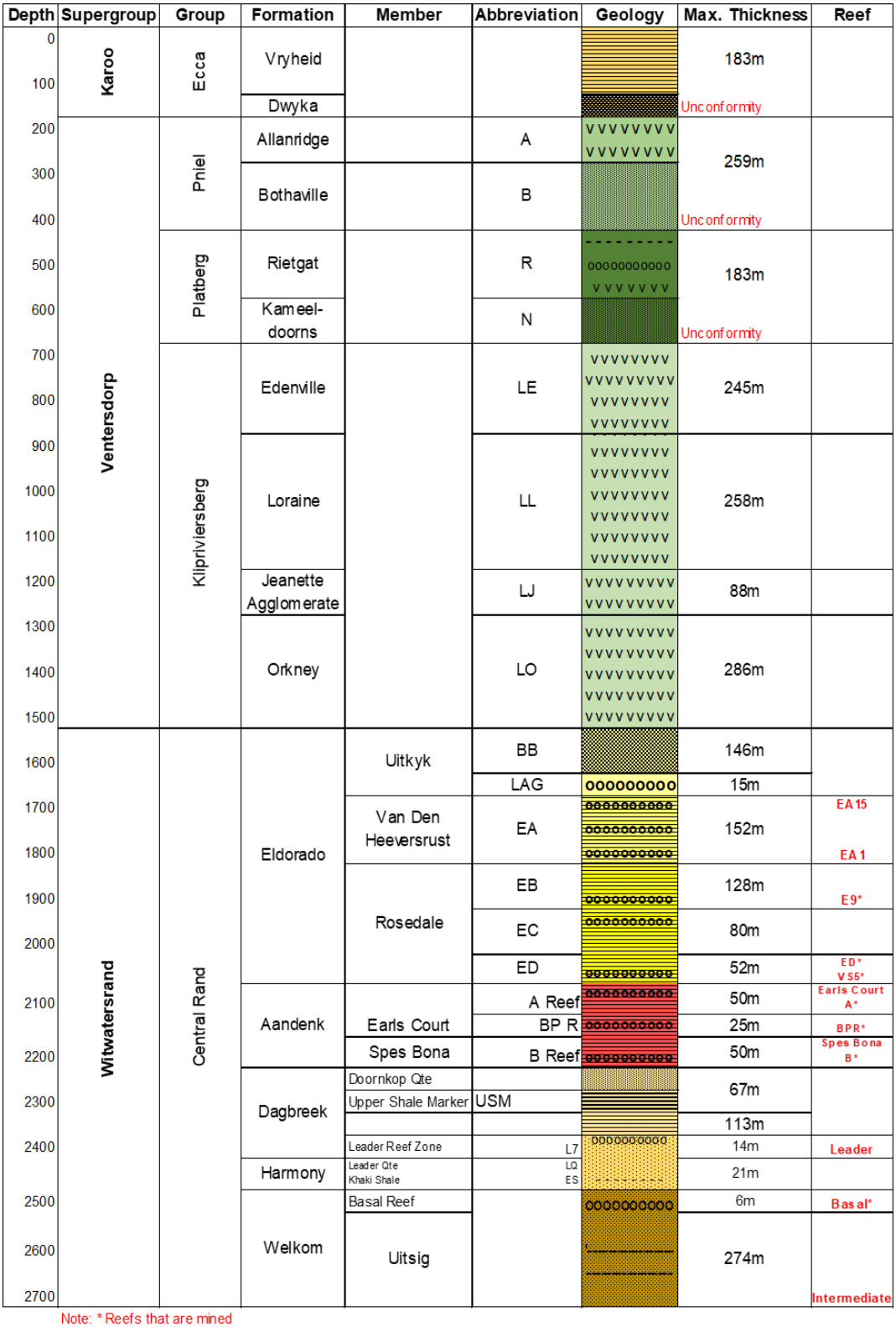
The Jelani Operation is located within the north-western portion of the Free State Goldfield, situated on the south-western margin of the Witwatersrand Basin. The Witwatersrand Basin comprises a thick sequence of sedimentary rocks that host the world-renowned gold-bearing conglomerate reefs and forms one of the most extensively mined geological provinces in South Africa (Bara Consulting, 2026).

The regional geological succession consists of sedimentary rocks of the Witwatersrand Supergroup, overlain by volcanic rocks of the Ventersdorp Supergroup and, in turn, by sedimentary rocks of the Karoo Supergroup (Figure 8-3). The geological sequence generally youngs upward from the Witwatersrand strata through the Ventersdorp volcanics to the Karoo sediments exposed at surface (Bara Consulting, 2026) and (AquiSim Consulting, 2025).

The uppermost geological sequence, occurring just below aeolian sands that partially cover the Study Area, comprises Karoo Supergroup sediments, which can attain a thickness of down to approximately 200 mbgl (Figure 8-3 and Figure 8-4). Locally, the Allanridge Formation (part of the Ventersdorp Supergroup) is exposed at surface. The Karoo succession includes the Beaufort Group (including the Normandien Formation), the Ecca Group (including Volksrust and Vryheid Formations) and the Dwyka Group (Dwyka Formation). The Beaufort Group contains extensive sandstone horizons capable of supporting groundwater occurrences, while the Ecca Group consists predominantly of shale and mudstone with subordinate sandstone units. The Dwyka Formation commonly consists of a low permeability tillite unit separating the shallow Karoo aquifer system from the deeper fractured aquifer systems associated with the Ventersdorp and Witwatersrand rocks as described in (MvB Consulting, 2026) and (AquiSim Consulting, 2025).

The volcanic rocks of the Ventersdorp Supergroup unconformably overlie The Witwatersrand rocks and predominantly consist of andesitic lavas, pyroclastic units and associated volcanic sediments. The Ventersdorp succession is approximately 1,300 m thick in the central portions of the Free State Goldfield and is associated with significant tectonic activity that resulted in extensive faulting and block movements throughout the basin (MvB Consulting, 2026) (AquiSim Consulting, 2025).

The underlying Witwatersrand Supergroup comprises quartzites, conglomerates, shales and argillaceous sedimentary units deposited in a fluvial environment. Within the Free State Goldfield, the principal economic units occur within the Central Rand Group and include the Basal Reef, B Reef, A Reef, EA Reef and ED Reef horizons targeted by the proposed mining operation. The Witwatersrand succession exceeds 2 000 m in thickness within parts of the goldfield and forms the principal bedrock sequence underlying the project area (Bara Consulting, 2026).



Note: * Reefs that are mined

Figure 8-3. Free State Goldfields Stratigraphy (from: Harmony Gold Geology Department)

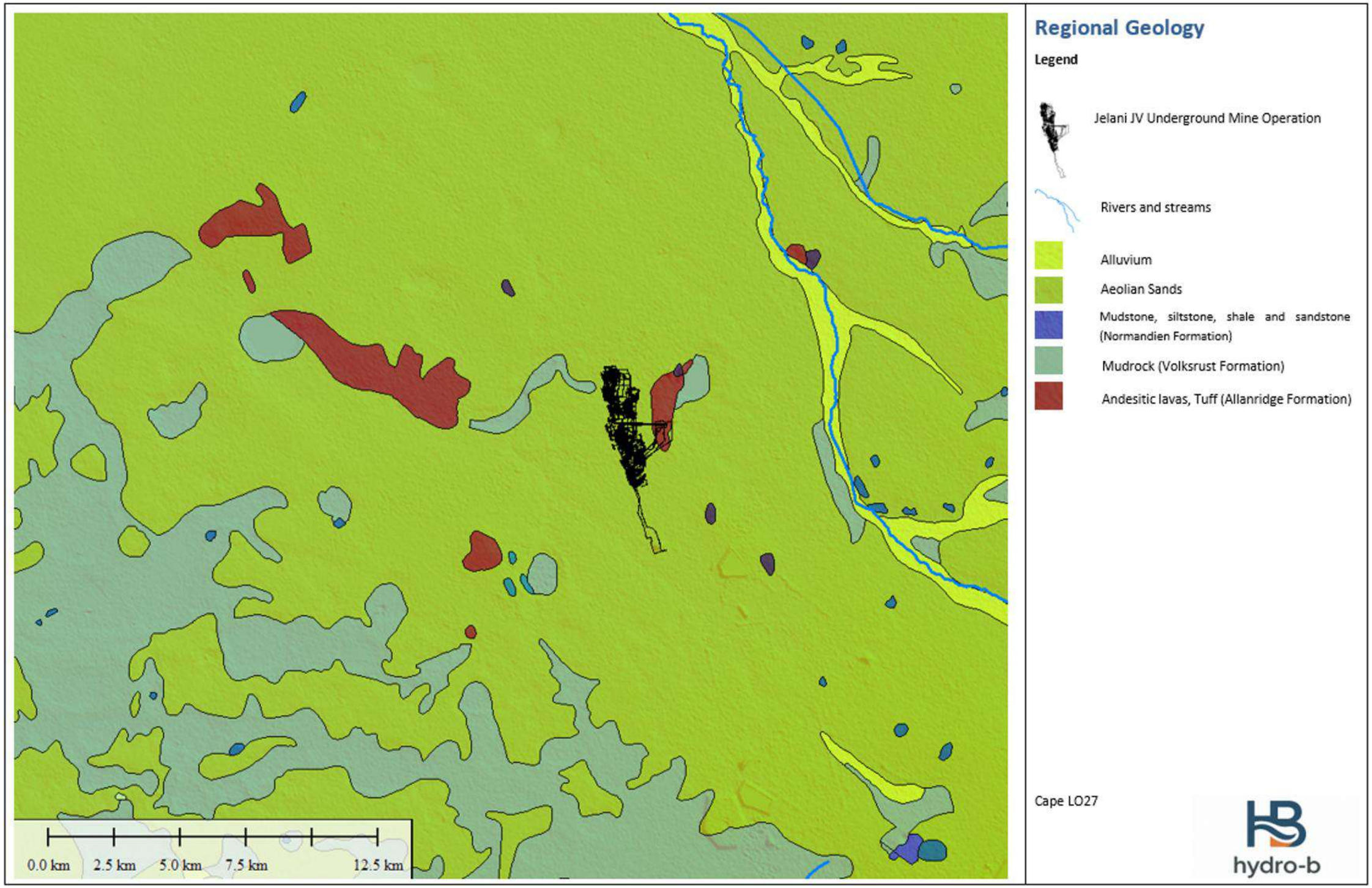


Figure 8-4. Regional Surface Geology

8.3.2 Local Geology

The Jelani Operation is situated along the western margin of the Free State Goldfield in close proximity to the historical and current Target Mine Operations. The local geology intersected by the mining operations comprises a thick sequence of Witwatersrand strata affected by faulting, folding and erosional truncation associated with subsequent tectonic events (Bara Consulting, 2026).

The near-surface geology within the project area is dominated by Karoo sediments consisting mainly of weathered shale, mudstone, sandstone and unconsolidated surficial materials. The Karoo sediments are underlain by the Ventersdorp Supergroup which, based on the exploration drilling throughout the gold field, has an average thickness of 1 300 m. The Ventersdorp Supergroup can be divided into the Pniel sequence, the Platberg Group and the basal Kliprivierberg Group consisting of alternating sediments, andesitic lavas, tuffs and agglomerates. The thickness and preservation of these units varies locally due to erosion and fault displacement (AquiSim Consulting, 2025) (MvB Consulting, 2026).

The principal lithostratigraphic units underlying the Ventersdorp Supergroup belong to the Central Rand Group and include the Luipaardsvlei, Harmony, Booysens, Kimberley, Eldorado and Mondeor Formations. These formations comprise interbedded quartzites, conglomerates and shale units. Within these lithostratigraphic units the Jelani Operations will target the EA reef, A reef, B reef and Basal reef at mining depths ranging between 1 513 m – 2 600 m below surface.

The stratigraphic sequence contains numerous shale horizons that provide important stratigraphic controls and may act as local barriers to vertical groundwater movement where sufficiently continuous (Bara Consulting, 2026).

8.3.3 Structural Geology

Structurally, the Free State Goldfield is dominated by a large north-south trending synclinal basin. The region displays complex structural geology because of faulting and folding associated with this syncline (MvB Consulting, 2026) with numerous north-striking faults and significant vertical displacement. The De Bron Horst forms a major regional structural feature that divides the goldfield into eastern and western sectors (Figure 8-5).

Additional thrust faulting associated with Ventersdorp-age tectonism has further modified the basin (Bara Consulting, 2026) (MvB Consulting, 2026). The local structural setting is characterised by a series of north-striking normal faults associated with the western margin of the goldfield. These faults subdivide the geological succession into discrete structural blocks and influence the continuity in stratigraphy (Bara Consulting, 2026).

The regional structural geology is dominated by structures developed within the Witwatersrand and Ventersdorp successions. Although some of these structures extend into or affect the overlying Karoo unit these are mainly associated with post-Karoo movement and dolerite intrusions and only provide localised conduits through an otherwise low-permeability Karoo sequence (MvB Consulting, 2026).

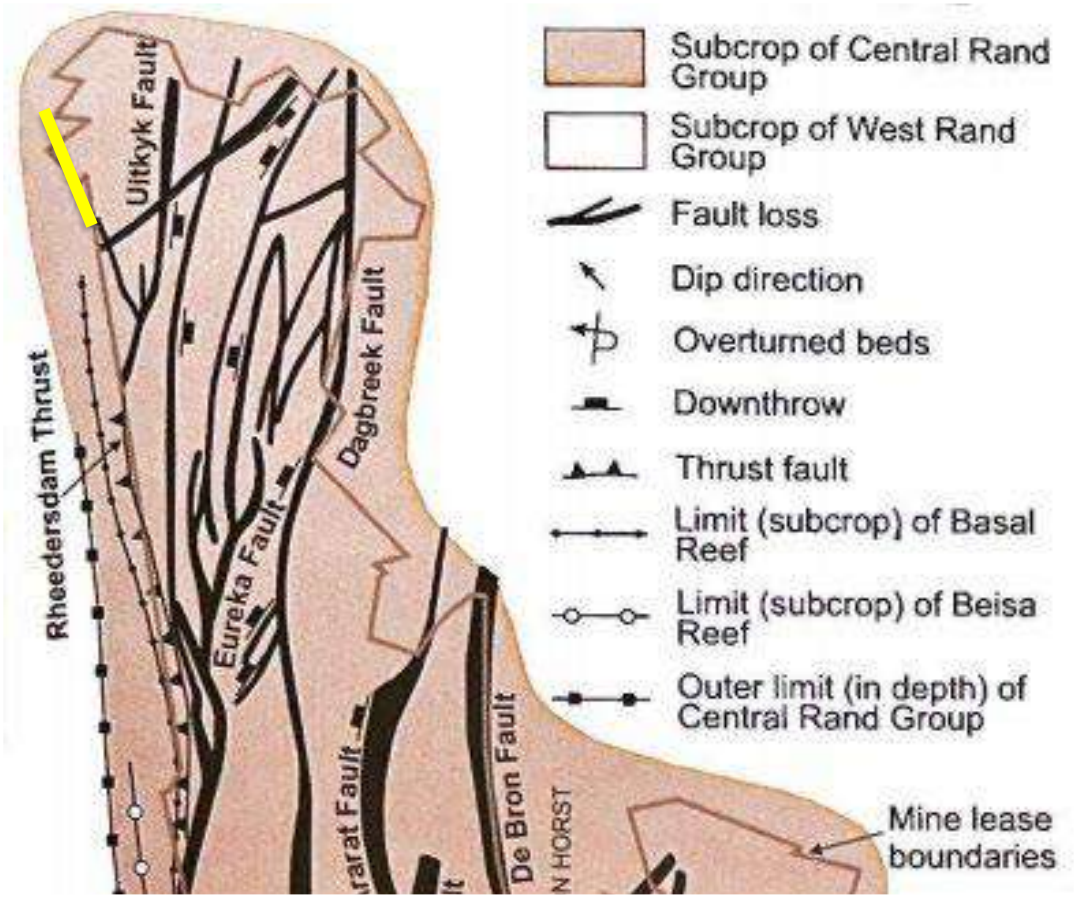


Figure 8-5. Structure of the Welkom Goldfields. Location of the Proposed Operation Indicated by the Yellow Bar (Bara Consulting, 2026).

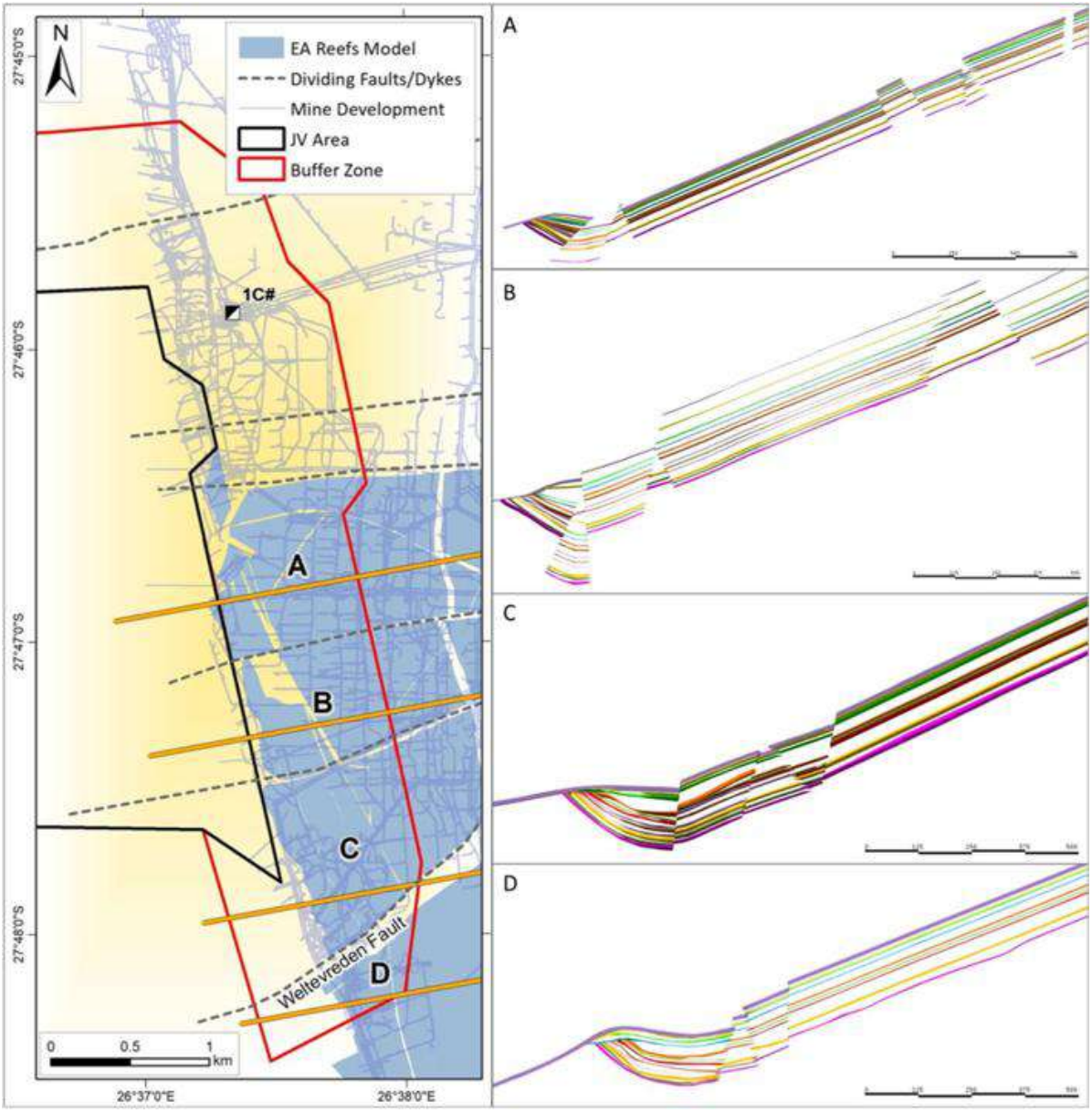


Figure 8-6. West-East Cross Sections Through The Jelani Operation Showing the Targeted Reefs (Bara Consulting, 2026).

8.4 Hydrogeology

8.4.1 Aquifer Description

To understand the hydrogeological setting a description of the groundwater occurrence in the region is summarised below. It is important to note that groundwater interacting with the underground mining operations is largely derived from the deep Witwatersrand aquifer rather than from the shallow Karoo aquifer. Over the years of mining and groundwater abstraction from the underground mines the deep aquifer has been dewatered significantly (MvB Consulting, 2026).

The Study Area is characterised by two main aquifers (Figure 8-7):

- A shallow weathered and fractured Karoo aquifer:
  - A shallow, perched aquifer exists in the weathered zone of sedimentary rocks directly beneath the surface to an average depth of 10 meters below ground level (mbgl), with most water strikes consistently located at the interface between weathered and fractured bedrock. Groundwater mainly occurs within sandstone horizons and lenses of the younger Beaufort Group which are directly recharged by precipitation;
  - The primary porosity of the older Vryheid and Dwyka Formations is very low, and the shales, mudstones and tillite generally function as aquicludes (AquiSim Consulting, 2025). Any water bearing capacity is associated with secondary joints, bedding planes and faults and at contacts between dolerite intrusions/dykes and country rock;
- A deep, fractured Ventersdorp/Witwatersrand aquifer:
  - The deep Ventersdorp/ Witwatersrand aquifer underlies the Karoo aquifer, with the Ventersdorp aquifer overlying the Witwatersrand aquifer (Figure 8-7). Groundwater in this combined aquifer is thought to be connate (i.e. original formation water) or extremely old (fossil) water and mainly occurs in geological structures such as fault zones or igneous intrusions (e.g. dykes).

8.4.1.1 Shallow Karoo Aquifer

This aquifer consists of a shallow weathered zone overlying a fractured rock zone and is directly recharged by rainfall. Groundwater levels in this aquifer are shallow as can be observed by the presence of numerous natural springs, wetlands and pans. The aquifer is locally intruded by dolerite dykes and sills. The following statistics were derived from borehole logs for 43 exploration holes (Golder Associates, 2008):

- Average thickness of Karoo: 117 m
- Percentage of boreholes intersecting dolerite in Karoo: 33%
- Average depth of dolerite from surface: 74 m

Groundwater occurrence within the Karoo aquifer is generally restricted to sandstone horizons, fracture zones and dyke contacts, with groundwater flow in the fractured unit often associated with contact zones with dolerite dykes and sills (AquiSim Consulting, 2025). Shale horizons present in the Karoo formations often restrict vertical infiltration of rainwater and groundwater strikes are mainly observed at the weathered/fractured rock interface. The Dwyka Formation, situated at the base of the Karoo aquifer, is

considered to act as an aquitard which forms a hydraulic barrier between the Karoo aquifer and the underlying aquifer units.

The primary permeability of the Karoo aquifer does not allow significant groundwater flow except where the permeability has been increased by secondary structures and consequently yields for boreholes drilled in this aquifer are generally low. In (AquiSim Consulting, 2025) the average yields for 39 boreholes drilled across the Free State goldfields by Pretorius in 1989 were summarised as shown below in Table 8-1. These yields correlate well with the borehole yields estimated during the hydrocensus (between 0.4 and 0.9 m^3/hr) and show yields are generally low, as expected for Karoo aquifers.

Table 8-1. Average Yields for Boreholes Drilled in the Karoo Aquifer

Aquifer	Dry Boreholes (% of total drilled)	Average Yield (m^3/hr)	Average Yield of boreholes with water strikes (m^3/hr)
Beaufort Group (Adelaide Subgroup)	25	2.7	3.55
Ecca Group (Volksrust Formation)	42	0.92	1.58

The groundwater quality in the fractured aquifer is generally of a poorer quality than in the weathered aquifer due to the concentration of salts and a slower recharge rate to this deeper part of the aquifer (AquiSim Consulting, 2025).

The shallow Karoo aquifer units can thus be characterised as a predominantly shallow, weathered and locally fractured aquifer system where groundwater availability is controlled by rainfall recharge, weathering, lithology and local geological structures. This is the principal groundwater system considered to be relevant to agricultural and domestic boreholes on surrounding farms.

8.4.1.2 Deeper Fractured Ventersdorp/Witwatersrand Aquifer

The Ventersdorp and Witwatersrand sequences are considered as one aquifer in which structures (as described in Section 8.3.3) significantly control the regional, deep groundwater flow. Major faults can act either as preferential groundwater flow pathways where intensely fractured, or as hydraulic barriers where fault mineralisation reduces permeability.

Numerous dykes of Ventersdorp, Bushveld, Pilanesberg and Karoo age intrude the Witwatersrand succession, commonly following pre-existing fault structures. Dyke contacts and associated fracture zones are locally important groundwater-bearing features and may influence hydraulic connectivity between geological units (AquiSim Consulting, 2025) (MvB Consulting, 2026). In addition, mine voids that have been expanded over the years have added significant groundwater conduits in the Witwatersrand aquifer and interconnect with the pre-existing fracture network.

Groundwater occurrence within the deeper Ventersdorp and Central Rand geological sequences is therefore primarily controlled by faulting, fracturing, dyke contacts and mining-related disturbances of the rock mass (AquiSim Consulting, 2025) (MvB Consulting, 2026).

As mentioned above the impermeable nature of the Dwyka Formation at the base of the Karoo aquifer effectively seals off the deeper aquifer. Post-Karoo movement and intrusions provided some conduits for leakage between the Karoo aquifer and the deep Witwatersrand aquifer. However, the deep aquifer recharge from surface is regarded as negligible, and at best localised (MvB Consulting, 2026).

This is concluded based on the dewatering of this aquifer over the past 40 years during which the water levels in the Witwatersrand aquifer dropped significantly, with some underground dewatering boreholes having dried up in some instances. In contrast, groundwater levels in the Karoo aquifer have remained constant (MvB Consulting, 2026).

Previous hydrogeological studies concluded the following:

- There is no or very limited hydraulic connectivity between the Karoo aquifer and the deeper Ventersdorp/Witwatersrand aquifers;
- Recharge to the Witwatersrand aquifer is negligible (MvB Consulting, 2026);
- Once the Witwatersrand aquifer is dewatered (or the water level lowered) it will not recover. The estimated post-mining water level in the Witwatersrand aquifer will therefore be deeper than the pre-mining water level of ~200m below surface.

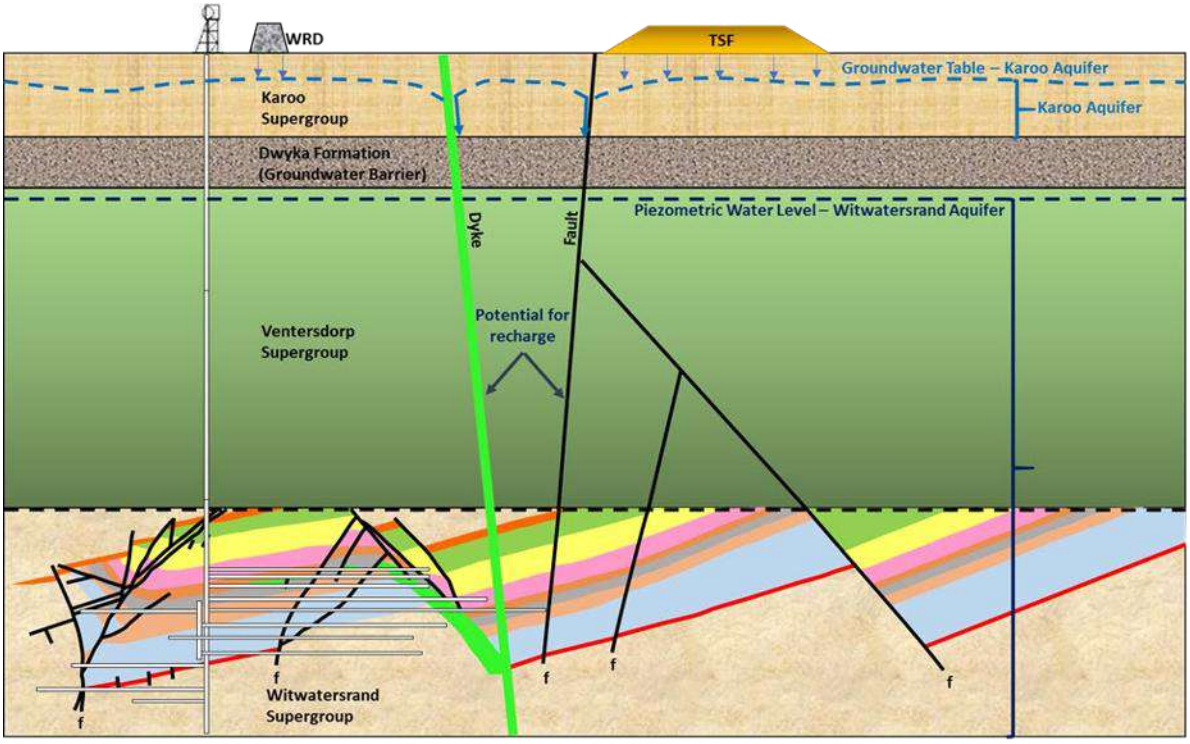


Figure 8-7. Graphical Representation of the Regional Aquifers (MvB Consulting, 2026).

8.4.2 Aquifer Parameters

Available aquifer test data for the Karoo aquifer was provided in (AquiSim Consulting, 2025) where AquiSim analysed data from (Golder Associates, 2008). Table 8-2 shows the transmissivity and hydraulic conductivity values obtained for the larger Harmony Gold Welkom Area. Based on borehole depths (with a maximum depth of 100 mbgl) these characteristics are relevant for the shallow Karoo aquifer.

AquiSim observed that the heterogeneous nature of the aquifer is evident from the variability in the calculated transmissivity/hydraulic conductivity values and typical for fractured and weathered sedimentary hard rock aquifers. The derived T- and K-values are indicative of a low permeable environment (AquiSim Consulting, 2025). The average hydraulic conductivity for the shallow aquifer is 0.29 m/d, with geometric and harmonic means of 0.1 and 0.042 m/d, respectively.

Table 8-2. Hydraulic Parameters Derived from Available Aquifer Test Data.

BH ID	SWL	Collar	Corrected SWL	BH Depth	Corrected BH Depth	Saturated Thickness	T (Drawdown)	T (Recovery)	T (Average)	K
	mbc	magl	mbs	mbc	mbgl	m	m2/day	m2/day	m2/day	m/day
BH129	2.9	0	2.90	26.24	26.24	23.34	14.30	14.60	14.45	0.619
BH135	2.88	0	2.88	35.95	35.95	33.07	2.50	3.10	2.80	0.085
BH41	6.06	0.28	5.78	26.37	26.09	20.31	27.60	-	27.60	1.359
BH144	19.49	0.71	18.78	39.19	38.48	19.70	0.70	-	0.70	0.036
BH120	0.72	0.27	0.45	20.36	20.09	19.64	1.20	-	1.20	0.061
BH190	2.24	0.14	2.10	28.24	28.10	26.00	0.60	-	0.60	0.023
BH142	8.09	0.56	7.53	35.74	35.18	27.65	0.50	-	0.50	0.018
BH17	2.32	0	2.32	35.20	35.20	32.88	1.90	-	1.90	0.058
H3-1	7.49	0.48	7.01	100.00	99.52	92.51	1.70	-	1.70	0.018
BH122	2.36	0.45	1.91	30.35	29.90	27.99	8.00	8.40	8.20	0.293
BH123	1.59	0.43	1.16	26.46	26.03	24.87	2.00	2.90	2.45	0.099
BH185	1.01	0.26	0.75	39.16	38.90	38.15	0.40	-	0.40	0.010
BH27	2.69	0	2.69	32.69	32.69	30.00	12.40	-	12.40	0.413
H3-2	5.25	0.26	4.99	35.80	35.54	30.55	2.10	3.20	2.65	0.087
N32-1	3.37	0.38	2.99	14.33	13.95	10.96	3.80	-	3.80	0.347
BH187	2.84	0.66	2.18	25.42	24.76	22.58	0.50	-	0.50	0.022
SH-1	5.78	0.21	5.57	25.40	25.19	19.62	28.00	-	28.00	1.427

No information is provided for hydraulic conductivities for the deeper Ventersdorp/Witwatersrand aquifer. However, reported hydraulic conductivity values for these units, such as in (Witthüser, Holland, Seidel, & König, 2014) and other studies widely range between approximately 10^{-9} - 10^{-2} m/day, representing fresh to fractured rock conditions. In some cases, significantly higher values of up to several m/day have been reported in strongly weathered quartzite zones.

8.4.3 Groundwater Use

8.4.3.1 Small-scale Abstractions

Based on the hydrocensus results, small-scale borehole sources in the Study Area are mainly used as water sources for domestic purposes for single households. Eight of the 19 boreholes surveyed during the hydrocensus were in use as third-party groundwater supplies. The owners of the boreholes in the area reported that boreholes are generally low-yielding, usually ranging between an estimated 0.4 – 0.9 m^3/hr. No borehole yields were reported to be strong enough to be used for crop irrigation.

8.4.3.2 Mine Water Abstraction

Active mining operations closest to the Study Area are the Target Mine (overlapping with the proposed Jelani Operation), Freddies Mine (to the south) and Tshepong Mine (further south), which are interconnected as shown in Figure 8-8. Currently, water is actively being pumped at the Tshepong and Target Mines.

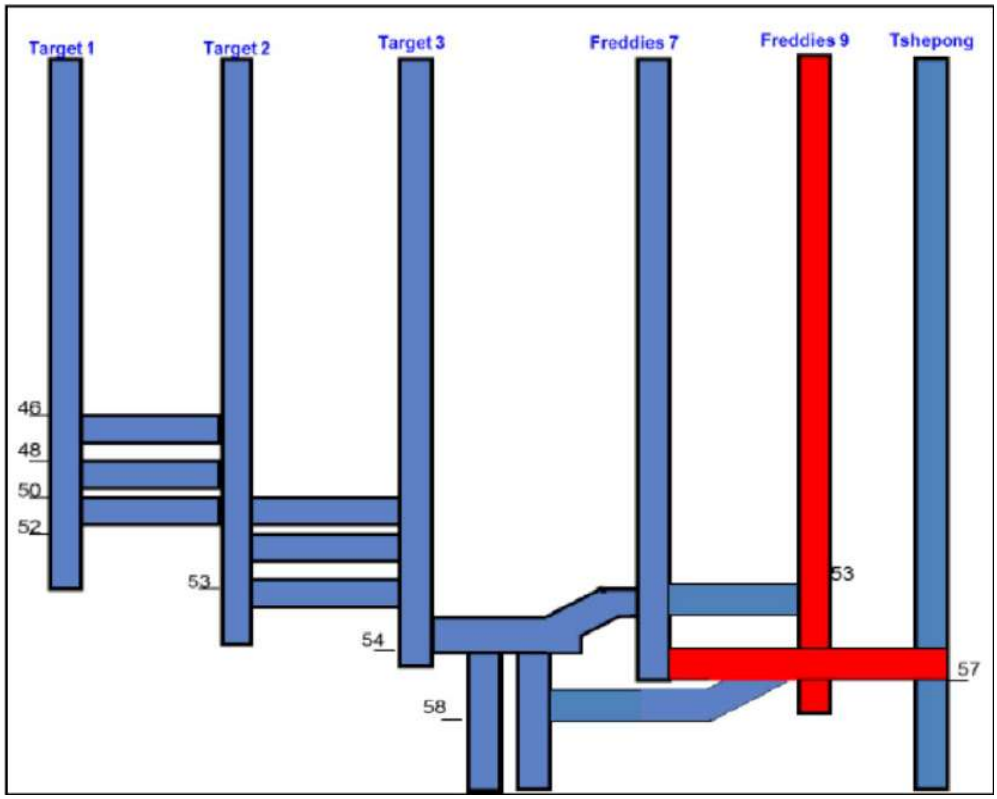


Figure 8-8. Target, Freddies and Tshepong Mine Interconnection (Digby Wells Environmental, 2015)

Regarding the current water situation at the Target Gold Mine reference is made to a hydrogeological investigation that served as input into the Pre-Feasibility Study for the Jelani Operation (Groundwater Square, 2016). For estimation of abstraction for Target Mine operations the investigation described the following:

- Target Gold Mine is currently in full operation from No.1 Shaft;
  - The average volume of underground water pumped to surface for October and November 2015 was 181.7 Ml or 5.96 Ml/day;
  - Underground water pumped to the Plant for the period January 2013 - January 2016 ranged between 1.8 Ml/day and 4.8 Ml/day, averaging at 3.3 M/l/day;
  - Daily discharge to Vöelpan for the period starting July 2015 and ending March 2016 ranged between zero and ~11 100 m^3/day, averaging at 4 823 m^3/day or 4.8 Ml/day;
- The No.2 shaft is not operational but is equipped with an emergency winder and used as a second means of egress for the Target Mine;

    - The No.2 Shaft underground water pumped from No.1 Shaft for the period January 2013 - January 2016 averaged at 2 518 m^3/day or 2.5 ML/day;
- The No.3 Shaft has been operating intermittently since the late 1990s and is currently closed on care and maintenance;
    - During October 2015 the refurbished pumping station at 30 Level became operational due to water from Freddies No.9 Shaft, which closed in December 2014, finding its way to No.3 Shaft on 65 Level. Before closure on average some 3.2 Ml/day was pumped at Freddies No.9 Shaft;
    - Pumping from No.3 Shaft currently roughly averages between 3.5 to 3.6 Ml/day. The average for the 5 day prior to the site visit calculates to 2.7 Ml/day;
    - The average volume pumped from Target 3 for the period June 2016 – September 2016 was 3.5 Ml/day.

8.4.4 Groundwater Levels

There are 311 monitoring boreholes across the Harmony Gold mining areas, distributed around Tailings Storage Facilities (TSFs) to monitor possible impacts emanating from these TSFs. Although no geological information is available for these boreholes, it is assumed they mainly target the shallow Karoo aquifer as they are meant to monitor impacts on the shallow groundwater environment. Groundwater levels were available for 164 of these boreholes, ranging between 0 and 33 mbgl, with most groundwater levels within 15 mbgl.

Groundwater monitoring for the Target Mine Operations included groundwater levels for five boreholes (A1, A3, A5, A6 and BH88) ranging between 0.8 and 5.9 mbgl. During the hydrocensus, groundwater levels were measured in 12 boreholes;

- Static groundwater levels ranged between 0.59 m to 5.62 mbgl;
- Dynamic groundwater levels were measured in boreholes BH01, BH03 and BH87 and ranged between 5.3 and 44.9 mbgl.
- Figure 8-9 shows the monitoring boreholes for which data was available showing most recent groundwater level reported for each point (AquiSim Consulting, 2025).

All groundwater levels were added to Figure 8-9 and show a strong relationship with surface elevation, indicating groundwater levels in the shallow Karoo aquifer typically mimic topography, showing that overall groundwater flow directions follow topographical gradients and are generally close to surface. Based on groundwater levels from the Target Mine Operations monitoring and hydrocensus boreholes, groundwater levels within in the Jelani Project Area are close to surface with deeper groundwater levels associated with borehole abstraction. Based on this it can be concluded that there is no impact from the underground mining activities on groundwater levels in the shallow Karoo aquifers, with only local impacts from single borehole sources.

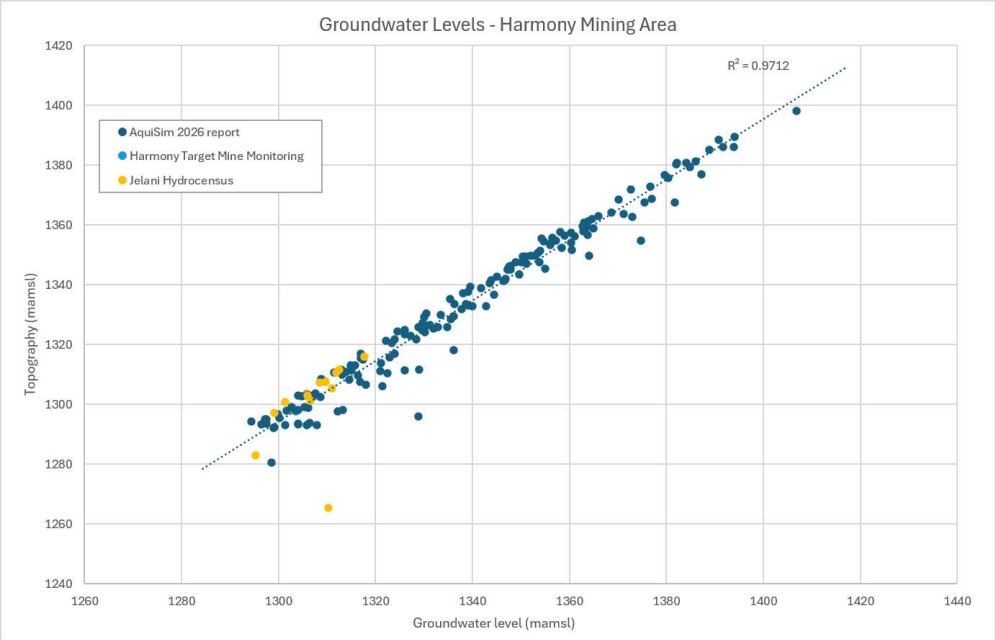


Figure 8-9. Bayesian Correlation for Available Groundwater Levels.

8.4.4.1 Karoo Aquifer

The connectivity between the Witwatersrand and Karoo aquifers can best be investigated through an assessment of the regional groundwater levels. If the Karoo aquifer and the underlying Witwatersrand aquifers in which the mine workings are situated have a strong hydraulic connection this will lead to zones of dewatering in the shallow Karoo aquifer. Regional groundwater levels in the shallow Karoo aquifer would indicate areas where groundwater drawdown occurred. (MvB Consulting, 2026). Harmony Gold has an extensive groundwater monitoring network, and this information was made available. However, only groundwater quality is measured and the groundwater levels were not recorded (Aquisim Consulting, 2018).

8.4.4.2 Witwatersrand Aquifer

Groundwater level records in the Witwatersrand aquifer are scarce. Some data is available for Joel mine (Van Biljon, 1995). Although this is at some distance from the Study Area it does provide some information that is applicable throughout the basin. Joel mine is located in the southern extremity of the Witwatersrand basin and started operating in 1986. At the time when mining started the water level was at 775 mamsl, some 600 m below surface. The Witwatersrand aquifer is a confined aquifer, and the water level is represented by a piezometric or pressure level, which is expected to be consistent throughout the basin. This piezometric level of 775 mamsl that was measured at Joel prior to any dewatering from the mine is thought to represent the original water level in the entire Witwatersrand aquifer (MvB Consulting, 2026). What was also noticeable at Joel was that between January 1986 and December 1992 the water level in the aquifer dropped 198 m due to dewatering from Joel mine. Many of the dewatering boreholes drilled at Joel mine dried up during this time as sections of the mine became dewatered. This shows that abstracting from the Witwatersrand aquifer dewaters the aquifer and that there is very little or no recharge to this aquifer.

Table 8-3. Hydrocensus Details

ID	Coordinates			Survey Date	Owner Information		Bore/Spring Status & Equipment							Hydrogeological Information			Sample Taken	Photo	Comments
							Primary Water Application				Equipment	Estimated Abstraction/Flow Rate [L/hour]	Borehole inner casing diameter (mm)	Borehole Depth (mbgl)	Casing Height (m)	Static Water Level (mbch)	Static Water Level (mbgl)			
	Latitude	Longitude	Elevation (mbgl)		Owner	Farm Name	Type	Primary Use	Other Uses											
									Domestic	Stock Watering										
BHN	27.79009	26.580750	N/A	15/12/2025	Eduard Steyn	Blaauwklip No. 181	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	500	152	Unknown	0.72	2.76	2.04	Yes	Yes	Bailer Sample
B11	27.787924	26.584360	N/A	15/12/2025	Eduard Steyn	Blaauwklip No. 181	Borehole	No Use	None	None	None	None	Unkown	Unknown	Unknown	Unknown	Unknown	No	No	No Access due to wet road. Farmer says the BH is surrounded with water and can not be accessed during the wet season
BH89	27.792849	26.574685	N/A	15/12/2025	Eduard Steyn	Damleegte No. 441	Borehole	No Use	None	None	None	None	Unkown	Unknown	Unknown	Unknown	Unknown	No	No	BH Destroyd according to the farmer
BH88	27.793880	26.57508	N/A	15/12/2025	Pieter Haasbroek	Goedgesnij No. 376	Borehole	No Use	None	None	None	None	Unkown	Unknown	N/A	Unknown	Unknown	No	Yes	Broken handpump. No access to measure water level or take sample
BH01	27.757485	26.587600	N/A	07/01/2026	Jaco Grobbelaar	Onrust No. 377	Borehole	Domestic	Yes (Main Household and workers houses)	Yes (Small Scale)	Submersible pump	800	152	Approx 70m	0.00	44.87	44.87	Yes	Yes	Grab sample taken from tank. Water level measured while pump was on
BH02	27.753129	26.587748	N/A	07/01/2026	Jaco Grobbelaar	Onrust No. 377	Borehole	Domestic	Yes (Single Household)	None	Submersible pump	800	Unkown	Approx 50m	Unknown	Unknown	Unknown	No	Yes	Bees. No additional info could be collected
BH03	27.784716	26.556810	N/A	07/01/2026	Christo Nel	Modderfontein No. 343	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	400	152	Approx 80	0.19	12.52	12.33	Yes	Yes	Water level measured while pump was on. Farmer uses a 1.1kw pump because a 1.5kw pump is too strong for the low yielding borehole. Grab sample taken
BH04	27.786132	26.560869	N/A	07/01/2026	Christo Nel	Modderfontein No. 343	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Windpump	Unknown	152	Unknown	Unknown	Unknown	Unknown	No	Yes	Windpump sealed, no water level access
BH87	27.802249	26.584288	N/A	07/01/2026	Pieter Haasbroek	Lacuna No. 442	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	Unknown	152	Unknown	0.80	6.13	5.33	No	Yes	Water level measured while pump was on
BH05	27.808042	26.581237	N/A	07/01/2026	Pieter Haasbroek	Lacuna No. 442	Borehole	Stock Watering	None	Yes (Small Scale)	Windpump	Unknown	152	Unknown	0.50	1.63	1.13	No	Yes	
BH86	27.805929	26.596764	N/A	07/01/2026	Pieter Haasbroek	Lacuna No. 442	Borehole	No Use	None	None	Windpump	Unknown	152	Unknown	0.51	1.10	0.59	No	Yes	
BH06	27.741958	26.595715	N/A	12/01/2026	Tertius de Jager	Zuurbron No. 444	Borehole	Domestic	Yes (Single Household)	Yes (Small Scale)	Submersible pump	500	Unkown	Approx 30	Unknown	Unknown	Unknown	No	Yes	No Access, farmer does not have key to open structure built around the BH. Grab sample taken from tank.
BH07	27.743021	26.599114	N/A	12/01/2026	Tertius de Jager	Zuurbron No. 444	Borehole	No Use	None	None	Windpump	None	Unkown	Unknown	Unknown	Unknown	Unknown	No	Yes	Bees. No additional info could be collected
BH08	27.742836	26.592158	N/A	12/01/2026	Tertius de Jager	Zuurbron No. 444	Borehole	No Use	None	None	None	None	152	18	0.21	5.83	5.62	No	Yes	
A7	27.778172	26.645384	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	None	None	None	None	152	2.92	0.12	2.32	2.20	Yes	Yes	Assumed BH may be blocked at 2,92m. Water looks dirty, may be due to an animal. Bailer sampled.
A6	27.773525	26.645368	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	None	None	None	None	50	8.73	0.36	3.30	2.94	No	Yes	
A5	27.800561	26.633653	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	None	None	None	None	152	3.62	0.04	1.75	1.71	Yes	Yes	Bailer Sampled
A4	27.800690	26.631467	N/A	12/01/2026	Eric Sello Senoge	Uitkyk No. 258	Borehole	Monitoring	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Could not be found / located
A3	27.783672	26.621949	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Monitoring	None	None	None	None	152	4.31	0.00	0.87	0.87	Yes	No	Bailer Sampled
A2	27.779486	26.620518	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Monitoring	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Could not be found / located
B1	27.782195	26.614362	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	None	None	None	None	None	152	Unknown	0.41	1.65	1.24	No	Yes	Assumed to be B1 as it plots close to the provided coordinates for B1
B2N1	27.780207	26.609205	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Domestic	Yes (Single Household)	None	Submersible pump	Unknown	152	Unknown	Unknown	Unknown	Unknown	No	No	Borehole Closed off. No additional data could be collected
B2N2	27.782227	26.606346	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Borehole could not be found. Not currently monitored by Aquatico
BH85	27.792017	26.593248	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	Domestic	Yes (Single Household)	None	Submersible pump	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Borehole Closed.
B7	27.794087	26.616054	N/A	12/01/2026	Willem Taljaard	Graspan No. 40	Borehole	None	None	None	Windpump	None	152	Unknown	Unknown	Unknown	Unknown	No	Yes	Windpump sealed, no water level access

8.4.5 Groundwater Quality

8.4.5.1 Hydrocensus

During the hydrocensus four samples (including one duplicate) were taken from third-party domestic sources and three samples were taken from monitoring boreholes (Figure 8-10):

- Third-party boreholes: BHN, BH01 and BH03;
- Monitoring boreholes: A3, A5 and A7

Sample results were compared to SANS 241:2015 standards. The samples from the third-party boreholes were considered to be representative of background groundwater quality, and these boreholes show generally good groundwater quality with the exception of nitrate concentrations over the SANS limit for BHN and BH01. Magnesium 70 mg/l (at 73.1 mg/l, limit 70 mg/l) and antimony (0.03 mg/l, limit 0.02 mg/l) are slightly elevated. No other parameters exceeded SANS limits.

The elevated nitrate concentrations in BHN and BH01 suggest that this may be a result of the use of agricultural fertilisers or animal waste related to the agricultural nature of the Study Area. Boreholes BHN and BH01 are both used for potable water supply and nitrate concentrations should continue to be monitored frequently to establish long-term trends, as long-term exposure to elevated nitrate can be harmful to human health. If elevated nitrate concentrations persist the owners may need to investigate treatment options such as ion-exchange to meet SANS water quality standards.

Monitoring boreholes A3 and A5 are situated close to and in downgradient positions of the Target Mine No. 1 and 2 TSF (less than 50 m). Borehole A7 is downgradient of the Target 2 Shaft at a downgradient position roughly 100 m away from the associated waste rock dump. All three monitoring boreholes are therefore representative of groundwater quality in close proximity to these infrastructures.

Samples A3 and A5 show poor groundwater quality with elevated EC, TDS, chloride, sulphate, sodium, and calcium, magnesium, ammonia, antimony, cobalt and manganese to a lesser extent. The acidic pH in A3 (pH of 4.74) may be indicative of acid mine drainage related to the TSF. Sample A7 shows a similar water quality to A3 and A5 although concentrations are relatively lower compared to concentrations for A3 and A5 of the parameters mentioned above. The similarity in groundwater composition indicates that groundwater quality has been impacted at very short distances from existing mine infrastructures.

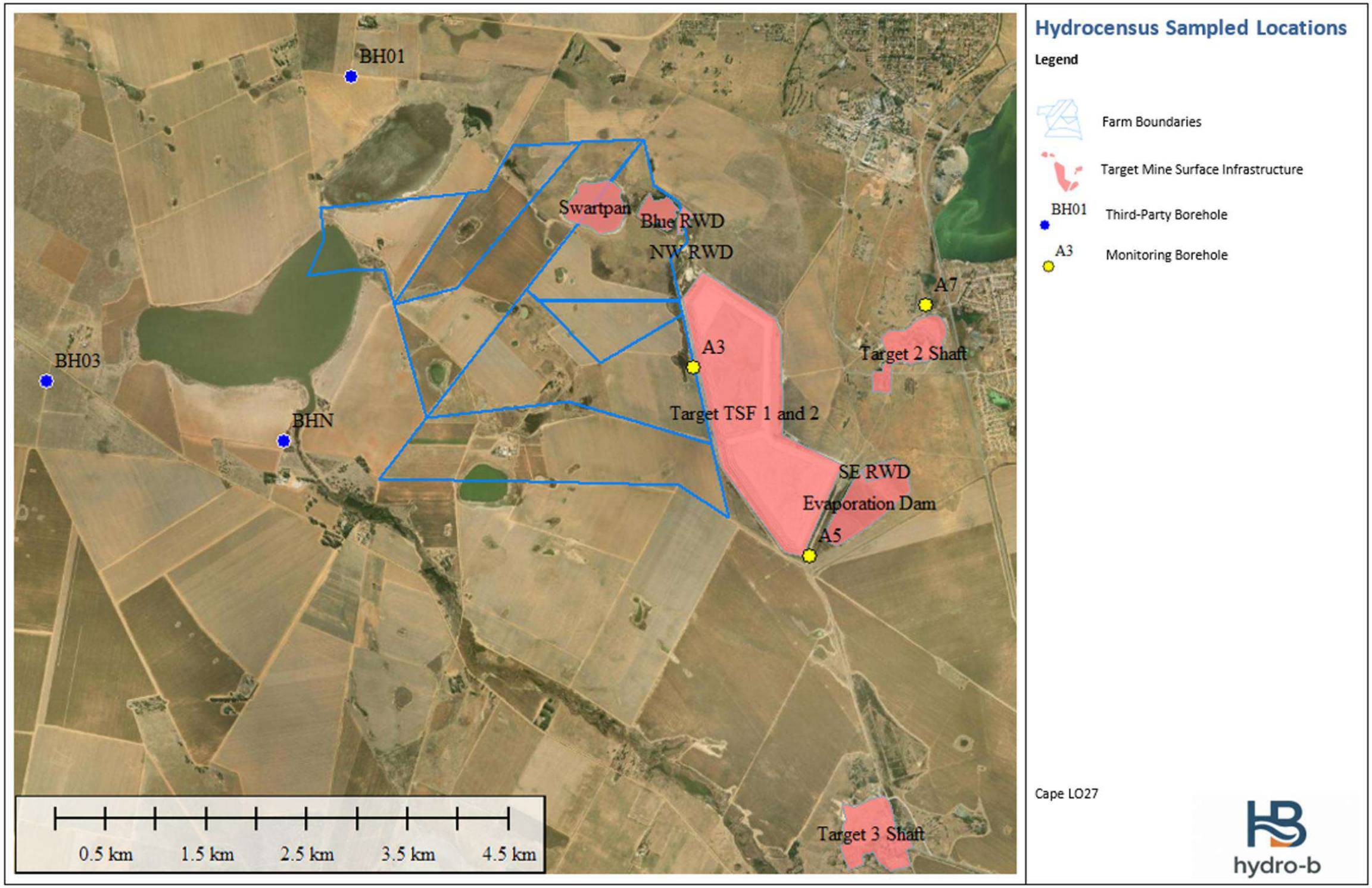


Figure 8-10. Hydrocensus – Sampled Locations.

- A7: Mg–Ca–SO_4 type; magnesium (47 %) and calcium (42 %) dominate the cations, and sulphate (~69 %) is the main anion. The relatively lower sodium (81 mg/L) and chloride (125 mg/L) may suggest mixing of seepage from the TSF with natural groundwater.

A Piper Diagram shows the hydrochemical facies in Figure 8-11:

- BHN-A/B: These samples plot in the central region of the diamond, confirming a mixed Na–HCO_3/Cl water type.
- BH01 and BH03: Both lean toward the Na–HCO_3 corner, reflecting the bicarbonate-rich nature with moderate Na^+.
- A3, A5 and A7: These acidic, saline samples plot toward the upper right of the diamond, showing dominance of SO_4^{2-} and Cl^- with varying cation compositions; A7 is Mg–SO_4, while A3 and A5 trend toward Na/Ca–Cl–SO_4 waters.

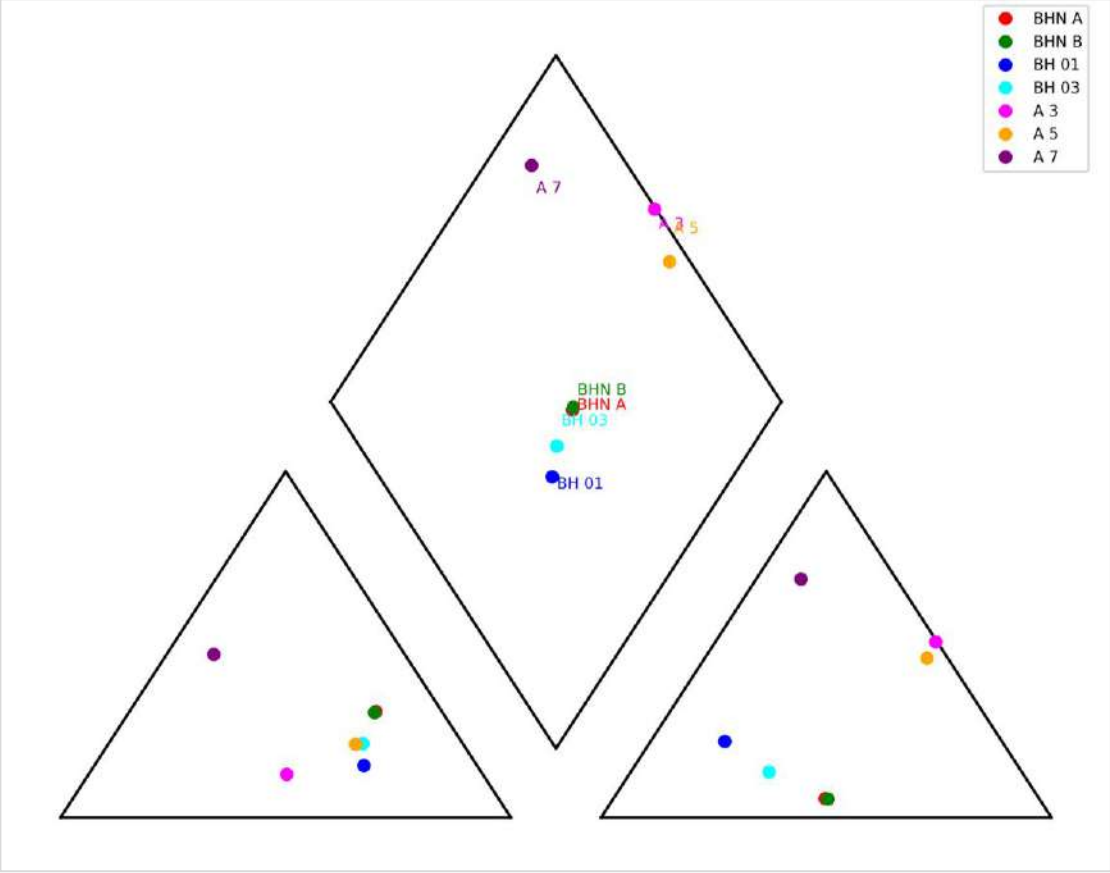


Figure 8-11. Piper Diagram for the Hydrocensus Locations

Table 8-4. Hydrocensus Sample Analyses Results.

SAMPLE ID		BHN	BH 01	BH 03	A 3	A 5	A 7
SAMPLED		2026/01/15	2026/01/07	2026/01/07	2026/01/12	2026/01/12	2026/01/12
Total Alkalinity (pH>4.5)	mg $CaCO_3$/L	369	318	383	11.8	302	379
Bicarbonate Alkalinity	mg $CaCO_3$/L	369	318	383	11.8	302	379
Carbonate Alkalinity	mg $CaCO_3$/L	0.00	0.00	0.00	0.00	0.00	0.00
M Alkalinity (8.3>pH>4.5)	mg $CaCO_3$/L	369	318	383	11.8	302	379
P Alkalinity (pH>8.3)	mg $CaCO_3$/L	0.00	0.00	0.00	0.00	0.00	0.00
Conductivity (Laboratory)	mS/m	183	108	130	576	1065	270
pH (Laboratory)		7.46	7.57	7.54	4.74	6.63	7.11
Total Hardness	mg $CaCO_3$/L	446	254	328	1902	3112	1635
Calcium Hardness	mg $CaCO_3$/L	145	159	167	1478	1651	774
Magnesium Hardness	mg $CaCO_3$/L	301	94.7	161	424	1462	861
Total Dissolved Solids (TDS)	mg/L	1092	724	802	4323	8114	2168
Temperature	°C	21.0	21.0	21.0	21.0	21.0	21.0
Turbidity	NTU	0.67	14.6	<0.28	45.5	8.76	32.6
Ammonia and Ammonium	mg N/L	<0.45	<0.45	<0.45	21.8	<0.45	17.1
Calcium	mg Ca/L	58.0	63.6	66.8	592	661	310
Chloride	mg Cl/L	258	59.9	148	1188	2273	125
Magnesium	mg Mg/L	73.1	23.0	39.2	103	355	209
Nitrate and Nitrite (TON)	mg N/L	40.8	22.7	6.90	3.13	0.35	<0.35
Nitrite	mg N/L	<0.01	<0.01	<0.01	1.13	<0.01	0.01
Ortho Phosphate	mg P/L	0.49	0.19	0.15	0.09	0.10	0.44
Potassium	mg K/L	20.5	4.53	10.7	31.7	38.5	10.0
Sodium	mg Na/L	235	171	189	666	1714	81.1
Silicon	mg Si/L	10.3	12.5	14.0	6.82	10.7	10.8
Sulphate	mg SO_4/L	40.9	109	86.5	1670	2888	1180
Aluminium	mg Al/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony	mg Sb/L	0.03	0.02	0.02	0.02	0.03	0.05
Arsenic	mg As/L	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Barium	mg Ba/L	0.36	0.03	0.03	<0.01	<0.01	<0.01
Beryllium	mg Be/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Boron	mg B/L	0.26	0.12	0.18	0.36	0.04	0.23
Cadmium	mg Cd/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Chromium	mg Cr/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	mg Co/L	<0.01	<0.01	<0.01	0.25	0.68	<0.01
Copper	mg Cu/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	mg F/L	1.38	0.13	0.42	<0.09	<0.09	0.12
Iron	mg Fe/L	<0.01	<0.01	<0.01	0.29	<0.01	<0.01
Lead	mg Pb/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium	mg Li/L	0.03	<0.01	0.02	<0.01	<0.01	<0.01
Manganese	mg Mn/L	<0.01	<0.01	<0.01	20.8	0.52	0.59
Mercury	mg Hg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Molybdenum	mg Mo/L	0.02	<0.01	0.01	0.03	0.06	0.04
Nickel	mg Ni/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	mg Se/L	0.03	0.02	0.03	<0.01	0.02	0.04
Strontium	mg Sr/L	1.92	0.76	0.51	2.81	5.01	1.99
Tin	mg Sn/L	0.04	0.03	0.04	0.02	0.04	0.05
Vanadium	mg V/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.10
Zinc	mg Zn/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide (Free)	mg CN/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide (Total)	mg CN/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
WAD Cyanide	mg CN/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	mg U/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

8.4.5.2 Harmony Gold Target Monitoring Data

Monitoring data was received from Harmony Gold for the Target Mine Operations for the period 2022 – 2025. The database included monitoring points for process, surface and groundwater points as part of the existing monitoring network. As was shown in the hydrocensus results, groundwater in close proximity of surface infrastructures related to the Target mining activities can be impacted. Impact on groundwater quality can come from direct seepage from infrastructure into the underlying aquifers, or discharge of water from infrastructures to surface water, and subsequent impact on groundwater quality through surface water-groundwater interaction. As such the monitoring points were sorted into three categories:

- Potential sources;
- Surface water monitoring points; and
- Groundwater monitoring points.

8.4.5.2.1 Sources

Sample results were available for the following potential sources:

- South-East RWD (D12);
- Blue RWD (E4);
- Freddies No. 9 Dam (ESW5);
- Target 1 Salvage Yard Evaporation Dam (ESWT2); and
- Target 1 Million Gallon Dam (TMGD1/ESWT1).

As the Target 1 Shaft area does not fall within the catchments related to the Jelani Operation these were omitted from this assessment. Sources, surface water and groundwater sampling locations are shown in Figure 8-12. Concerning pH, the monitoring data provided shows variability in results pre-2024 but relatively stable results from 2024 onwards. Since 2024 pH for all monitored sources have been within (or slightly below/above) the SANS limit range, with exception of the Blue RWD which shows acidic conditions (average pH of around 3). This may indicate efforts from the Target Mine to stabilise the effluent pH.

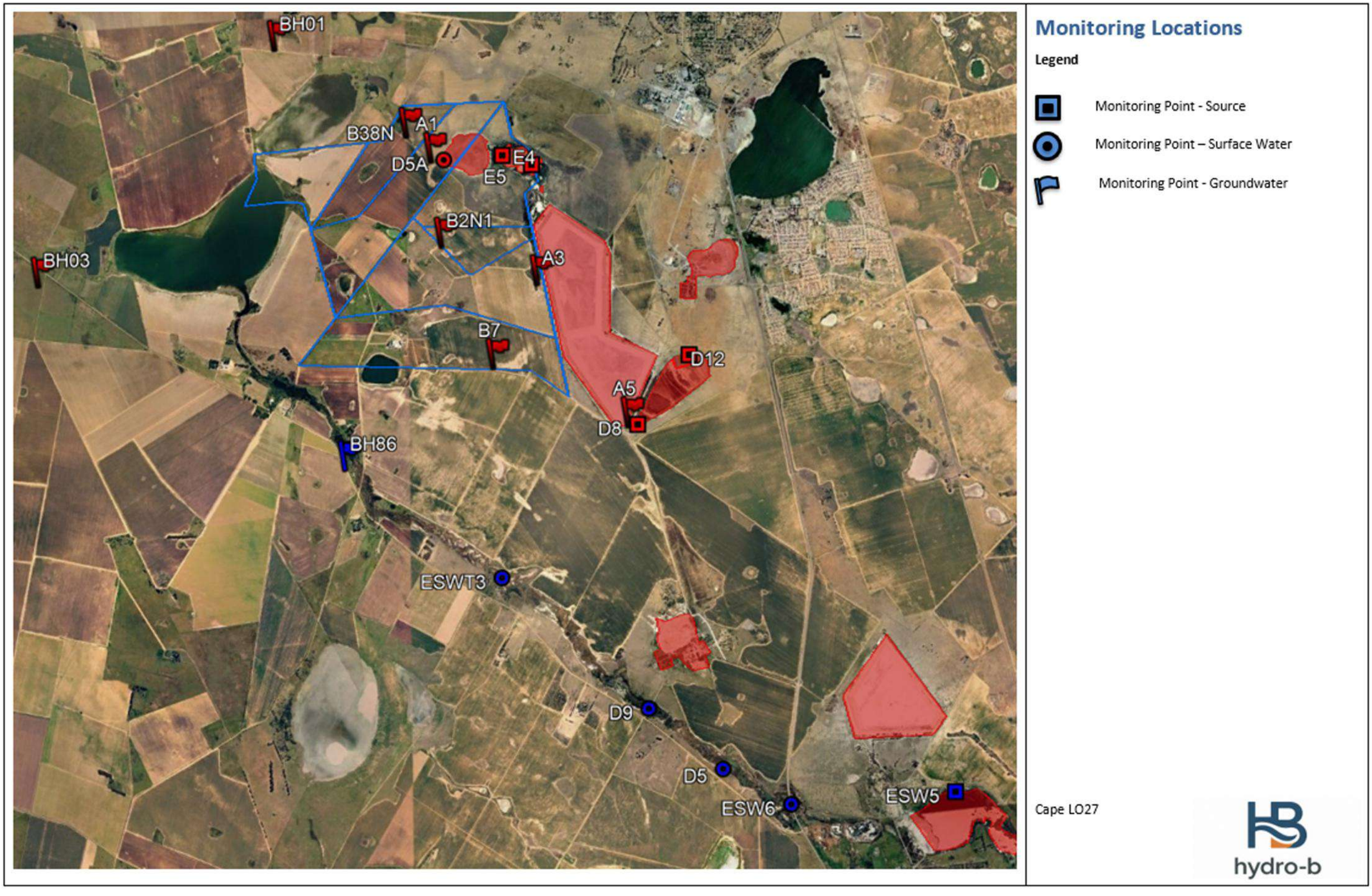


Figure 8-12. Monitoring Locations – Process Water, Surface Water and Groundwater (Source: Google Earth Pro)

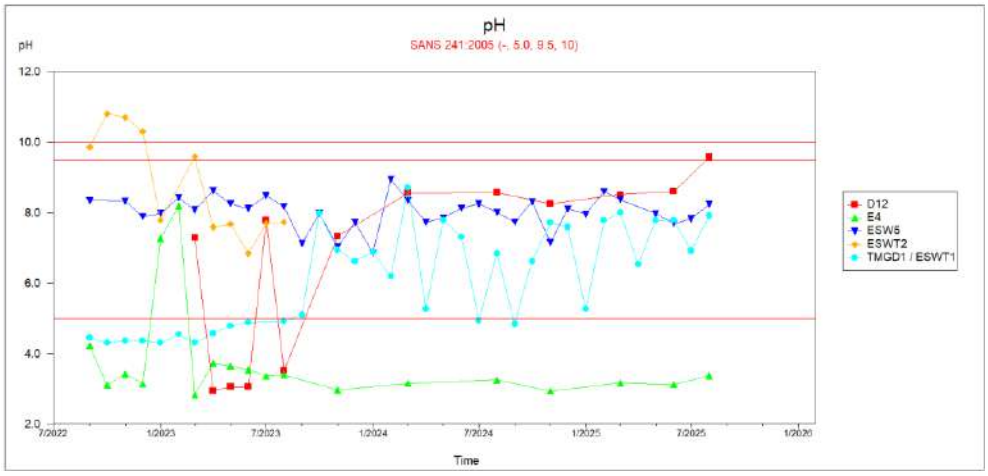


Figure 8-13. Sources – pH

When looking at the EC trends for sources, results for D12 and E4, both RWD related to the Target TSF 1 and 2, look similar with average EC of around 900 mS/m. EC values for ESWT1 and ESWT5, downgradient of the Target 1 process water dam and the Freddies No. 9 dam respectively, show similar EC values of around 500 mS/m. ESWT2, downgradient of a process dam at Target 2 shaft, shows a similar average EC, but with higher variability compared to ESW5 and ESWT2. This shows that water in RWDs related to the Target 1 and 2 TSF show elevated EC values up to 1 000 mS/m, with water in process dams related to Target 1, 2 and Freddies No. 9 dam show much lower, but still elevated EC values.

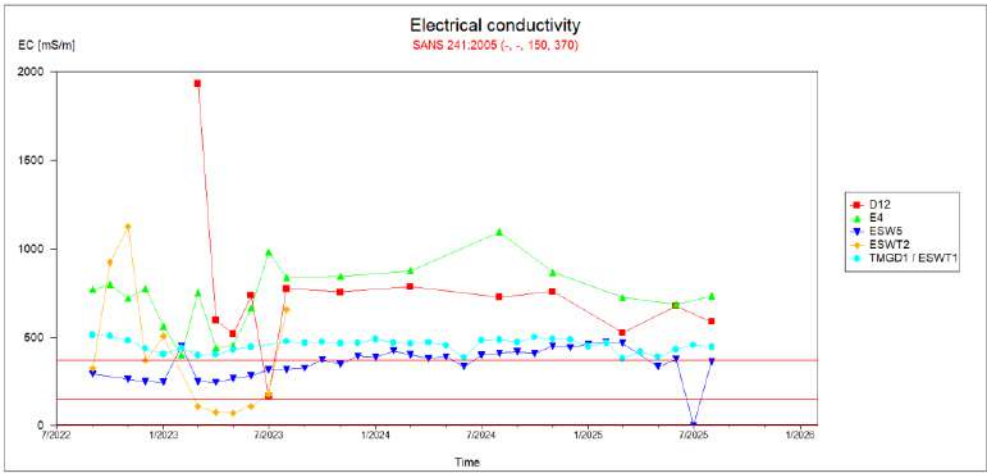


Figure 8-14. Sources – EC

8.4.5.2.2 Target TSF and Associated Infrastructure

For water quality for surface and groundwater points downgradient of sources, the following sources and receptors were linked:

- E4 (Blue RWD) -> E5 (Emergency Overflow Dam) -> D5A (Swartpan) -> A1 (Swartpan outflow) -> B38N monitoring borehole
- D12 (SE RWD) -> A5 monitoring borehole -> B7 third-party borehole
- Target TSF (no sample point) -> monitoring borehole A3 -> third-party borehole B2N1

Regarding pH the following was observed:

- Blue RWD and downgradient:
  - water in the RWD dam, emergency overflow dam and Swartpan mainly low pH values between approximately 2.5 and 4, indicating return water from the Target TSF exhibits a low pH;
  - in contrast, pH measured at the Swartpan outflow and in monitoring borehole B38N are relatively stable between approximately 7 and 9.
- SE RWD and downgradient:
  - the pH in the RWD and downgradient borehole D5 have mainly been within the SANS range, between 7 and 9, with pH at the RWD higher than at D5;
  - in 2023 low pH values were observed for both monitoring locations but these have since increased.
- Target TSF and downgradient:
  - Although no water quality was provided for the Target TSF itself, downgradient monitoring borehole A3 shows that pH is mostly within the SANS range, with only one value in 2025 slightly below the pH 5 limit;
  - Downgradient third-party borehole B2N1 shows a relatively pH around pH 8.

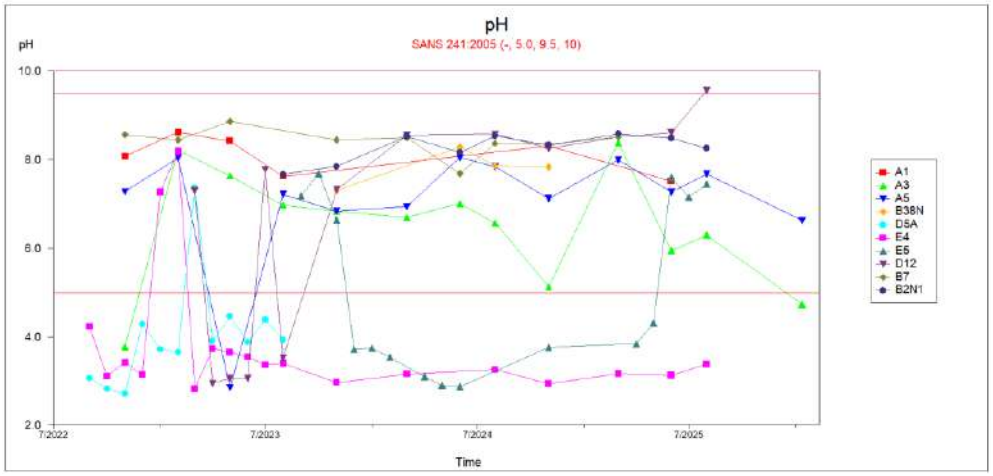


Figure 8-15. Target TSF and Associated Dams and Downgradient – pH

Regarding the EC the following was observed:

- Blue RWD and downgradient:
  - EC values in the RWD dam and Swartpan are elevated between 1 000 and 1 700 mg/l;
  - EC values in the emergency overflow dam fluctuate between about 300 and 9 000 mS/m and may be related to the periodic usage of this dam. EC values at monitoring borehole A1 are significantly lower, up to about 2 000 mS/m;
  - EC values in the downgradient monitoring borehole B38N are significantly lower and just above the SANS limit of 370 mS/m.
- SE RWD and downgradient:
  - EC in the SE RWD (D12) is elevated but stable at around 750 mS/m with exception of one spike in 2023, with borehole D5 (immediately downgradient of the evaporation dam) showing lower EC values of between 1 00 and 500 mS/m with exception of one spike in 2022;
  - EC values in third-party borehole B2N1 are below the SANS limit.

- Target TSF and downgradient:
  - although no water quality was provided for the Target TSF itself, downgradient monitoring borehole A3 shows the EC is around 600 mS/m, above the SANS limit of 370 mS/m;
  - downgradient third-party borehole B7 shows EC values below the SANS limit.

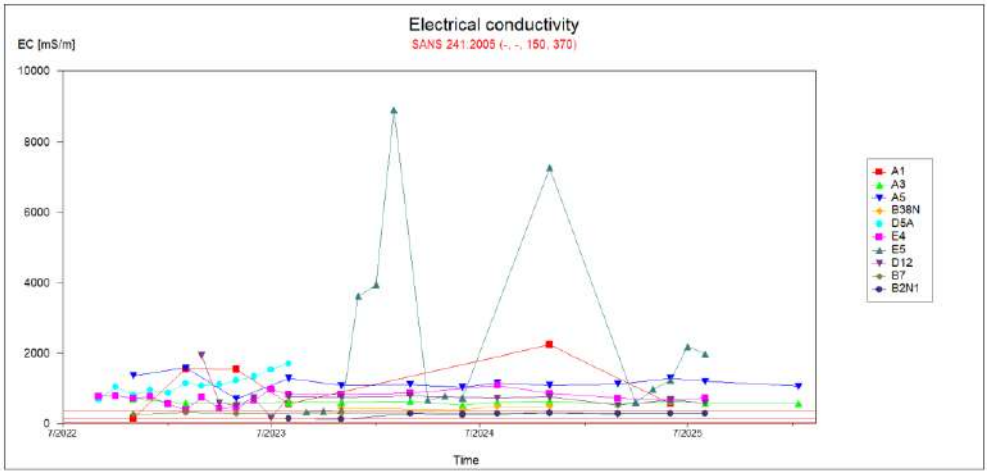


Figure 8-16. Target TSF and Associated Dams and Downgradient – EC

Regarding sulphate the following was observed:

- Blue RWD and downgradient:
  - sulphate concentrations in the RWD dam and Swartpan are elevated at concentrations around 3 000 mg/l;

  - concentrations in the emergency overflow dam strongly fluctuate between about 500 and 7 000 mg/l and may be related to the periodic usage of this dam;
  - sulphate measured at monitoring borehole A1 just downgradient of the Swartpan shows a similar range for water in the Swartpan;
  - sulphate in downgradient monitoring borehole B38N is significantly lower and below the SANS limit of 400 mg/l.
- SE RWD and downgradient:
  - sulphate in the SE RWD (D12) is elevated between approximately 1 000 and 2 000 mg/l, with borehole D5 (immediately downgradient of the evaporation dam) showing higher concentrations of between 2 000 and 3 500 mg/l. This higher concentration can likely be attributed to the evaporation dam;
  - sulphate concentrations in third-party borehole B2N1 are below SANS limits.
- Target TSF and downgradient:
  - although no water quality was provided for the Target TSF itself, downgradient monitoring borehole A3 shows elevated sulphate concentrations in line with these observed at the SE RWD;
  - downgradient third-party borehole B7 shows sulphate concentrations below SANS limits.

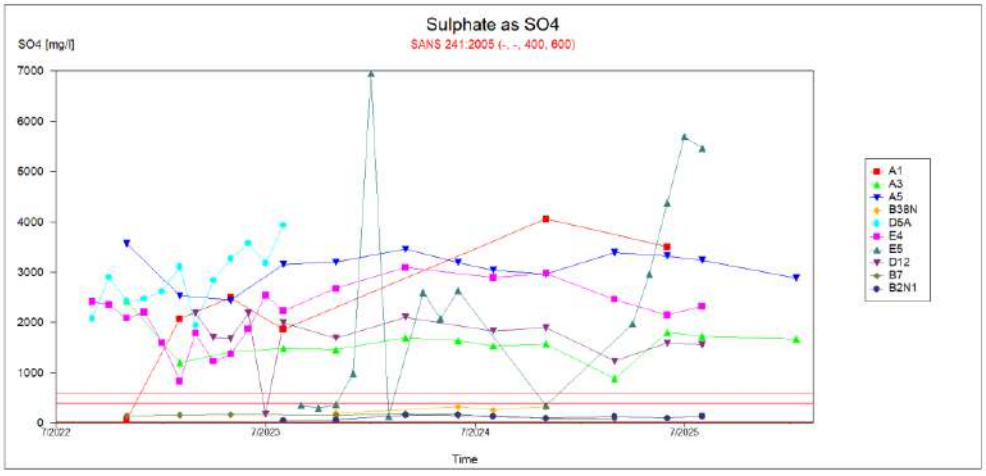


Figure 8-17. Target TSF and Associated Dams and Downgradient – SO4

From the above, the main sources are the Target TSF and related process dams. This is shown by elevated EC and sulphate concentrations, which seem more elevated for the process water facilities north of the Target TSF when compared to the process water facilities to the south of the Target TSF. In addition, acidic conditions are mainly related to the northern process water dams – this may indicate that return water from Target TSF1 may be more acidic than from Target TSF2.

8.4.5.2.3 Freddies No. 9 dam, Target Shaft 3 and the Doringspruit

For the Doringspruit and related sources, the following the following sources and receptors were linked:

- ESW5 (Freddies No. 9 dam) -> ESW6 (Losdoringspruit) -> D5 (Losdoringspruit) -> D9 (Losdoringspruit) -> ESWT3 (Losdoringspruit, downgradient of Target Shaft 3) -> Monitoring borehole BH86

Regarding pH the following was observed:

- The pH for all monitoring points is within SANS range and relatively stable between approximately 7 and 9.

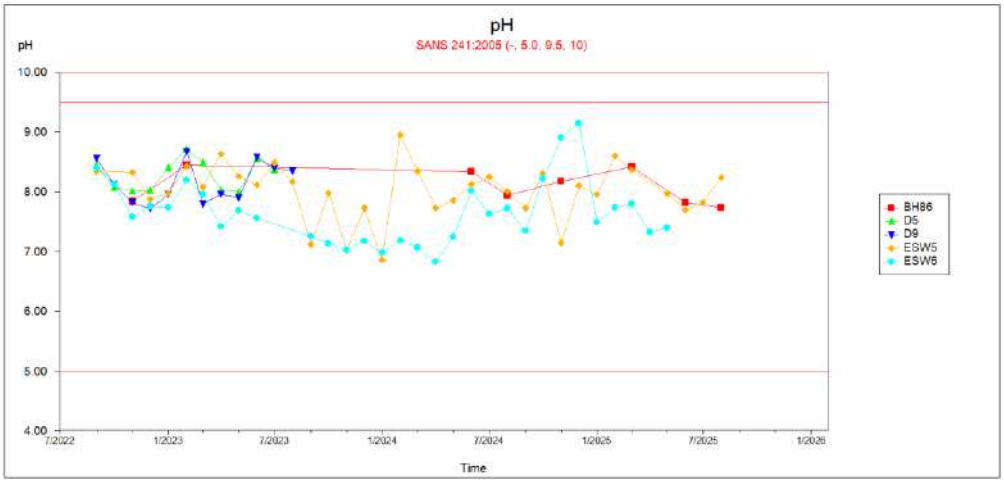


Figure 8-18. Source Freddies Dam and Downgradient Losdoringspruit – pH

Regarding EC the following was observed:

- The EC for Freddies No. 9 dam shows a gradually increasing trend over the period 2022 – 2025, with EC values just exceeding the SANS limit of 350 mS/m. However, values later in 2025 show values just at or below the limit;
- ESWT3, the most downgradient monitoring point on the Doringspruit, shows clear variability in concentrations, with three-to-six-month intervals between peaks. A similarity in fluctuations, although less pronounced, can be seen for ESW6 further upstream and ESW5 (Freddies No. 9 dam); this could possibly indicate dilution effects immediately downgradient of Freddies No. 9 dam, and possible discharge of waters from the Target Shaft 3 area;
- For all other monitoring points EC values are mainly below the SANS limit with some notable spikes, mainly for D5 and ESW6. In 2023 the EC also spiked and exceeded the SANS limit for borehole BH86, but this has not occurred since.

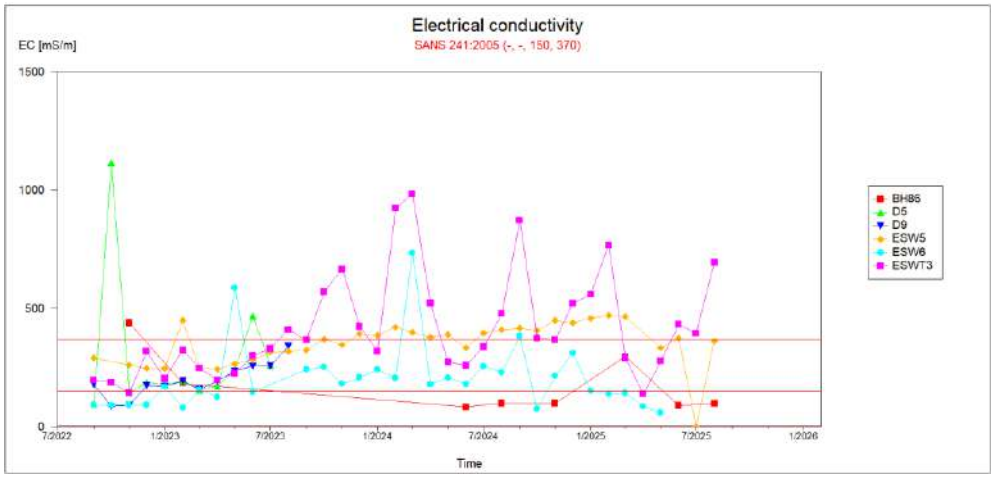


Figure 8-19. Source Freddies Dam and Downgradient Losdoringspruit – EC

Regarding SO_4 the following was observed:

- The sulphate concentrations for water in the Freddies No. 9 dam shows a gradually increasing trend over the period 2022 – 2025, with sulphate below or slightly above the SANS limit of 600 mg/l.
- ESWT3 shows peaks in sulphate concentrations with three-to-six-month intervals between peaks, similar as for EC. A similarity in fluctuations can be seen for ESW6 and ESW5; this could possibly indicate dilution effects immediately downgradient of Freddies No. 9 dam, and possible discharge of waters from the Target Shaft 3 area;
- For all other monitoring points sulphate concentrations are mainly below the SANS limit with some notable spikes, mainly for D5 and ESW6. Sulphate concentrations for borehole BH86 have remained below the SANS limit.

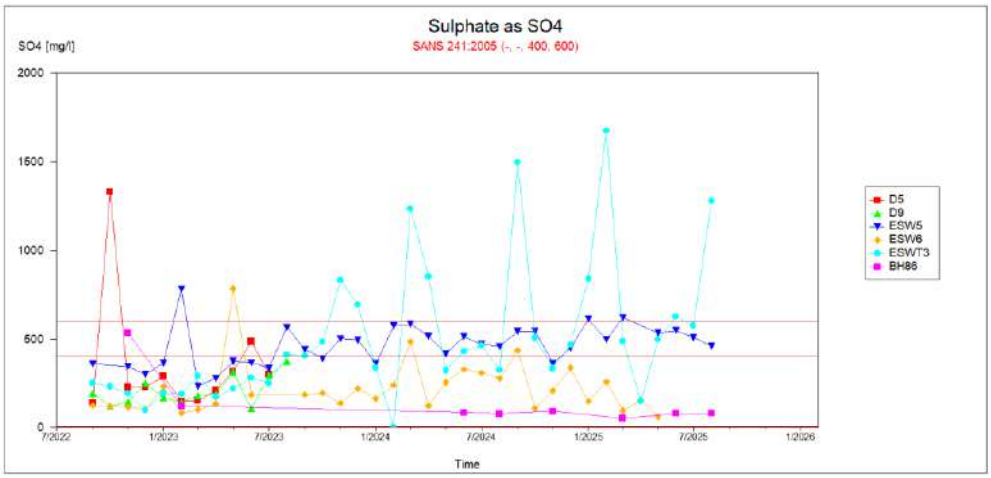


Figure 8-20. Source Freddies Dam and Downgradient Losdoringspruit – SO4

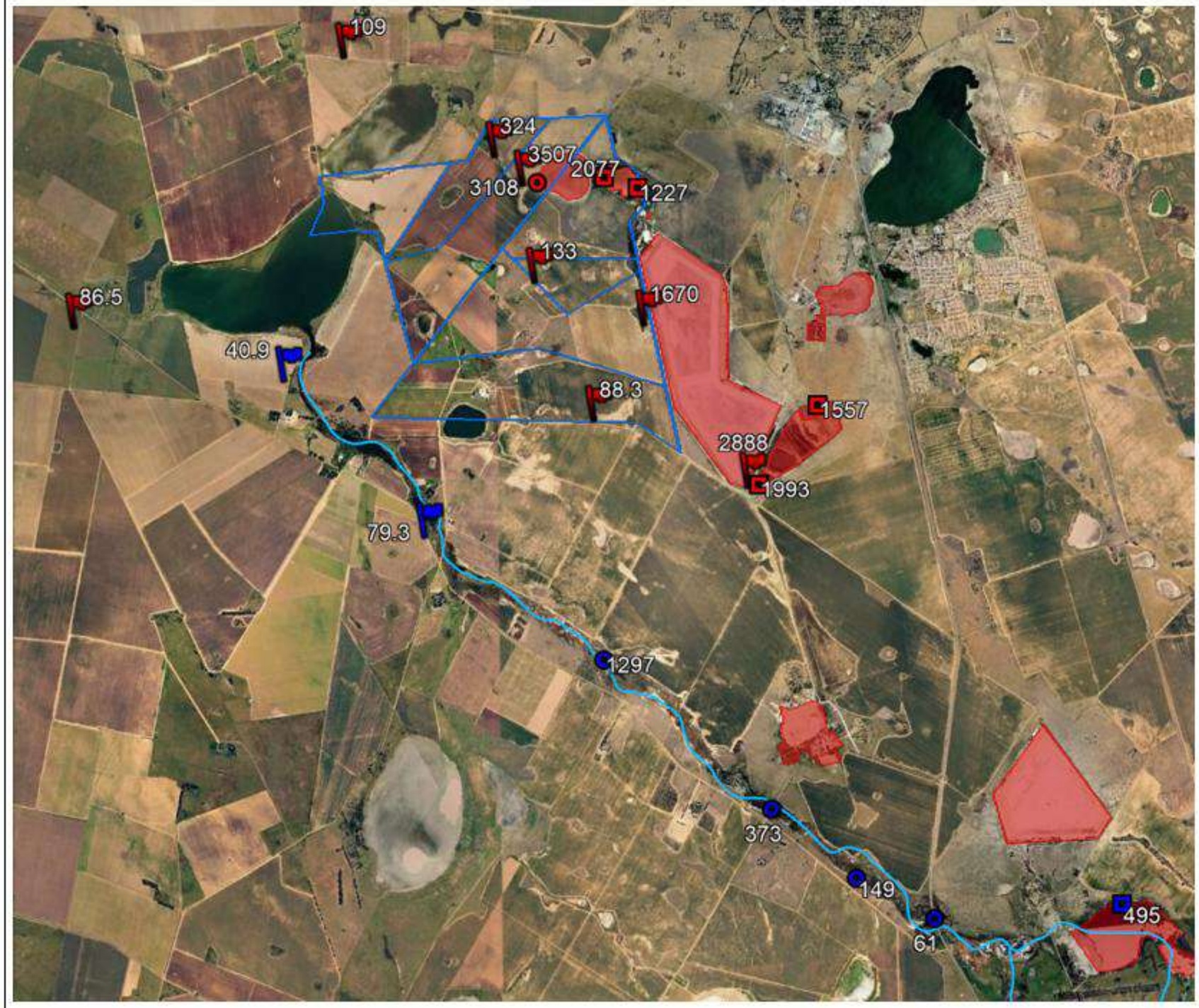
Concerning the water quality in the Doringspruit and downgradient groundwater, the following can be concluded:

- Water in Freddies No. 9 Dam shows a slightly increasing trend but generally remains below the SANS limit;
- Water in the Doringspruit downgradient of the Target 3 Shaft area indicates there may be discharges of water from this site, which could explain the peaks in sulphate concentrations;
- Groundwater in close proximity to the spruit does not indicate any impacts- this is shown in BH86 as well as BHN, sampled as part of the hydrocensus.

8.4.5.3 Overall Conclusions Current Groundwater Quality

Pertaining the groundwater quality in the Study Area, the following can be concluded:

- the main source of contamination is the Target TSF 1 and 2 and associated process water dams. Other secondary sources are the Target 3 Shaft area and the Freddies No. 9 TSF and dam;
- sulphate is the main parameter of concern and can be used as an indicator parameter for contamination (Figure 8-21);
- highest sulphate concentrations and acidity were observed for the process dams to the north of the TSF; sulphate concentrations for process dams south of the Target TSF were elevated, but lower when compared to the infrastructure north of the TSF;
- surface waters, such as the Doringspruit and the Swartpan, are impacted by existing mine infrastructure;
- groundwater immediately downgradient of infrastructure is impacted by seepage from TSFs and unlined process water dams. However, third-party and monitoring boreholes further downgradient of infrastructures do not show elevated sulphate concentrations, and as such there is no evidence of widespread groundwater contamination;
- uranium was included in this assessment due to elevated concentrations reported in mine process water and some downstream surface water features, indicating that uranium is present within the site water management system. Although uranium is not currently included in the Target Mine monitoring programme uranium was analysed in hydrocensus boreholes. Uranium was not detected in any of the hydrocensus samples and there is therefore no evidence at present to indicate an impact on groundwater quality;
- However, to confirm this, uranium should be included as a routine parameter in the groundwater monitoring programme of the Target Mine monitoring boreholes.



Monitoring Locations

Legend

Monitoring Point - Source

Monitoring Point – Surface Water

Monitoring Point - Groundwater

Concentrations SO_4 in mg/l

Cape LO27

hydro-b

Figure 8-21. Target TSF and Dams and Doringspruit- SO_4 Concentrations (Source: Google Earth Pro)

9 Conceptual Model

The conceptual hydrogeological model has been developed from the available geological, hydrogeological and operational information, including existing, regional groundwater models, existing Target mine groundwater and mine water records, historical Target pumping and inflow data and the existing understanding of groundwater behaviour associated with the deep Free State gold mines. The conceptual model considers groundwater quantity and quality during the operational and post-closure phases and provides the basis for assessing the groundwater impacts associated with the Jelani Operation taking into account baseline conditions.

9.1 Regional Geology

The Jelani Operation is situated within the Free State Goldfields, where the geology comprises the Karoo Supergroup overlying the Ventersdorp Supergroup and the underlying Witwatersrand Supergroup which holds the gold-bearing reefs targeted by the underground mining operations.

9.2 Hydrostratigraphic Units

Two principal hydrogeological environments are considered relevant to the Jelani Operation:

1. A shallow Karoo aquifer system; and
2. A deep, fractured Ventersdorp/Witwatersrand aquifer.

9.2.1 Shallow Karoo aquifer

The surface geology is dominated by Ecca Group shales, mudstones and sandstones, part of the Karoo Supergroup. This aquifer can be subdivided in a weathered unit (to an approximate depth of 10 m) and a fractured unit (to an approximate depth of 80 m). Most of the Karoo sediments are saturated and significant groundwater occurrence is mainly associated with sandstone horizons, weathered zones, fractures and dyke contacts. This aquifer is directly recharged by rainfall. The Dwyka Formation at the bottom of the Karoo aquifer is considered an aquitard, separating this aquifer from the deeper aquifer.

From previous experience the hydraulic conductivity of this aquifer is in the range of 10^{-1}-10^{-2} m/d, with previous aquifer testing in this aquifer yielding similar results, with an average hydraulic conductivity of 0.29 m/d and a harmonic mean of 0.042 m/d). Information on porosity of this aquifer were not available for this study, however, based on previous experience an acceptable range for the weathered aquifer is 3-7% and for the fractured aquifer 1-3%.

9.2.2 Ventersdorp/Witwatersrand Aquifer

The Ventersdorp/Witwatersrand aquifer is strongly controlled by fractures, faults, intrusive contacts and, in the Witwatersrand unit, existing mine voids. Hydraulic conductivities for this aquifer widely range between 10^{-9} - 10^{-2} m/day representing fresh to fractured rock.

The available investigations indicate that groundwater-bearing structures may occur within the Ventersdorp sequence and that, locally, these could provide hydraulic connections between shallow groundwater and deeper water-bearing zones. However, such connections are limited and localised,

as the groundwater samples from the shallow aquifer do not indicate groundwater that has interacted with deep mine water or shallow groundwater levels to be impacted by mine abstractions in the deeper aquifer. This aligns with descriptions in historical studies which described the linkages between the shallow Karoo and deep Witwatersrand systems as negligible.

9.2.3 Groundwater Recharge

Recharge to the shallow Karoo groundwater system occurs predominantly through infiltration of rainfall. The most recent hydrology report (Kongiwe Environmental, 2026) indicates an average annual rainfall of approximately 492 mm/a for the Welkom area. Based on previous experience in similar Karoo settings the recharge is expected to be between 1-3% of MAP. Hydraulic connection between the shallow Karoo aquifer and the underlying deeper aquifer is limited and recharge to the deeper aquifer is considered to be negligible or localised.

9.3 Groundwater Flow

9.3.1 Shallow Groundwater

Groundwater flow in the shallow Karoo aquifer generally follows topographic gradients and local drainage patterns, with groundwater discharge occurring towards surface drainage features, pans and other local discharge zones. The regional drainage is generally from southeast towards northwest, with the Sand River being the principal regional drainage feature. The shallow groundwater system is therefore conceptualised as a relatively shallow, rainfall-recharged system. General groundwater flow directions are as depicted in Figure 9-1.

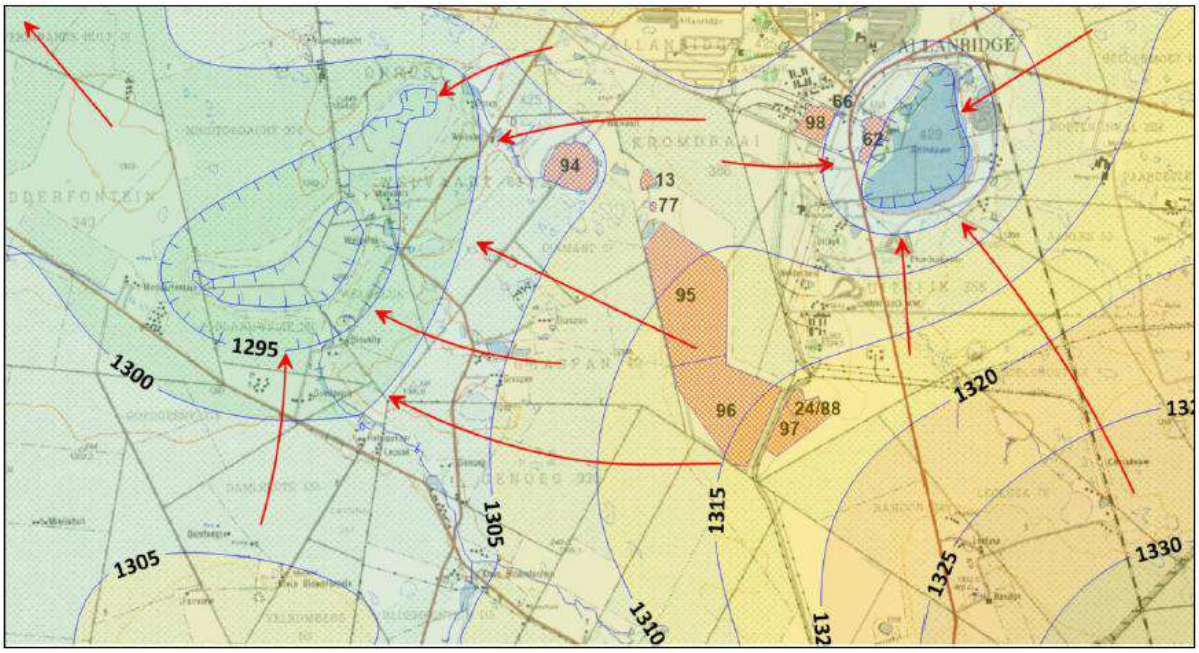


Figure 9-1. Simulated Groundwater Contours (Karoo Aquifer) Indicating Main groundwater Flow Directions (AquiSim Consulting, 2025).

9.3.2 Deep Groundwater

Groundwater flow in the deep aquifer is very different, as mine voids in the Witwatersrand unit have intersected water-bearing fractures, faults and other permeable structures, and groundwater is captured in the mine workings and pumped to surface. The existing underground mine workings form artificial flow paths and connections between different mine areas that allow for significant groundwater volumes to move from mine to mine, and groundwater levels in the deep aquifer are significantly subdued resulting from long-term pumping.

9.4 Existing and Proposed Mine Dewatering

Historical Target operation records indicating average pumping from Target 3 shaft of approximately 3.5 ML/day in 2016 while Target 2 shaft handled approximately 2.5 ML/day. As the Jelani Operation will use the same infrastructure and mining will occur in the same area, this provides some insight in the anticipated groundwater inflows for the Jelani project. The principal groundwater source for the deeper Jelani workings is expected to be predominantly from the water stored within the interconnected network of mining-related voids within the deep fractured Witwatersrand aquifer.

The Jelani workings will overlap with and extend approximately 140 m below the maximum depth of the existing Target 2 workings. The appropriate conceptualisation is therefore that the proposed Jelani Operation will be an incremental expansion of an existing deep groundwater sink rather than the creation of a new groundwater depression.

The shallow Karoo aquifer is an important groundwater resource for surrounding farms and local fractures and geological contacts could act as preferential groundwater pathways. However, the available regional evidence indicates that the shallow and deep groundwater systems are not hydraulically connected on a regional scale. The historical investigations concluded that extensive dewatering of the deep Witwatersrand system did not show noticeable dewatering of the upper Karoo aquifer to date. The conceptual model therefore assumes that the deep mining and associated dewatering primarily affect the deep Witwatersrand groundwater system and interconnected mine workings, while the shallow Karoo aquifer remains mainly controlled by local rainfall recharge and shallow geological conditions.

9.5 Groundwater Quality

The shallow Karoo groundwater is generally of relatively good quality, with a predominant calcium-magnesium-bicarbonate type groundwater and generally low salinity. Elevated nitrate was observed for some boreholes, potentially linked to the use of agricultural fertilisers.

Where existing infrastructure is present, mainly the target Mine TSF and associated process and evaporation ponds, elevated sulphate and acidity were observed in groundwater immediately downgradient of these infrastructures due to process water seepage into the underlying aquifer.

Deep mine water is expected to be saline with elevated sodium, magnesium, chloride and sulphate concentrations, characteristic of groundwater associated with mining in the Witwatersrand.

Sulphate is the main contaminant of concern to groundwater, with sampling analyses also indicating elevated salinity, metals and ammonia in some monitoring boreholes. However, no impacts were

observed for any third-party boreholes, showing that impact on groundwater quality remains in close proximity to the existing infrastructures.

9.6 Source–Pathway–Receptor Model

The principal groundwater source–pathway–receptor model is conceptualised as follows.

9.6.1 Sources

The principal potential groundwater contamination sources associated with the existing Target operation including:

- The existing Target TSF;
- associated process water dams, to the northeast and southwest of the TSF;
- the Swartpan, currently receiving overflow from the above-mentioned process dams; and
- an evaporation dam to the southeast of the TSF.

For this impact assessment the focus will be on predicting the spatial extent of the cumulative contaminant migration (historical and future) from pollution sources for the operational and the post-closure phase. The cumulative impact from historical and proposed mining activities is relevant to consider for the Jelani project because the project will utilise some of the existing Target process water infrastructures rather than creating new contamination sources (with exception of a new TSF, which will fall outside of the scope of this assessment).

The conceptual model will therefore focus on the cumulative impact of groundwater contamination associated with the Jelani project, subject to confirmation of the final mine infrastructure and water-management arrangements.

9.6.2 Pathways

Potential contaminant migration pathways include:

- infiltration;
- shallow groundwater flow;
- geological fractures and preferential pathways;
- deeper groundwater flow;
- mine workings.

The conceptual model will focus on the impact on groundwater quality in the shallow Karoo aquifer and will assume that contamination from surface facilities will not migrate vertically to the deep mine workings, or that mine water will automatically migrate into shallow farm aquifers. Instead, hydraulic connectivity must be controlled by the presence and permeability of geological structures and the prevailing hydraulic gradients.

9.6.3 Receptors

The main receptors are:

- farm boreholes;

- downstream shallow groundwater; and
- surface drainage.

The principal potential impact pathway is: surface mine water infrastructures → groundwater quality in the shallow Karoo aquifer → downgradient aquifers, farm boreholes and drainage features.

9.7 Conceptual Model Uncertainties

The conceptual model is considered sufficiently established to assess the incremental groundwater impacts of Jelani; however, several uncertainties remain.

These include:

- The construction details and depth of monitoring boreholes. For this assessment it has been assumed these were drilled into the fractured Karoo stratigraphy.
- The post-closure plans for the mine surface infrastructure for the Target Mine and the Jelani Operation;
- Source-terms for each source and geochemical modelling of long-term seepage quality emanating from the Target TSF;
- Specific seepage rates from each surface infrastructure.

9.8 Conceptual Model of Potential Impact from Jelani

The conceptual model predicts the following sequence during mining:

1. New mine workings intersect fractures and other water-bearing structures;
2. Groundwater enters the workings and is collected within the underground water-management system;
3. Hydraulic connections with existing Target workings allow water to move through the established underground network;
4. Pumping at Target 2 removes the additional mine water from the underground system;
5. The additional groundwater abstraction is expected to be concentrated within the deep Witwatersrand groundwater system;
6. The shallow Karoo aquifer remains predominantly controlled by rainfall recharge and local hydrogeological conditions;
7. Because the shallow and deep systems have limited regional hydraulic connectivity, significant additional drawdown of the shallow Karoo aquifer is not expected;
8. Existing surface contamination sources remain the principal potential source of groundwater quality impacts;
9. Jelani will utilise existing infrastructure, the incremental contaminant source associated with the project is expected to be limited.

10 Numerical Model

A finite difference numerical groundwater flow model was constructed based on the conceptual model for the Project. The numerical model was calibrated with the available hydrocensus groundwater level data. The numerical model was constructed using GMS 10.8.12, a pre- and post- processing package for MODFLOW and the MODFLOW NWT solver was used. MODFLOW is a three-dimensional groundwater flow model published by the United States Geological Survey (USGS). MODFLOW is a widely used simulation code which is well documented. The numerical model was constructed to represent the hydrogeological units for the weathered and fractured aquifers.

10.1 Aim of the Model

The aim of the numerical groundwater model is to:

- Construct a groundwater model based on the existing numerical groundwater model as detailed in (AquiSim Consulting, 2025);
- To construct a model focussing on the Study Area;
- To simulate potential cumulative impacts of seepages from mine waste facilities (WRDs, TSFs and associated process water facilities) on the local groundwater environment. This includes the proposed Jelani Operation and nearby existing mining operations;
- Provide inputs to the groundwater impact assessment for operational and post-closure phases.

10.2 Model Inputs

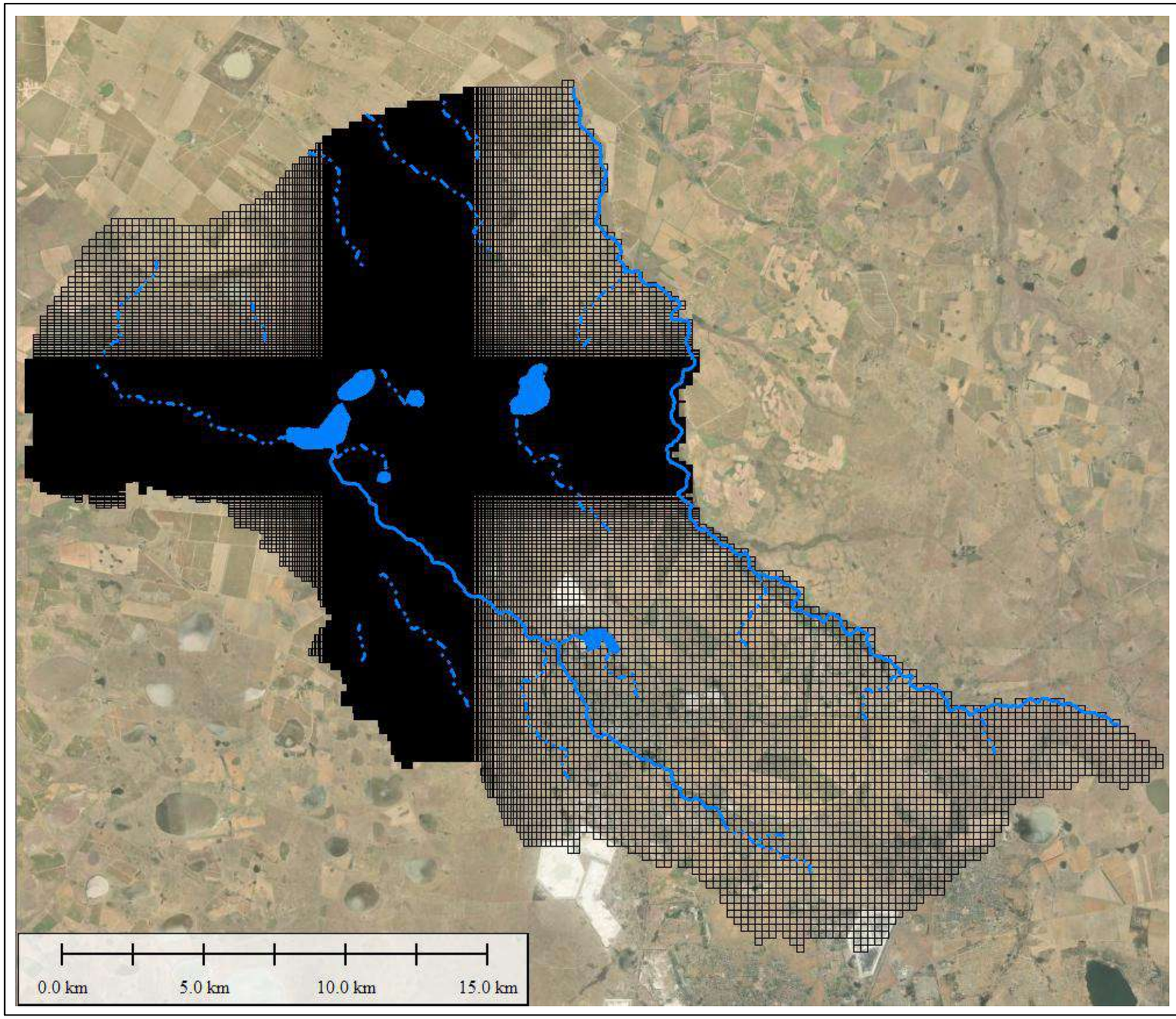
Model inputs were used and were predominantly based on a previous iteration of a groundwater model as carried out by (AquiSim Consulting, 2025), with the addition of information obtained from Harmony Gold monitoring reports and the hydrocensus as carried out as part of this assessment. The following input data was used to construct the numerical groundwater model update:

- A report on a previous groundwater model, including descriptions of lithological units, hydraulic conductivities, storage parameters and recharge estimates;
- Groundwater levels collated and analysed in previous hydrogeological investigations with relevant groundwater levels for the period between 1999 and 2013;
- Harmony Gold monitoring reports for the period March 2022 – August 2025;
- The hydrocensus survey carried out in 2025/2026;

10.3 Model Construction

10.3.1 Model Domain

The model domain is irregularly shaped with approximate dimensions of 38 km by 29 km in the horizontal directions. Compilation of the finite difference grid using the GMS GUI facilitated the construction of a conventional horizontal grid, as well as vertical geometry provided for the two layers.



Model Boundaries and Grid

Legend

Model grid

Perennial rivers

Non-Perennials

Pans

Cape LO27

hydro-b

Figure 10-1. Model Boundaries and Grid

The modelling area was discretised by a 394 x 330 grid in the x and y directions, resulting in 173 894 active cells for the model grid. A grid refinement of 25 m x25 m cells covering the Jelani mining right area was applied with gradually coarser grid cell sizes to a maximum size of 200 m x 200 m away from the mining area to reduce model run time (Figure 10-1).

Along the vertical direction the numerical model was structured in two layers with layer thicknesses of 10 m and 70 m (Table 10-1). The layer positions were based on lithology and mining depths for the Jelani Operations mine and allow for accurate horizontal and vertical groundwater flow in the model. The total model thickness was set at 80 m in order to model the upper Karoo aquifer.

Table 10-1: Summary Table Showing Layer Number, Type and Thickness

Layer	Aquifer Units	Thickness (m)	Depth (m)	Layer Type
1	Karoo weathered aquifer	10	70	Unconfined
2	Karoo fractured aquifer	70	80	Confined

10.3.2 Boundary Conditions

Boundary conditions are sets of differential equations that must be solved to express the known water fluxes and variables (such as hydraulic heads) within the model domain. There are three boundary conditions available in MODFLOW, which provide different solutions:

- Specified head (Dirichlet);
- Specified flux (Neumann); or
- Mixed (Cauchy) boundary condition.

Local hydraulic boundaries were identified for the model boundary, which are represented by local water courses and topographical highs and lows. These hydraulic boundaries were selected far enough from the proposed mining area so that the boundaries do not influence the numerical model artificially. The identified boundary conditions specified in the hydrogeological model are detailed in Table 10-2.

Recharge was applied to the entire model extent for the Karoo aquifer and assigned an initial value of 5 mm/a, equating to about 1% of MAP. Other boundary conditions applied to the top pf the model were river boundary conditions (for perennial rivers and pans) and drain boundary conditions (for non-perennial streams).

Table 10-2:Identification of Real-World Boundaries and Adopted Model Boundary Conditions.

Boundary	Boundary Description	Boundary Condition
Hydraulic Boundary (Northeast)	• Perennial river assigned as river boundary condition	• Perennial river condition which acts as a specified head (Dirichlet).
Topographic Boundary (Northwest, Southwest, Southeast)	• Topographical boundaries assigned as a no-flow boundary	• No-flow boundary condition (Neumann).

10.4 Steady State Simulation

Calibration is the process of finding a set of boundary conditions, stresses, and hydrogeological parameters that produce results that most closely match field measurements of hydraulic heads and flows. In a regional groundwater flow model, a difference between calculated and measured heads of up to several meters can be tolerated and is usually expressed as a function of the total range of observations.

The steady state groundwater flow model was set-up and calibrated to simulate the groundwater system for the Project area using static groundwater levels for nine hydrocensus boreholes for December 2025 – January 2026, groundwater levels for Harmony Gold monitoring boreholes for August 2025 and historical groundwater level data retrieved from (AquiSim Consulting, 2025). The model reproduces the observed heads for the hydrocensus boreholes well and provided background groundwater heads that are consistent with expectations for this region.

10.4.1 Steady State Calibration

A steady-state groundwater flow model was set-up and calibrated based on the groundwater data as described above. The objective of the steady state model was to simulate baseline groundwater conditions for the Project area and to use this as input for forward modelling for future developments.

A total of 31 boreholes were used for the steady state calibration, based on available groundwater level data. The model was calibrated by varying model input data over realistic ranges of values until a satisfactory match between simulated and observed water level data was achieved. Since recharge and permeability are dependent on each other via the measured heads, the model was calibrated by changing the permeability and recharge separately. The initial permeability and recharge values were based on previous model inputs and were adjusted manually until a best fit was obtained.

- Convergence criteria for a head change of 10^{-3} m were selected. After model calibration a correlation of 95% was obtained between the simulated and observed groundwater elevations (Figure 10-2). The calibration was deemed acceptable with a Mean Residual Head of -0.4, a Mean Residual Absolute Head of 3.5 and a Root Mean Square Error (RMSE) of 5.1;
- The steady state mass balance for the entire model domain is presented in Table 10-4; a water balance error of 0.0015% was achieved and is regarded as an accurate balance calculation;
- Calibrated hydraulic conductivities are shown in Table 10-3;
- A recharge value of 5.8 mm/a, equating to about 1.2% of MAP was adopted as the base-case modelling value based on the outcomes of the calibration process.

Table 10-3: Calibrated Hydraulic Conductivities

Description	kh (m/d)	kv (m/d)
Karoo aquifer - weathered	1.6e-01	1.6e-02
Karoo aquifer - fractured	4.0e-02	4.0e-03

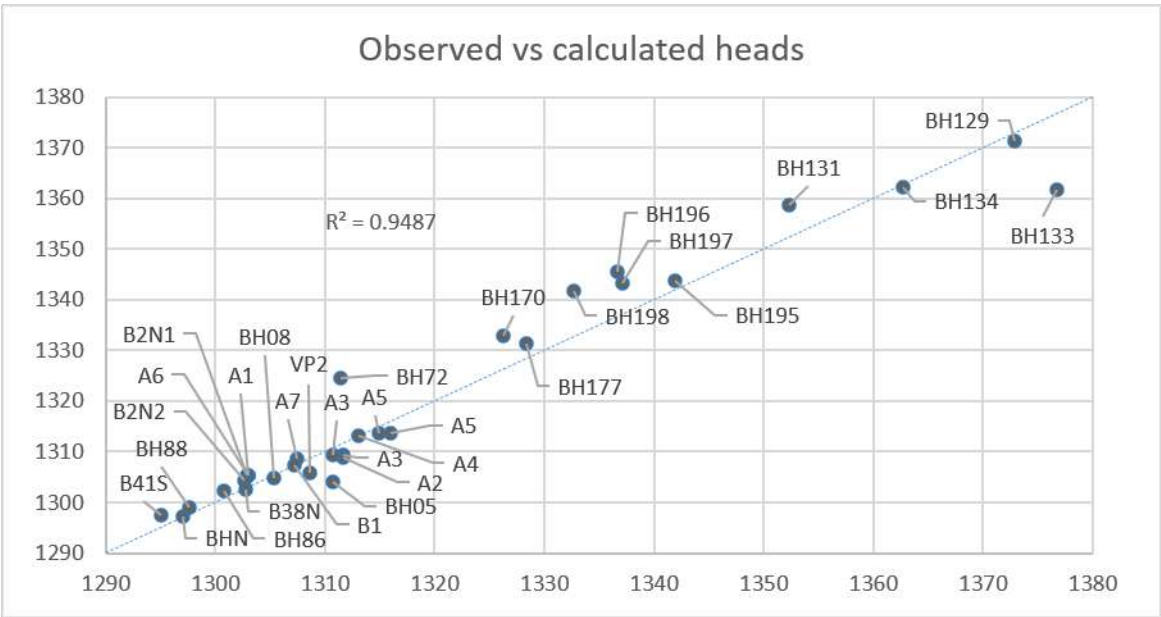


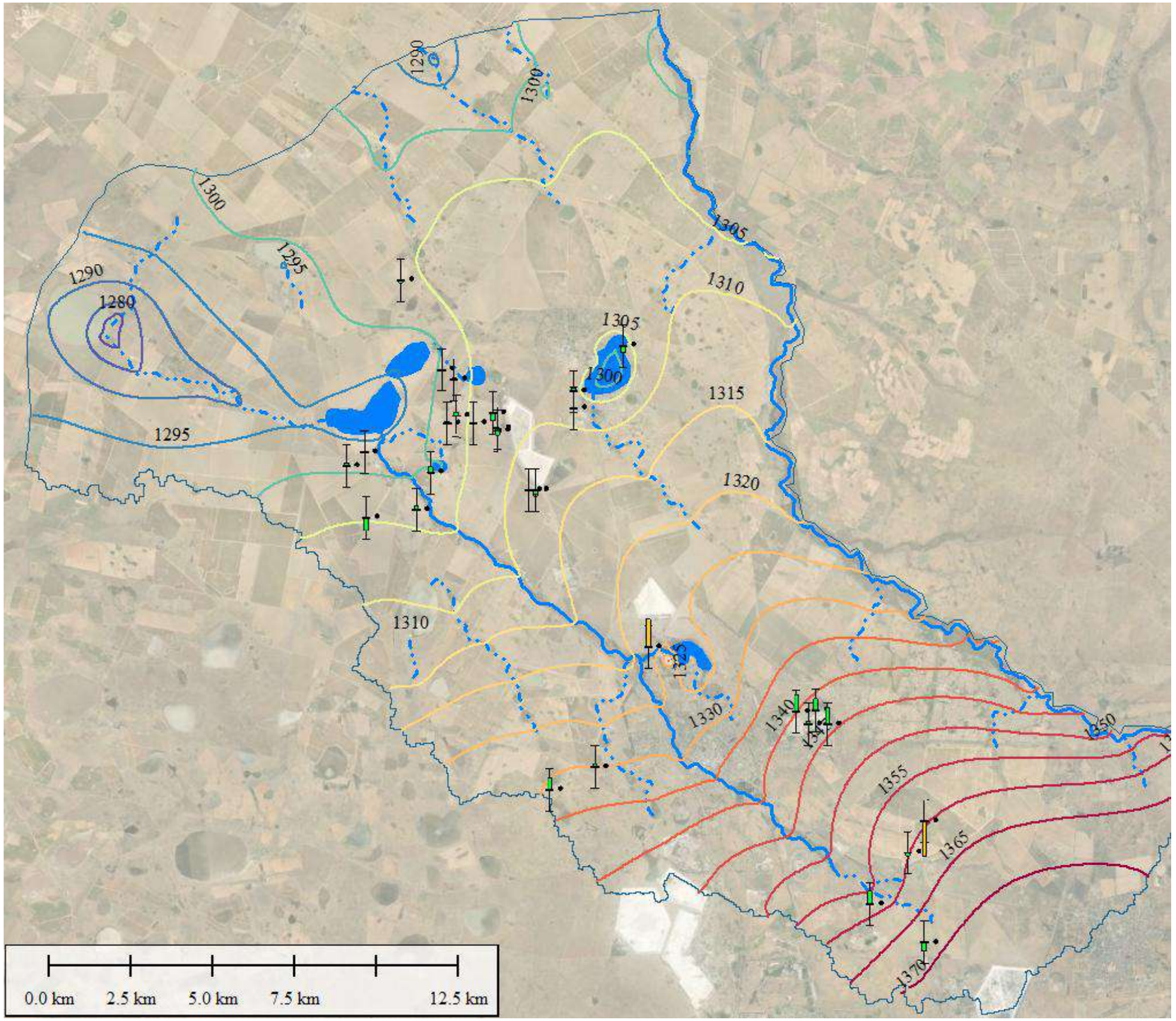
Figure 10-2: Correlation Between Observed and Calculated Heads – Steady State

Table 10-4: Mass Balance of the Steady State Model

Boundary Condition	Flow In (m^3/day)	Flow Out (m^3/day)
Recharge	8498.4	0
Drains	0	4335.7
River Leakage	3083.7	7246.6
Total Flow	11582.1	11582.3
Summary	In-Out	% Difference
Total	-0.17	0.0015%

10.4.2 Simulated Water Levels and Flow Directions

The simulated groundwater levels for the pre-mining situation are shown in Figure 10-3. Pre-mining simulated heads indicate a general groundwater flow direction in a west-northwesterly direction. The simulated groundwater levels correlated to the hydrocensus data which indicated a similar regional flow direction, as well as flow directions previously simulated in (AquiSim Consulting, 2025).



Steady State Model Calibration

Legend

Perennial rivers

Non-Perennials

Pans

Groundwater contours (mamsl)

Calibration target

Cape LO27

hydro-b

Figure 10-3. Steady State Model Calibration and Groundwater Contours

10.4.3 Sensitivity Analysis

A sensitivity analysis was done based on PEST runs and results for Relative Composite Sensitivity (RCS) are shown in Figure 10-4. The relative composite sensitivity of a parameter in a groundwater model indicates how influential that parameter is in controlling the ability of the model to match observed data, after accounting for differences in parameter scales, number of observations, observation values and correlations between parameters. It measures how much the difference in modelled and observed values would change if the value for a certain parameter change.

A high RCS means that the model results are very sensitive to that parameter, a small change in the parameter produces a noticeable change in residuals and the parameter is important for calibration. A low RCS means the model outputs hardly respond to changes in parameter value and in the calibration process this parameter can be adjusted without much effect. The parameters this model is most sensitive to are:

- Recharge, for which the model is highly sensitive;
- The horizontal hydraulic conductivity of the weathered layer.

The model was not very sensitive to changes in vertical hydraulic conductivities.

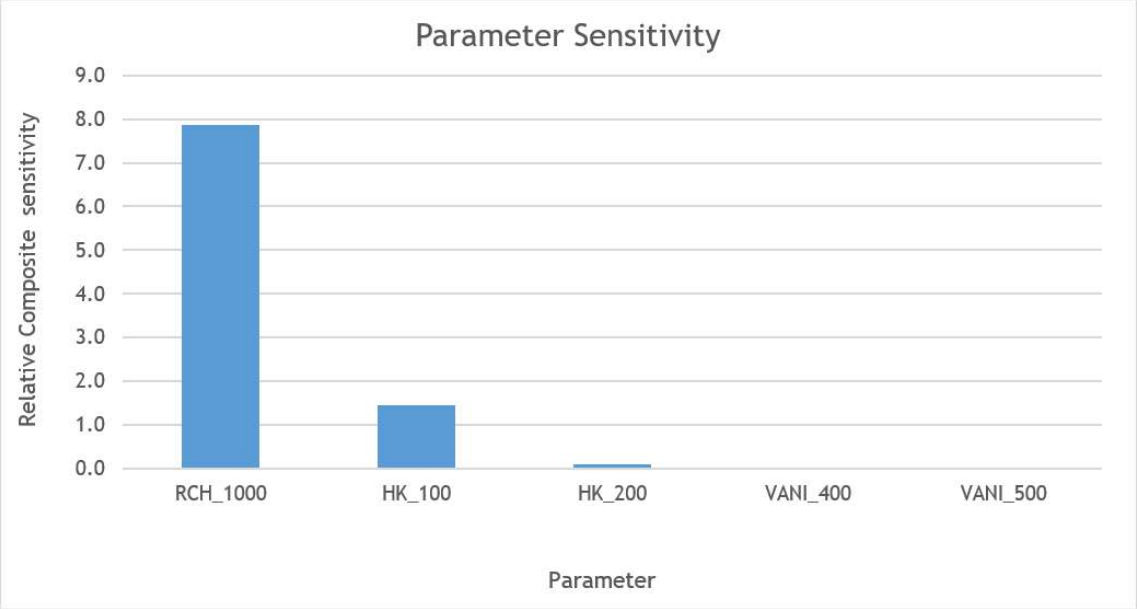


Figure 10-4: Model Parameter Sensitivity

10.5 Transient Calibration

10.5.1 Calibration Setup and Data

Based on the steady-state model, a transient model was set up for simulation of existing and proposed mining activities. The transient model was calibrated based on available monitoring data collected for various Harmony Gold mining operations from 1999 onwards. All groundwater level data was collated for this model update. The following groundwater levels were used for transient calibration:

- Groundwater levels for 17 boreholes located within the model boundary based on data in (AquiSim Consulting, 2025) for the period 1999 - 2013;
- Groundwater levels for 11 monitoring boreholes based on data in Harmony Gold Target Mine monitoring reports for the period November 2022 – August 2025;
- Groundwater levels for 12 hydrocensus borehole locations for December 2025 - January 2026;

The model was calibrated using inputs for the steady-state model and transient groundwater levels for available monitoring boreholes. In addition, the following data was used as input:

- Lithological units and parameterization based on previous model versions and aquifer pump test results; and
- Existing Target Mine surface infrastructure layout.

10.5.2 Storage Parameters

Specific yield (Sy) and Specific storage (Ss) for the aquifer units used in the calibrated transient model were as follows Table 10-5:

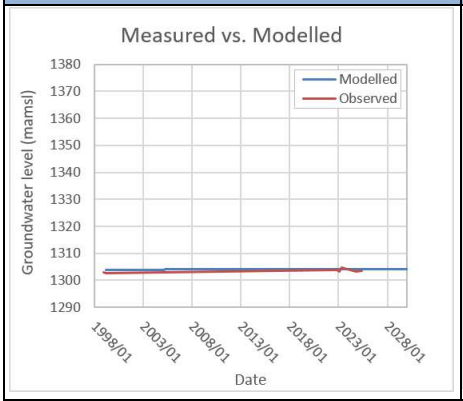
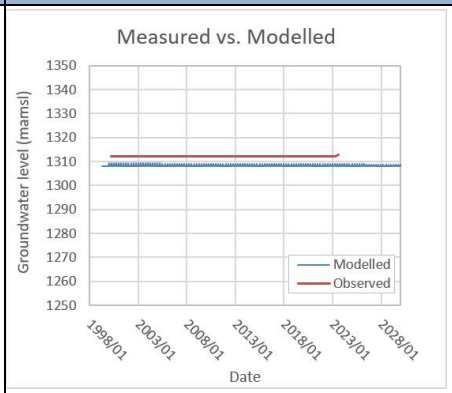
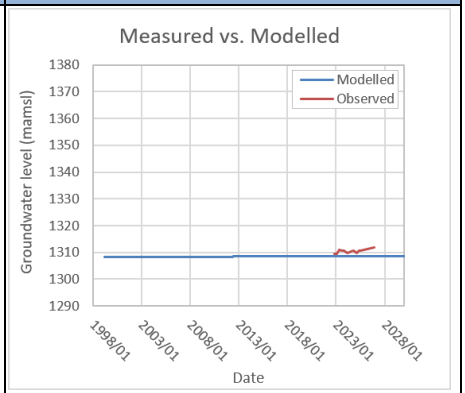
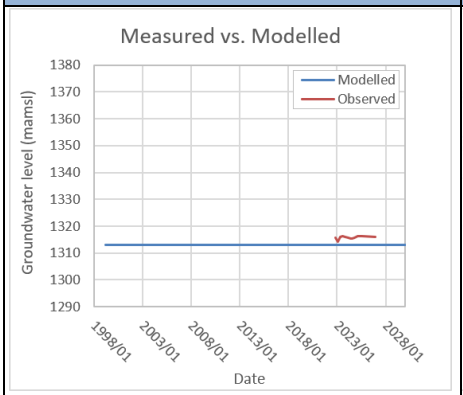
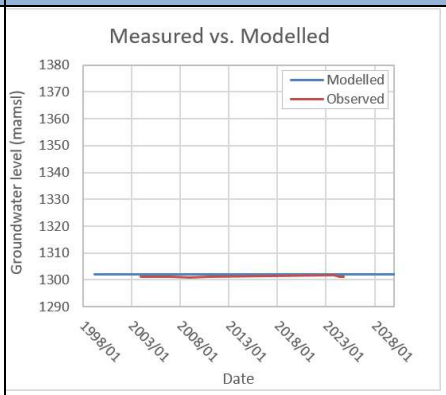
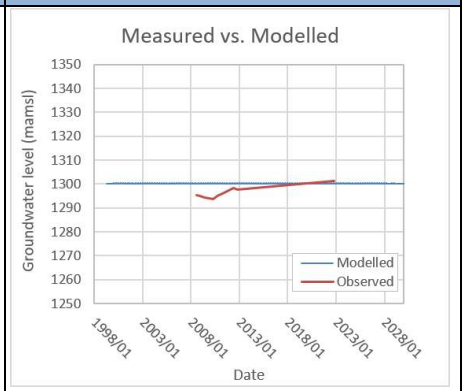
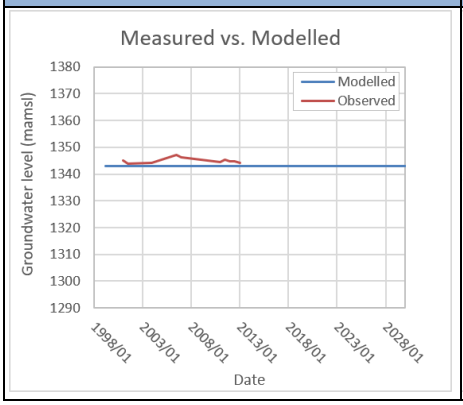
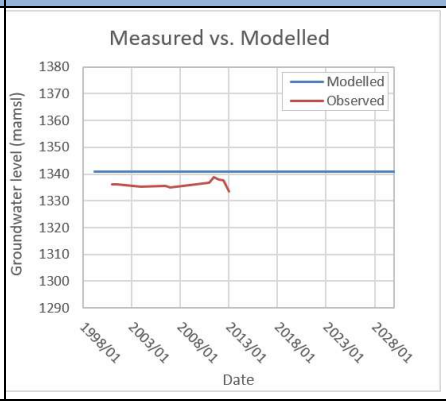
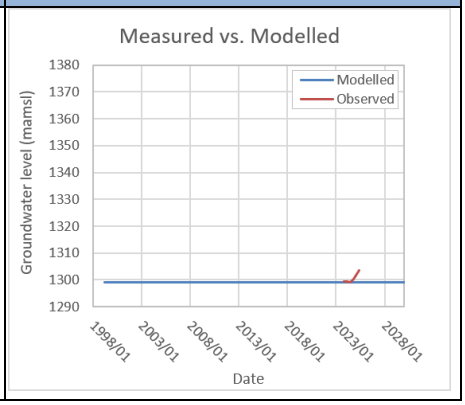
Table 10-5: Storage Parameters

Aquifer Unit	Ss	Sy
Karoo weathered	1.0e-03	1.0e-02
Karoo fractured	1.0e-04	1.0e-02

10.5.3 Transient Calibration Results

Transient calibration results show that model results generally align with observed groundwater level data. For all observed boreholes there are no clear increasing or decreasing trends, indicating that on a regional scale groundwater levels in the shallow Karoo aquifer remain stable over the modelled period. Local fluctuations in some of the boreholes indicate local influences on groundwater levels but based on the available data and groundwater use no clear source of impact could be established. However, these fluctuations are considered minor as they are 4 m or less for all boreholes data for which data was available.

Table 10-6. Correlation Graphs – Measured vs. Modelled Groundwater Levels

A1	A2	A3
		
A5	**B38N**	**B41S**
		
BH195	**BH198**	**BH88**
		

10.6 Scenario Modelling

As previously mentioned the scenario modelling focussed on contaminant movement in the shallow aquifer. The current understanding is that the impact of the dewatering of the deeper aquifer will not result in a significant impact on groundwater levels in the shallow aquifer and as such the quantification of this impact was not undertaken as part of these model simulations.

The contaminant migration is based on using sulphate as a conservative tracer and indicator parameter for illustration of the release and dispersion of contaminants in groundwater, assuming the various mine-related surface infrastructures can all contribute to elevated sulphate concentrations in the underlying shallow Karoo aquifer.

The proposed Jelani project will utilise the existing surface infrastructure with no additional or new mining infrastructure proposed, and therefore no changes in sources are expected. For each source concentrations were assigned using average sulphate concentrations from available information as detailed in Section 8.4.5.2. Where this was not available, such as for the Target TSF, values were based on input concentrations as used in (AquiSim Consulting, 2025). Based on background groundwater quality data the average background concentration for sulphate is 140 mg/l, and this value was taken as the lower limit for contaminant plume migration. Model input concentrations are summarised in Table 10-7.

Table 10-7. Model Input Concentrations.

Infrastructure	Input concentration (SO_4, mg/l)
Target TSF (No. 1 and 2)	2 000
North-West RWD	2 160
Blue RWD	2 160
Emergency Overflow Dam	2 480
Swartpan	2 860
South-East RWD	2 000
Evaporation Dam	3 500

1967 was used as the start year for the activities based on previous modelling as a conservative approach representing the maximum period over which contamination could have occurred (AquiSim Consulting, 2025). 2041 was taken as end year for the process water and evaporation dams, as this is included to be the projected as end date for the mining activities related to the Jelani project (Bara Consulting, 2026). It is assumed that these dams will be rehabilitated with natural recharge allowed in these areas by infiltration of accumulated rainwater.

At current no source-term or geochemical modelling results are available to assess the long-term quality of seepage water from the Target TSF. As a conservative approach, input concentrations for the

Target TSF were kept constant into the post-closure phase and simulated together with seepages from the process water and evaporation dams and the Swartpan.

To simulate infiltration of water from the mine waste and water infrastructures a recharge rate of 0.00013 m/d (10% of MAP) was used. This percentage is in line with values used in other studies in similar hydrogeological settings, including (AquiSim Consulting, 2025), as well as values reported in well-known research publications such as (Hodgson & Kranz, 1998).

A longitudinal dispersivity of 25 m was adopted for the transport simulations, which is considered appropriate for the regional scale of the model domain (~30 km) and long transport distances. The selected value is consistent with published guidance and previous regional-scale groundwater transport studies, which indicate that longitudinal dispersivity may range from tens to several hundreds of meters for kilometer-scale transport problems in heterogeneous aquifer systems (Gelhar, Welty, & Rehfeldt, 1992) and (Xu & Eckstein, 1995). Transversal dispersivity was set as 0.1 times the longitudinal dispersivity.

As a base case scenario, the effective or kinematic porosity for the Karoo aquifer was assigned to be 4% for the weathered zone and 2% for the fractured zone. These values provided a best fit for the 2025 groundwater quality data.

Scenario modelling for 2025 (reference year for model results in (AquiSim Consulting, 2025) as well as availability of monitoring data in Figure 10-5 shows that:

- contaminant plume migration mainly follows the regional groundwater flow direction, which for the Study Area is in a general westerly flow direction;
- The current extent of the sulphate plume is congruent with the previous model results and aligns with available groundwater quality data;
- the existing contaminant plume indicating only limited migration from current the TSFs (maximum distance of approximately 420 m).

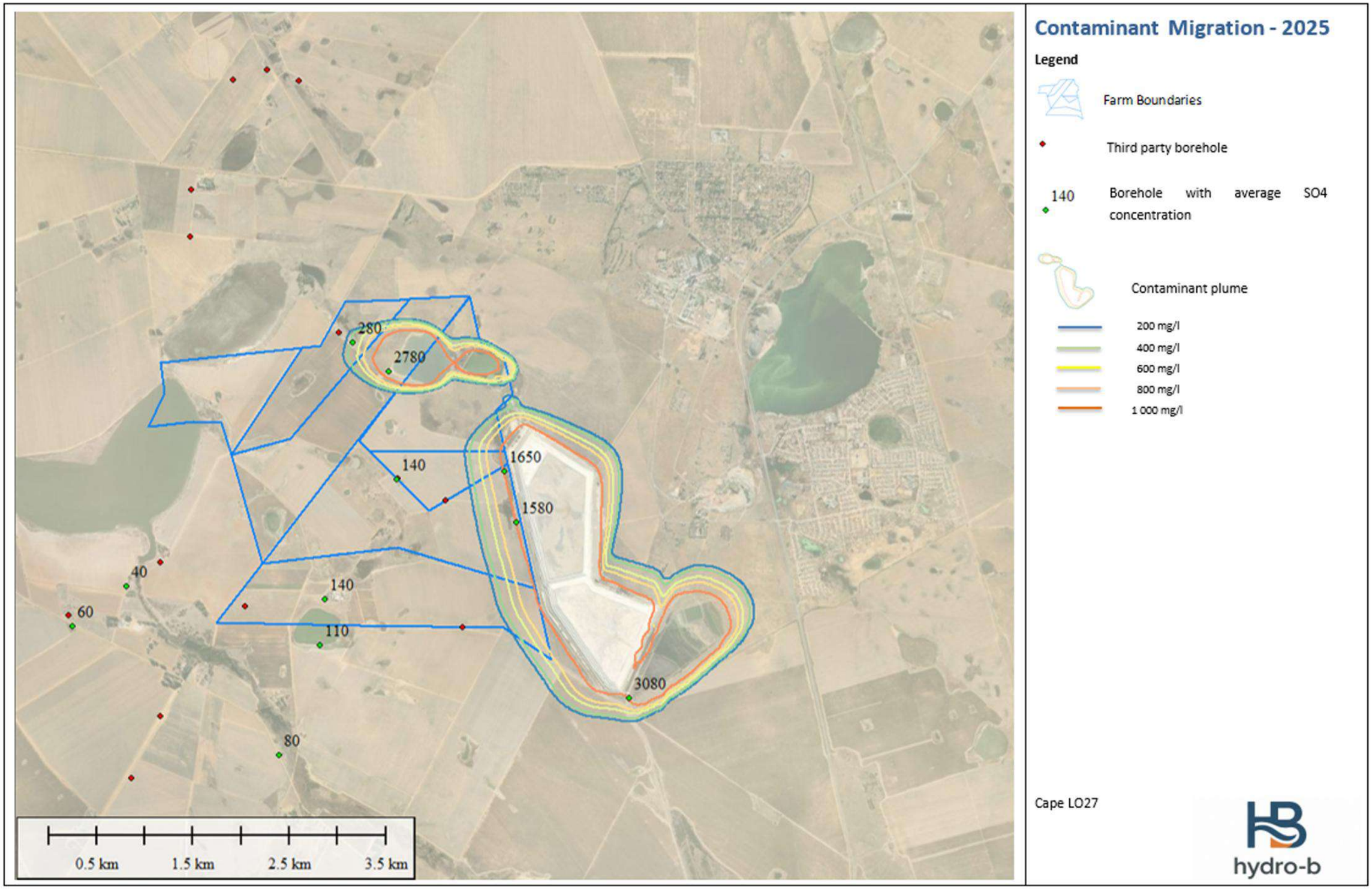


Figure 10-5. Contaminant Plume – 2025 Situation

11 Groundwater Sensitivity, Avoidance and Acceptable Change

The groundwater environment within the Project Area comprises shallow groundwater associated mainly with the Karoo sequence and deeper groundwater associated with fractured Ventersdorp and Witwatersrand formations. The shallow groundwater system is considered the principal groundwater receptor potentially affected by seepage from surface infrastructure, while the deeper groundwater system is primarily associated with mine dewatering and inter-mine flows.

Groundwater receptors identified during the assessment include existing third-party groundwater users, shallow groundwater and surface drainage that interact with groundwater.

No additional major surface infrastructure is proposed for the Jelani Operation as part of this assessment. The proposed operation will make use of existing Target Mine surface infrastructure. Therefore, the need for groundwater-specific avoidance areas associated with new surface infrastructure is limited.

The principal groundwater protection requirement is prevention, early detection and management of contaminant migration from existing mine infrastructure. Areas with existing groundwater users downgradient of this infrastructure should be regarded as receptors and should be incorporated into the groundwater monitoring programme. Protection of these groundwater receptors will rely on source control, monitoring, early detection and adaptive management.

For this assessment acceptable change is considered to comprise changes in groundwater levels or quality that remain within natural and established baseline range and do not result in an unacceptable impact on identified groundwater users or other groundwater receptors. Where monitoring identifies a significant, long-term deviation from baseline conditions that can be attributed to the project the cause should be investigated and management measures, where required, implemented.

12 Impact Assessment

The hydrogeological impact assessment as detailed in this section has been conducted based on the most recent and available information regarding current and proposed activities and timelines. At this stage, the timeline and sequence of Project activities remain preliminary. As a result, potential interactions and cumulative effects for the various hydrogeological impacts for the Project Area may evolve as the Project design is refined.

12.1 Project Activities Assessed

The following key activities are likely to occur during the different phases of the project, and are assessed in the impact assessment:

- Construction Phase:
  - Setting up of mining activities.
- Operational Phase:
  - Mining of Jelani JV Project Area using Target 2 and 3 Shafts for access.
- Post-Closure Phase:

- Decommissioning of the Jelani Operation at the end of life of the project.

12.2 Methodology for Determining the Significance of Impacts

This section of the report focuses on the identification and assessment of potential groundwater impacts that may arise from the proposed project activities, processes, and actions. While the broader EIA Report will consolidate all identified environmental impacts, this groundwater assessment provides an evaluation of the project's interaction with groundwater resources.

In line with the EIA Regulations of 2014, the significance of direct, indirect, cumulative, and residual impacts on surface water will be systematically assessed using the methodology outlined in this section. The findings of this assessment will be integrated into the EIA Report through the standardised impact tables (Table 12-1 and Table 12-2), ensuring consistency across all specialist studies.

For the purposes of this study, potential groundwater impacts associated with the Jelani project are presented in Table 13-1. These impacts will be subject to a comprehensive risk assessment and risk mitigation planning process, as required under NEMA. The recommended mitigation measures will address all phases of the project (Construction, Operational and Post-Closure).

Table 12-1 : Tables Used to Identify and Classify the Significance of Identified Impacts

Nature of The Impact: ***Describe the Impact in Respect to The Activity to be Undertaken***		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status: (*positive or negative*)		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		
Calculated Significance Rating (Low, Medium, High)		
Reversibility: (Reversible or Irreversible)		
Irreplaceable loss of resources: (Yes or No)		
Residual Impacts • (List these below)		
Cumulative Impacts • (List these below)		
Mitigation measures • (List these below)		

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; and secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance. The impact significance rating system is presented in Table 12-2 and Table 12-3 and it involves three parts:

- **Part A**: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration.

- **Part B**: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A.
- **Part C**: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequences in Part B:

Table 12-2 : Consequence Rating Definitions

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration:

Table 12-3 : Consequence Rating Methodology

	Spatial Scale/ Population		
	Site or Local	**Regional**	**National/ international**
MAGNITUDE			

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
Minor	Duration	Long term	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	Duration	Long term	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	Duration	Long term	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability:

Table 12-4 : Significance Rating Methodology

Probability (of exposure to impacts)	Consequence Negative			Consequence Positive		
	Low	Medium	High	Low	Medium	High
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

12.3 Possible Impacts Identified

Table 13-1 below identifies the impacts associated with the Proposed Project.

12.4 Impact Assessment and Mitigation

12.4.1 Construction Phase

During the construction phase the Shaft 2 and 3 areas will be rehabilitated and refurbished to be used as access to the Jelani mining area. This may include clearance of vegetation and grading of some areas and movement of construction vehicles for site preparation and movement and placement of required equipment. The activities and impacts that are likely to occur during the construction phase are summarised in Table 12-5.

Table 12-5: Summary of Activities and Impacts for the Construction Phase

Activity	Impact Description
Site preparation for refurbishment of the Shaft 2 and 3 areas	**Impact1:** Release of pollutants during site preparation could pose a risk to groundwater quality.
Use of construction equipment for the refurbishment of the Shaft 2 and 3 areas	**Impact 2:** Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the groundwater.

The ratings and proposed mitigation measures for the construction phase are provided in Table 12-5 and Table 12-6.

Table 12-6: Significance Rating of Construction Impact 1

NATURE OF IMPACT 1: Release of pollutants during site preparation could pose a risk to groundwater quality.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversable	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Increased recharge in cleared areas		
Cumulative impacts • None expected		
Mitigation measures • Contain clearance activities to required areas as much as practically possible; • Prevent ponding in cleared areas through (temporary) stormwater management; • Prevent erosion within the cleared areas and downgradient areas • Any incidents that could release pollutants to groundwater should be reported and mitigated immediately.		

Table 12-7: Significance rating of Construction Impact 2

NATURE OF IMPACT 2: Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the groundwater.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Short term	Short term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Increased recharge in cleared areas		
Cumulative impacts • None expected		
Mitigation measures • Regular service of vehicles in designated repair bays; • Refuelling of vehicles only in designated areas; • Restrict movement of vehicles to a minimum;		

- All vehicles to be provided with a spill kit;
- Any incidents that could release hydrocarbons to groundwater should be reported and mitigated immediately.

12.4.2 Operational Phase

The activities and impacts that are likely to occur during the operational phase are summarised in Table 12-8.

Table 12-8: Summary of Activities and Impacts for the Operational Phase

Activity	Impact Description
Groundwater abstraction from the deep Witwatersrand aquifer	**Impact 1:** Abstraction from the deep aquifer may impact the availability of the shallow groundwater resource.
Groundwater abstraction from the deep Witwatersrand aquifer	**Impact 2:** Abstraction from the deep aquifer may impact on groundwater levels in the shallow Karoo aquifer.
Mine water and waste containment in existing mine infrastructure	**Impact 3:** Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use

The ratings and proposed mitigation measures for the operational phase are provided in Table 12-9 to Table 12-11.

12.4.2.1 Groundwater Abstraction

During the operational phase groundwater abstraction will take place to maintain dry, safe working conditions in the Jelani mine voids. This water will need to be discharged at surface at a quality that adheres to discharge standards.

The Jelani Operation will utilise the existing Target No. 2 and No. 3 shafts and will primarily extend within an already dewatered and operational underground mining environment to only approximately 140 m below the current Target No. 2 Mine workings. Therefore, while groundwater inflows may locally increase where previously not dewatered geological structures are intersected, no substantial increase in regional groundwater abstraction is expected compared to the current active mining operations, and projected pumping requirements for the Jelani project are considered to be consistent with that for the Target Mine operation.

Therefore, groundwater volumes to be abstracted for the proposed Jelani Operation are expected to be in line with the volumes currently managed at the Target Mine. Previous hydrogeological investigations, including (Groundwater Square, 2016), indicate that the Target Mine presently pumps approximately 5–6 Ml/day of groundwater to surface, with average pumping rates of 5.96 ML/day (as recorded during October and November 2015) and long-term pumping from Target No. 1 Shaft averaging at approximately 4.7 Ml/day.

The estimated total groundwater inflow for the Jelani Operation is expected to be approximately 5.4 Ml/day, comprising:

- an estimated 3.4 Ml/day groundwater make for the Jelani Operation; and
- approximately 2 Ml/day of inter-mine flow from Freddies No. 9 Shaft

As this volume will be abstracted from the deep Witwatersrand aquifer and this abstraction is not expected to have a significant impact on the groundwater resource in the shallow aquifer, the impact significance is expected to be medium.

Table 12-9: Significance Rating of Operational Impact 1

NATURE OF IMPACT 1: Abstraction from the deep aquifer may impact the availability of the shallow groundwater resource.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long term	Long term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Abstraction of all mining activities in the Witwatersrand aquifer		
Mitigation measures • Mining should progress as swiftly as possible to reduce the period of active dewatering; • Dewatering of the underground mine should stop as soon as mining activities cease. • Abstraction volumes should be monitored regularly and where these deviate from expected volumes, this should be reported immediately.		

12.4.2.2 Groundwater Drawdown

Farms in proximity of the proposed Jelani and existing Target mining operations are underlain by the shallow Karoo aquifer, which is the main source of groundwater for individual landowner borehole sources.

Previous hydrogeological reports indicated that the shallow Karoo aquifer is not hydraulically connected to the deep Witwatersrand mine workings. This has been shown by groundwater level data for shallow boreholes in the entire Harmony Gold mining area which vary between 0 and 33 mbgl, show an average depth to groundwater of 5.3 mbgl and are mostly between 0-4 mbgl.

For the Study Area specifically, static groundwater levels measured in hydrocensus boreholes in December 2025 were observed to be between 0.6 and 5.3 mbgl. Where boreholes were pumped while

visiting, dynamic groundwater levels of 12.5 and 44.9 mbgl were observed, indicating drawdown effects due to active borehole abstraction.

This shows natural groundwater levels in the shallow Karoo aquifer are close to surface with no indication of impacts by ongoing mining activities, and as such no regional radius of influence or drawdown effects are currently present in the shallow Karoo aquifer despite decades of mining at the Target 2 and 3 operations. Currently no evidence exists that mining has reduced regional shallow groundwater availability or has had a significant impact on shallow groundwater levels.

The existing mining has been ongoing for decades and has not led to widespread significant dewatering of the shallow aquifer, which is the main source of water for surrounding farms or other third-party groundwater users.

The addition of the proposed Jelani mining activities within the already impacted Witwatersrand aquifer is not expected to result in significant additional groundwater impacts beyond those already associated with the long-established mining complexes. As such the significance of this impact is expected to be medium.

Table 12-10: Significance Rating of Operational Impact 2

NATURE OF IMPACT 2: Abstraction from the deep aquifer may impact on groundwater levels in the shallow Karoo aquifer.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long term	Long term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		
Cumulative impacts • Abstraction of all mining activities in the Witwatersrand aquifer		
Mitigation measures • Groundwater levels in the shallow Karoo aquifer should be monitored on a regular basis throughout the LoM to verify no impacts on shallow groundwater levels. • Where it is proven that third-party boreholes have reduced yields due to mining activities, an alternative supply needs to be provided.		

12.4.2.3 Contaminant Plume Migration

Waste rock and ore will be brought to surface using the shafts, with ore processed at the Target processing plant and waste rock deposited on the existing waste rock dumps at the Target Shaft 2 and 3 areas. Partial use of the existing Target surface infrastructure, including RWDs, will be used for containment of process/dirty water. As these facilities are not lined, seepage from these dams into the underlying Karoo aquifer is expected to continue up to the end of LoM. As such, forward plume migration was simulated to predict plume migration for the operational phase to the end of Life of Mine (LoM).

If the RWDs, emergency overflow dam and evaporation dam are all used until 2041, and the Target TSF remains unchanged (no rehabilitation), contamination will migrate downgradient from existing infrastructures. As the migration will follow groundwater gradients, the migration mainly occurs in a westerly direction.

Figure 12-1shows that two third-party boreholes (B38N and B8) are located in the plume extending from the RWDs, emergency overflow dam and Swartpan and groundwater quality in these boreholes may be impacted during the LoM. These boreholes should be included in the monitoring programme for the Jelani Operation and compared to model results as well as SANS 241 drinking water standards.

As some downgradient groundwater users are likely to be impacted, the significance of this impact is expected to be medium.

Table 12-11: Significance Rating of Operational Impact 3

NATURE OF IMPACT 3: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long term	Long term
Magnitude *(Major, Moderate, Minor)*	Moderate	Moderate
Probability *(Definite, Possible, Unlikely)*	Definite	Possible
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Long-term potential impact on groundwater quality remains, particularly where downgradient groundwater users are located within the modelled plume extent.		
Cumulative impacts • Impact on groundwater quality by cumulative impact from the Target TSF and RWDs		
Mitigation measures • Diversion of clean water to Swartpan and prevention of dirty water from the emergency overflow dam; • Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling; • Continuous monitoring of process water in dams, pans and tailings ponds; • Continuous monitoring of groundwater quality in downgradient monitoring boreholes and third-party boreholes; • Yearly reporting of groundwater quality monitoring and comparison to groundwater model results; • Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.		

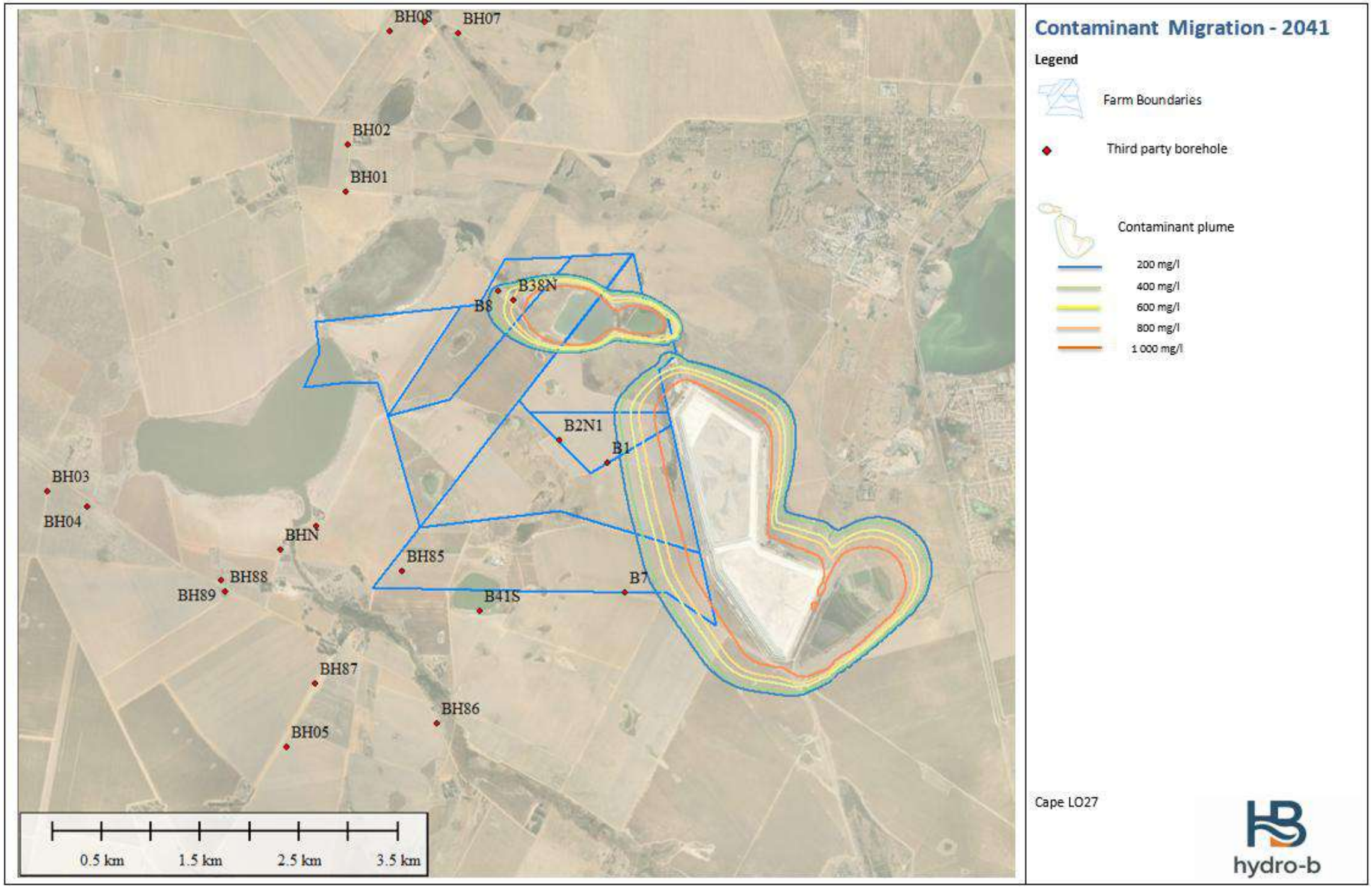


Figure 12-1. Contaminant Plume – 2041 Situation (end of LoM)

12.4.3 Post-Closure Phase

The activities and impacts that are likely to occur during the post-closure phase are summarised in Table 12-12.

Table 12-12: Summary of Activities and Impacts for the Post-Closure Phase

Activity	Impact Description
Cessation of groundwater abstraction from the deep Witwatersrand aquifer	**Impact 1:** Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers.
Mine water and waste containment in existing mine infrastructure	**Impact 2:** Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use

The ratings and proposed mitigation measures for the post-closure phase are provided in Table 12-13 and Table 12-14.

12.4.3.1 Groundwater Recovery and Decant Potential

After mining activities at target as well as Jelani have ceased, the mine voids are allowed to flood, causing groundwater levels in the surrounding deep aquifer to recover. Cessation of groundwater abstraction may result in recovery of deep groundwater levels, potentially increasing hydraulic connectivity between the deep and shallow aquifers

Based on available information, groundwater levels in the Witwatersrand aquifer are not expected to fully recover and remain approximately 400–500 m below the groundwater levels in the Karoo aquifer. In addition, it was concluded that the Karoo aquifer is a perched aquifer with shallow groundwater levels and has limited interaction with the underlying confined Witwatersrand aquifer. Therefore, the significance of the impact of decant of poor quality mine water into the shallow Karoo aquifer or onto surface through shafts is expected to be low.

Table 12-13: Significance Rating of Post-Closure Impact 1

NATURE OF IMPACT 1: Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long term	Long term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts None expected		

NATURE OF IMPACT 1: Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers.
Cumulative impacts • Cessation of all mine water abstraction activities in the Witwatersrand aquifer
Mitigation measures • Groundwater levels in the deep Witwatersrand aquifer should continue to be monitored on a regular basis. • Water level recovery in mine voids should continue to be monitored on a regular basis.

12.4.3.2 Contaminant Plume Migration

A previous hydrogeological model that includes groundwater pathways and contaminant plume migration for the Study Area was completed (AquiSim Consulting, 2025). As part of this assessment, the main sources of contamination in terms of size and contaminant load were determined to be the Target No. 1 and 2 Tailings Storage Facilities, the RWDs, the Evaporation Dam, the Emergency Overflow dam and the Swartpan (Figure 7-1).

After closure of the Jelani Operation the RWDs, emergency overflow dam and evaporation dam will be rehabilitated, no storage of process water will continue and natural recharge will be allowed to infiltrate into these areas. However, for the Target TSF it was assumed that source concentrations and infiltration rates remain constant as a conservative assumption.

Scenario modelling for 50 and 100 years post-closure (base case scenario - porosity 4% for the weathered zone and 2% for the fractured zone) show that the simulated contaminant plume migrates mainly in a westerly direction into the Study Area following the regional hydraulic gradient (Figure 12-2).

50 years after closure the simulated plume has migrated 1 050 m away from the Target TSF and associated dams. The simulated plume migrated approximately 1 300 m from the Target TSF and associated dams 100 years after closure.

A sensitivity analysis was performed on this parameter by varying the porosity values between 3 and 7% for the weathered zone and 1 and 3% for the fractured zone. Results show that plume from the Target TSF would migrate 2 000 m for the lowest porosity values and 650 m using the highest porosity values.

Figure 12-2 shows that:

- For the base-case scenario, third-party boreholes B1, B7, B8 and B38N are located within the plume extents for 50 and 100 years post-closure and groundwater quality in these boreholes may thus be impacted in the post-closure phase. For the conservative scenario (low porosity) borehole B2N1 is also projected to be within the simulated plume extent;
- These boreholes should be included in the monitoring programme for the Jelani Operation and compared to model results as well as SANS 241 drinking water standards.

As some downgradient groundwater users are likely to be impacted post-closure, the significance of this impact is expected to be medium.

Table 12-14: Significance Rating of Post-Closure Impact 2

NATURE OF IMPACT 2: Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use.		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Impact Status *(positive or negative)*	Negative	Negative
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long term	Long term
Magnitude *(Major, Moderate, Minor)*	Moderate	Moderate
Probability *(Definite, Possible, Unlikely)*	Definite	Possible
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resource: (Yes or No)	No	
Residual impacts Long-term potential impact on groundwater quality remains, particularly where downgradient groundwater users are located within the modelled plume extent.		
Cumulative impacts • Impact on groundwater quality by cumulative impact from the Target TSF and RWDs		
Mitigation measures • Rehabilitation of process water storage dams; • Rehabilitation and evaporative cover on the Target TSF; • Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling; • Continuous monitoring of water quality in dams and pans for a period of at least five years; • Continuous monitoring of groundwater quality in downgradient monitoring and third-party boreholes for a minimum period of five years; • Yearly reporting of groundwater quality monitoring and comparison to groundwater model results; • Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.		

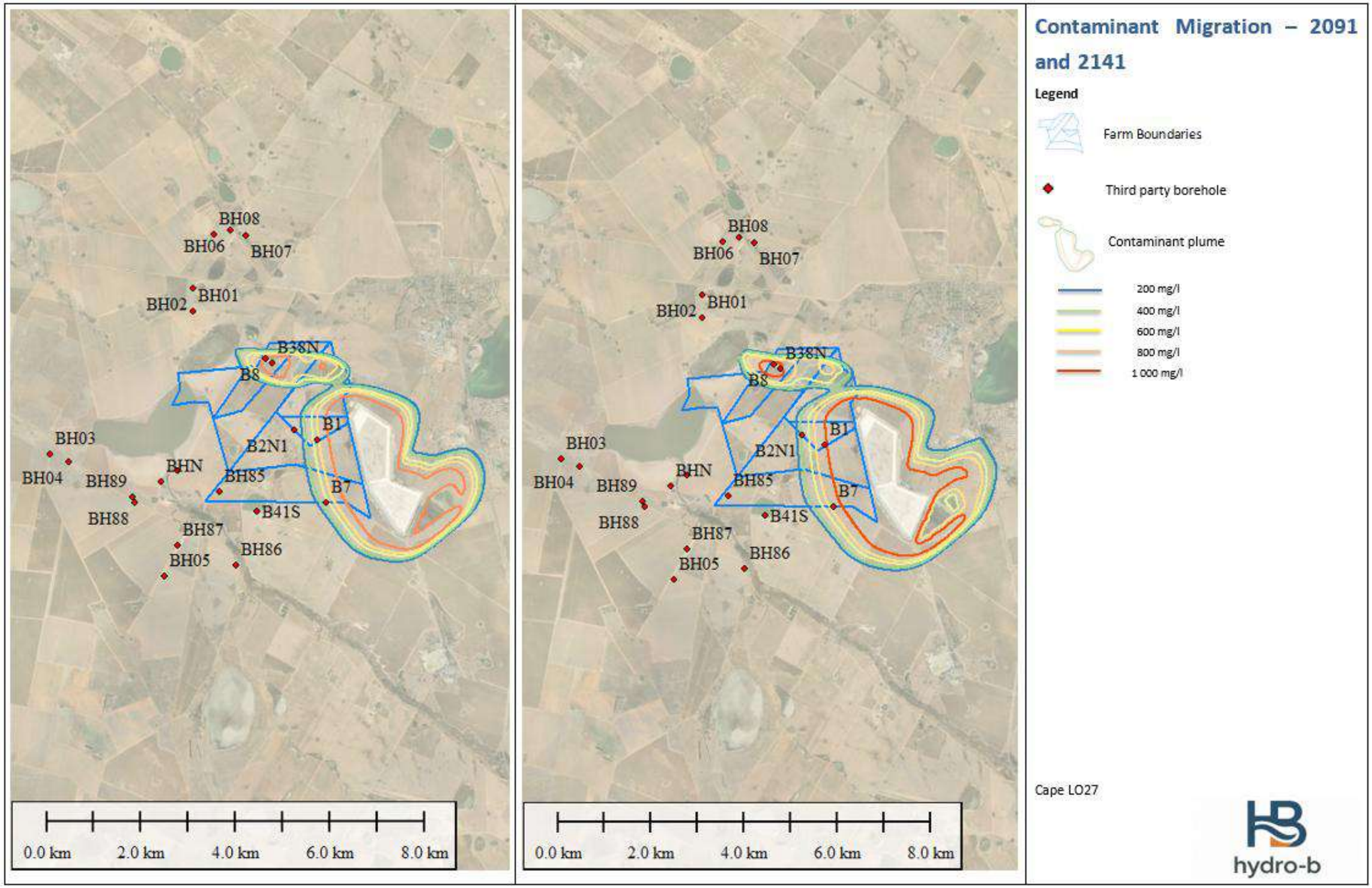


Figure 12-2. Contaminant Plume – 2091 and 2141 Situation (50 and 100 Years Post-Closure)

12.5 Cumulative Impacts

Cumulative impacts are impacts that result from the incremental impact of the proposed activities on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

The project is located in an area that is already impacted by existing mining activities. As already mentioned, existing Target Mine surface water infrastructure for mine waste and water is present which locally impacts on groundwater quality. As it is proposed that much of the mine water infrastructure will be used for the proposed Jelani Operation, this will lead to cumulative impacts that are impossible to divide into historical and future impacts.

This groundwater impact assessment for proposed Jelani Operation has assessed the potential cumulative effect of the existing Target TSF using available information, however, a site-specific source-term assessment is required to properly characterise the long-term contaminant loading from the TSF.

As such, the impacts and their significance included in the previous sections are already considered to be cumulative. As such, cumulative impacts have been incorporated into the individual impact assessments above.

12.6 Assessment Confidence

The confidence in this groundwater impact assessment is considered sufficient for the identification and assessment of the principal groundwater impacts, based on the available groundwater monitoring data, hydrocensus information, geological and hydrogeological information, existing mine information and numerical groundwater modelling. The assessment should be regarded as a dynamic assessment that should be refined as additional groundwater monitoring, source-term characterisation and operational information become available. The recommended groundwater monitoring programme and periodic numerical model updates are intended to address any uncertainties and improve confidence in the assessment over the life of the Project.

13 Impact Summary Table

The impacts and mitigation measures are summarised in Table 13-1.

Table 13-1. Summary of the Potential Groundwater Impacts and Proposed Mitigation Measures

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
Construction Phase													
1	Site preparation for refurbishment of the Shaft 2 and 3 areas	Release of pollutants during site preparation could pose a risk to groundwater quality.	Minor	Short term	Local	Possible	**Low**	Contain clearance activities to required areas as much as practically possible; Prevent ponding in cleared areas through (temporary) stormwater management; Prevent erosion within the cleared areas and downgradient areas Any incidents that could release pollutants to groundwater should be reported and mitigated immediately.	Minor	Short term	Local	Unlikely	**Low**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
2	Use of construction equipment for the refurbishment of the Shaft 2 and 3 areas	Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the groundwater.	Minor	Short term	Local	Possible	**Low**	Regular service of vehicles in designated repair bays; Refuelling of vehicles only in designated areas; Restrict movement of vehicles to a minimum; All vehicles to be provided with a spill kit; Any incidents that could release hydrocarbons to groundwater should be reported and mitigated immediately.	Minor	Short term	Local	Unlikely	**Low**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
Operational Phase													
1	Groundwater abstraction from the deep Witwatersrand aquifer	Abstraction from the deep aquifer may impact the availability of the shallow groundwater resource.	Minor	Long term	Local	Possible	**Medium**	Mining should progress as swiftly as possible to reduce the period of active dewatering; Dewatering of the underground mine should stop as soon as mining activities cease. Abstraction volumes should be monitored regularly and where these deviate from expected volumes, this should be reported immediately.	Minor	Long term	Local	Unlikely	**Medium**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
2	Groundwater abstraction from the deep Witwatersrand aquifer	Abstraction from the deep aquifer may impact on groundwater levels in the shallow Karoo aquifer.	Minor	Long term	Local	Possible	**Medium**	Groundwater levels in the shallow Karoo aquifer should be monitored on a regular basis throughout the LoM to verify no impacts on shallow groundwater levels. Where it is proven that third-party boreholes have reduced yields due to mining activities, an alternative supply needs to be provided.	Minor	Long term	Local	Unlikely	**Medium**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
3	Mine water and waste containment in existing mine infrastructure	Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use.	Moderate	Medium term	Local	Definite	**Medium**	Diversion of clean water to Swartpan and prevention of dirty water from the emergency overflow dam; Rehabilitation and evaporative cover on the Target TSF; Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling; Continuous monitoring of process water in dams, pans and tailings ponds; Continuous monitoring of groundwater quality in downgradient monitoring boreholes and third-party boreholes; Yearly reporting of groundwater quality monitoring and comparison to groundwater model results; Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.	Moderate	Medium term	Local	Possible	**Medium**

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
Post-Closure Phase													
1	Cessation of groundwater abstraction from the deep Witwatersrand aquifer	Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers..	Minor	Long term	Local	Possible	Low	Groundwater levels in the deep Witwatersrand aquifer should continue to be monitored on a regular basis. Water level recovery in mine voids should continue to be monitored on a regular basis.	Minor	Long term	Local	Unlikely	Low

Impact No.	Activity	Impact Description	BEFORE MITIGATION					Mitigation measures/ Recommendations	AFTER MITIGATION				
			Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE		Magnitude	Duration	Spatial Scale	Probability	SIGNIFICANCE
2	Mine water and waste containment in existing mine infrastructure	Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use	Moderate	Long term	Local	Definite	**Medium**	Rehabilitation of process water storage dams; Rehabilitation and evaporative cover on the Target TSF; Continuous monitoring of water quality in dams and pans for a period of at least five years Continuous monitoring of groundwater quality in downgradient monitoring and third-party boreholes for a minimum period of five years; Yearly reporting of groundwater quality monitoring and comparison to groundwater model results; Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.	Minor	Long term	Local	Possible	**Medium**

14 Proposed Conditions for Inclusion into the Environmental Authorisation

The following conditions are recommended for inclusion into the Environmental Authorisation for this project:

- The groundwater monitoring programme described in this report shall be implemented prior to and throughout construction, operation and closure of the Jelani Operation;
- Groundwater levels and groundwater quality shall be monitored at representative monitoring points, including identified third-party groundwater receptors where appropriate;
- Monitoring results shall be compared against established baseline conditions and defined trigger levels;
- Where monitoring identifies a prolonged or significant deterioration in groundwater quality or groundwater levels attributable to the project, the cause shall be investigated and appropriate corrective measures implemented;
- The groundwater monitoring network shall be reviewed periodically and updated where monitoring results, mine development or changes in groundwater conditions indicate that additional monitoring is required;
- The groundwater model shall be reviewed and updated at least every two years, or sooner where new relevant information, changes in mine development or material deviations from model predictions occur;
- Existing Target Mine sources that may contribute to cumulative groundwater impacts shall continue to be managed by the responsible operator and incorporated into future cumulative groundwater assessments;
- Site-specific seepage and source-term characterisation shall be undertaken where required to refine the assessment of contaminant loading from mine water infrastructure.

15 Groundwater Monitoring Programme

15.1 Monitoring Network Update

It is assumed the existing Target Mine monitoring network can be used for the proposed Jelani Operation. However, the following should be updated and the network should include at least the following:

- Background Boreholes:
  - BH88, Bh85, BH01, BH07;
  - Continue to monitor baseline groundwater quality and levels;
- Target TSF Monitoring Boreholes:
  - Monitoring boreholes A2, A3 and A5, monitored on a set frequency and analysed for a predetermined range of parameters;
  - Focus on seepage zones and plume migration.
- Compliance / Receptor Boreholes:
  - Process water dams: A1, B38N, B8,
  - Local pan: B41S;
  - Losdoringspruit: B86, BH11;
  - Target TSF: B7, B1, B2N1

Relevant monitoring points are shown in. As shown in Figure 15-1, It is recommended that all proposed monitoring points will form part of future monitoring rounds for consistency, spatial coverage and trend analyses.

15.2 Monitoring Frequency

The following monitoring frequencies should be adhered to.

Table 15-1: Monitoring Frequency

Parameter	(Construction and Operational)	(Post-Closure)
Groundwater levels	Quarterly	Biannually
Process / tailings water quality	Quarterly	Quarterly to Biannually (depending on outcomes)

15.3 Monitoring Parameters

Based on hydrochemistry results and typical tailings, waste rock and seepage geochemistry for gold mines, key parameters for groundwater monitoring should at least include:

- Major cations/anions (for water type assessment);
  - Ca, Mg, Na, K, SO_4, Cl, HCO_3, NO_3
- Physico-chemical parameters (for acidity and total dissolved salts):
  - pH, EC, TDS, Temperature
- Identified parameters of concern:
  - Nitrogen-based parameters:
    - NH_3, NO_2,
  - Metals:
    - Sb, B, Co, Mn, Se, U

The parameters above should be included in further monitoring of groundwater as a minimum. Where sampling of process and tailings waters show concerns for other parameters to be elevated, these should be added. These results should be compared to and analysed in conjunction with surface water, process water and tailings pond water to be able to determine source-pathway-receptor linkages.

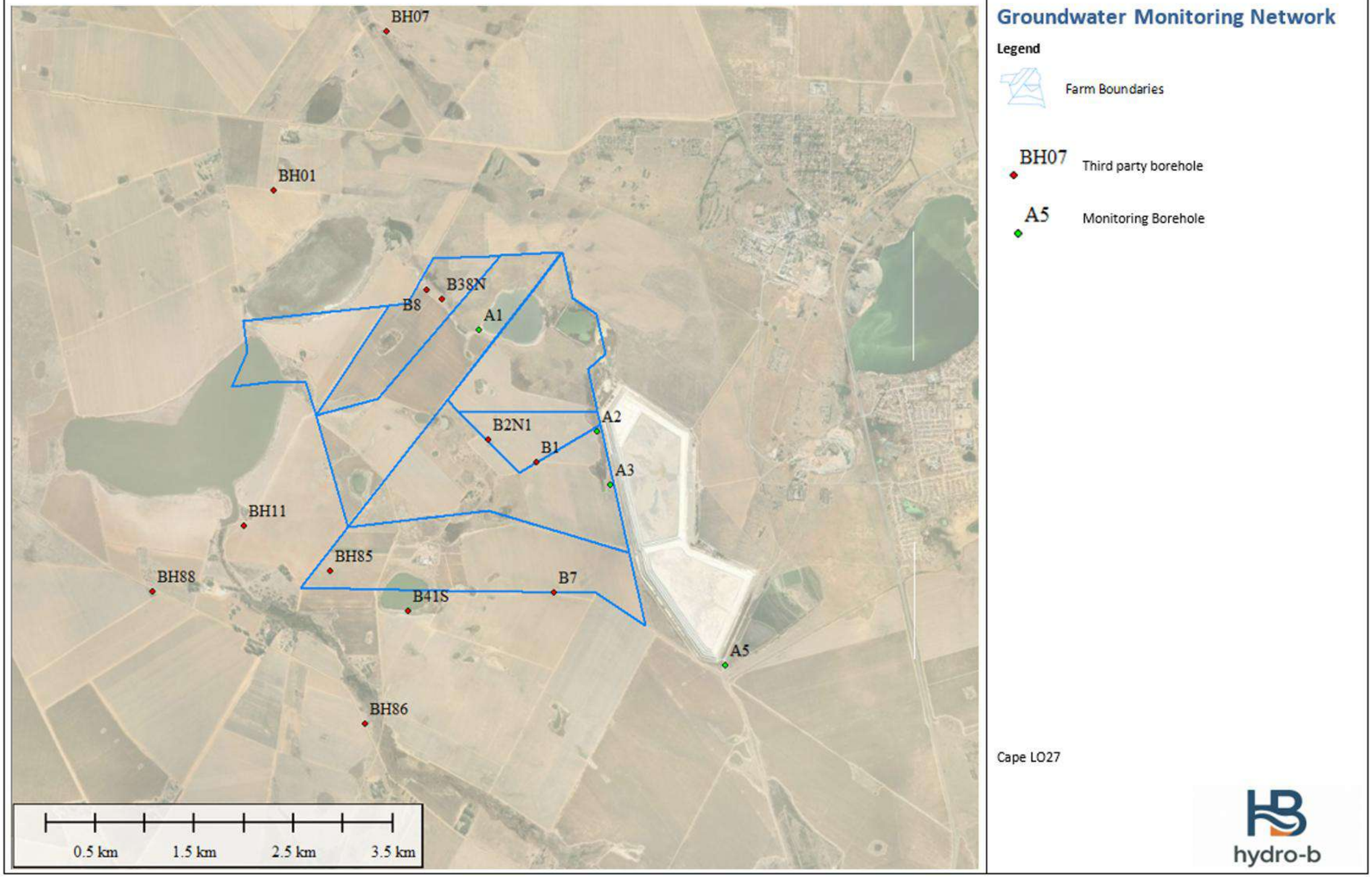


Figure 15-1. Groundwater Monitoring Network

16 Reasoned Specialist Opinion

Based on the available baseline information, hydrocensus investigation, conceptual hydrogeological model, numerical groundwater modelling and impact assessment, the proposed Jelani Operation has the potential to affect groundwater levels and groundwater quality during construction, operation and post-closure.

The principal potential groundwater impacts identified are associated with potential contaminant migration from existing mine water and waste infrastructure. The assessment identified existing groundwater-quality impacts associated with the Target Mine infrastructure which will form part of the cumulative impacts on the groundwater environment.

The numerical modelling indicates that potential groundwater impacts are generally spatially constrained and that the identified impacts can be managed through continued groundwater monitoring, management of contaminant sources, appropriate water-management measures and periodic updating of the groundwater model.

Residual groundwater impacts cannot, however, be excluded entirely, particularly in relation to long-term contaminant migration from existing mine infrastructure. The magnitude and extent of these impacts are subject to uncertainty associated with the characterisation of existing contaminant source terms and site-specific seepage conditions.

Based on the information available and subject to implementation of mitigation, monitoring and management measures as recommended in this report, the proposed Jelani Operation is considered acceptable from a groundwater perspective.

This opinion is subject to continued monitoring of groundwater levels and quality, implementation of defined trigger and response measures, appropriate management of mine related contaminant sources, and periodic review and updating of the groundwater model.

This opinion does not remove the need to comply with the requirements of the National Water Act, the applicable Water Use Licence conditions, the Environmental Authorisation and any additional requirements imposed by the competent authorities.

17 Consultation and Comments

The groundwater specialist assessment was undertaken as a technical specialist study as part of the Environmental Impact Assessment and Water Use Licence Application process. Stakeholder and public consultation associated with the EIA process is being undertaken by the Environmental Assessment Practitioner (EAP).

A written submission was received from a stakeholder during the consultation process in which concerns relevant to the proposed development were raised. The concerns were considered and formally addressed by the EAP through a response letter. Where the matters raised were relevant to groundwater, hydrogeology, groundwater quality, groundwater use or potential groundwater impacts, the information and concerns were considered as part of this groundwater impact assessment.

The stakeholder submission and the corresponding response are retained as part of the EIA consultation record. The project Comments and Responses Report/Register should be read together with this specialist assessment for the full record of stakeholder comments and responses. Any groundwater related comments received during any stages of the EIA/WULA processes should be considered in the finalisation or future updating of this assessment, where relevant.

18 Conclusions

Based on this Impact Assessment, the following can be concluded:

- The proposed Jelani Operation will be developed in an area already impacted by existing mining activities. It will overlap in extent with the Target mine and partially utilise existing Target mining and water management infrastructure, especially those related to the Target Shaft No. 2 and 3;
- The Jelani mine extent is significantly smaller in extent than the existing Target Mine with mining only extending 140 m deeper than current mining at 1 250 mbgl;
- The Hydrogeology of the Study Area can be described as a shallow, perched, weathered and fractured Karoo aquifer overlying a deep, confined, fractured Ventersdorp/Witwatersrand aquifer;
- Hydraulic connectivity between the shallow Karoo aquifer and the deep aquifer is considered limited;
- Current groundwater use is mainly for existing gold mining operations which abstract considerable volumes of water from the deep fractured aquifer. Small-scale third-party use, mainly for domestic purposes, is the main use of groundwater in the shallow aquifer;
- Groundwater levels in the shallow Karoo aquifer indicate good correlation with topography, showing groundwater levels remain close to surface;
- For sampled domestic groundwater sources, no cyanide or uranium was detected and sulphate only detected at concentrations below the SANS drinking water limit, showing no indication of current impacts of mining on groundwater sources;
- Existing groundwater impacts are largely associated with current mining infrastructure, particularly the Target Mine TSFs and associated RWDs, locally impacting on groundwater quality in proximity of existing mine surface infrastructure;
- Volumes of underground water to be pumped to surface for the proposed underground workings are expected to be in line with those for the Target Mine, with an estimated volume of approximately 5.4 Ml/day (3.4 Ml/day of groundwater make and 2 Ml/day of inter-mine flow from Freddies No. 9 Shaft);
- Currently no drawdown effects have been observed in the shallow aquifer due to mine dewatering;
- Post-closure groundwater rebound in the deep aquifer and potential cross-contamination is not expected as piezometric levels will remain below the shallow Karoo aquifer;
- The impact assessment identifies no additional cumulative groundwater impacts beyond those assessed for the individual project phases, as the assessed impacts already incorporate the effects of existing Target Mine infrastructure;
- Construction-phase groundwater-quality impacts are assessed as low significance after mitigation;

- Operational impacts on shallow groundwater availability and levels are assessed as low significance after mitigation, provided abstraction and shallow groundwater levels are monitored throughout the Life of Mine;
- Operational contaminant plume migration remains a medium-significance impact after mitigation, with B38N and B8 identified as potential groundwater receptors;
- Post-closure groundwater recovery and potential hydraulic connection with the shallow Karoo aquifer are assessed as low significance after mitigation; and
- Post-closure contaminant plume migration remains a medium-significance long-term impact, with several third-party boreholes potentially affected based on the simulated plume extent.

19 Recommendations

The following recommendations are made:

- The current Harmony Gold Target Mine monitoring network should be used for further monitoring for this project, but should be updated in terms of monitoring locations, frequency and parameters;
- Groundwater level and quality trigger levels and corresponding response actions should be defined and incorporated in the groundwater monitoring programme;
- Retrieve additional samples from third-party boreholes not previously sampled to confirm the understanding of the current groundwater quality situation;
- Undertake site-specific seepage and aquifer characterisation (dam water quality and levels, seepage rates, soil and unsaturated-zone properties and aquifer hydraulic properties) to further refine the contaminant transport assessment for the Jelani Operation;
- Updating the groundwater model every two years at a minimum, or after new information becomes available or significant changes in mine layouts or scheduling;
- Jelani resources should co-operate with Harmony Gold with regards to carrying out source-term determinations and geochemical modelling for the Target TSF, and this should feed into cumulative impact assessment updates for the Jelani Operation. The results should be incorporated into future cumulative groundwater impact assessments for the Jelani Operation;
- Jelani Resources to implement the construction-phase pollution prevention, stormwater and spill-response measures before activities commence;
- Monitor Jelani groundwater abstraction volumes and shallow Karoo groundwater levels throughout LoM and definition of trigger levels;
- Include B38N and B8 in the groundwater monitoring network as key potential receptors of operational contaminant plume migration;
- Maintain regular process-water and groundwater-quality monitoring and compare results

with model predictions and SANS 241 requirements;

- Rehabilitate process-water storage infrastructures at closure;
- Continue post-closure groundwater-level and groundwater-quality monitoring, including downgradient receptor boreholes, and update the transport model as new monitoring data become available; and
- Where a mining-related reduction in third-party borehole yield or groundwater quality is demonstrated, provide an alternative water supply;
- Any groundwater related comments received through the EIA/WULA consultation process should be incorporated into subsequent groundwater assessment updates.

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APPENDIX A HYDROCENSUS PHOTOS

Table 20-1: Hydrocensus Photos

BH ID	Photo
A3	

BH ID	Photo
A5	

BH ID	Photo
A6	

BH ID	Photo
A7	

BH ID	Photo
B1	

BH ID	Photo
B7	

BH ID	Photo
BH01	

BH ID	Photo
BH02	

BH ID	Photo
BH03	

BH ID	Photo
BH04	

BH ID	Photo
BH05	

BH06	

BH ID	Photo
BH07	

BH ID	Photo
BH08	

BH ID	Photo
BH86	

BH ID	Photo
BH87	

BH ID	Photo
BH88	

BH ID	Photo
BHN	

APPENDIX B Curriculum Vitae

Arjan van ‘t Zelfde

Groundwater expert

Skills

Water Management

Analytical thinking

Groundwater modelling

Unit Management

Analytical thinking

Software

GMS

Visual Modflow

Triwaco

MircoFEM

Aqtesolv

FlowMaster

StormCAD

Global Mapper

ArcGIS

Mapinfo

Surfer

Strater

Wish

Personal Data

1A Inverness Rd, Westdene, JHB

+27828638081

Arjan.idem@gmail.com

DOB 12/05/1977

SA permanent resident (Dutch)

Pr.Sci.Nat

Profile

Experienced manager with background in water services, hydrogeology and soils who is committed to contribute to the efficient use of water resources. Proven track record of leading teams and tackling complex and large-scale projects. Skilled in communication, technical support, analytical thinking, team management and modelling. Completed a MSc. in Soil Science at Wageningen University, The Netherlands. International experience in Africa and Europe. Seeking a position as technical manager in hydrogeology to contribute to sustainable use of water and effective water management.

Employment History

Owner, Hydro-B

December 2025 - Current

Various expert groundwater, soil and seepage assessments.

Associate Hydrogeologist, Digby Wells, SA

May 2025 – Current

Project-based groundwater assessments and numerical modelling

Manager Mining & Environmental Hydrogeology, Digby Wells, SA

February 2022 – February 2023

Served as the unit manager leading a team of hydrogeologists focussing on the mining industry. Some key responsibilities were:

- Managing a unit of hydrogeologists;
- Project management, technical inputs and modelling;
- Providing technical expertise and guidance related to groundwater modelling and management;
- Marketing and client management.

Divisional Manager: Water Services, Digby Wells, SA

March 2022 – January 2024

Served as the divisional manager leading a team of groundwater, surface water and geochemistry experts. Some of my key responsibilities were:

- Managing a multidisciplinary team, ensuring projects are delivered on time;
- Participating in the company’s operational, strategic and marketing teams;
- Providing the team with technical expertise, mentorship and guidance;
- Project management, technical inputs, and modelling.

Languages

Dutch (mother tongue)

English (excellent)

German (good)

Afrikaans (reasonable)

French (reasonable)

Manager Mining & Environmental Hydrogeology, Digby Wells, SA

November 2019 – February 2022

Served as the unit manager leading a team of hydrogeologists focussing on the mining industry. Some key responsibilities were:

- Managing a unit of hydrogeologists;
- Providing technical expertise and guidance on groundwater management;
- Marketing and client management;
- Project management, technical inputs, and modelling.

Senior Hydrogeologist, Digby Wells, SA

April 2019 – October 2019

Served as a senior expert in the hydrogeology unit. Some key responsibilities were:

- Management of projects with a strong hydrogeology component;
- Providing technical groundwater expertise for multidisciplinary studies;
- Expanding modelling capabilities;
- Fieldwork coordination and data collation.

Senior Hydrogeologist, GCS, SA

September 2014 – April 2019

Served as a senior hydrogeological expert. Some key responsibilities were:

- Management of hydrogeological projects or projects with hydrogeology inputs;
- Providing technical groundwater expertise for various studies;
- Building numerical modelling capabilities and expanding knowledge of hard-rock environments.

Hydrogeological consultant, Royal HaskoningDHV, NL

Mar 2009 – July 2014

- Management of hydrogeological studies for civil construction, roads, aquaducts and aquifer thermal energy storage;
- Providing technical groundwater expertise for studies for civil construction, roads, aquaducts, groundwater contamination, water supply and Aquifer Thermal Energy Storage (ATES);
- Design, build and operate groundwater monitoring networks;
- Secondments as project hydrogeologist on widening of three major highways (1 year full-time) and hydrogeological expert for policies and permitting of ATES systems (for two provinces in The Netherlands, part-time for 1 year for each).

Hydrogeological consultant, O'Neill Ground Water Engineering, IRL

Jan 2005 – Dec 2008

- Fieldwork: drilling supervision, piezometer installation, aquifer pump testing, soil and (ground)water sampling and in-field testing of soils for small-scale wastewater treatment plants and rainwater infiltration systems;
- Water supply catchment delineations and aquifer vulnerability assessments;
- Discharge license applications, water management plans and flood risk assessments;
- Design of stormwater and sewage drainage for housing developments;
- Inputs for groundwater and soil impact assessments.

Appendix D7 – Soils, Land Use and Land Capability Assessment

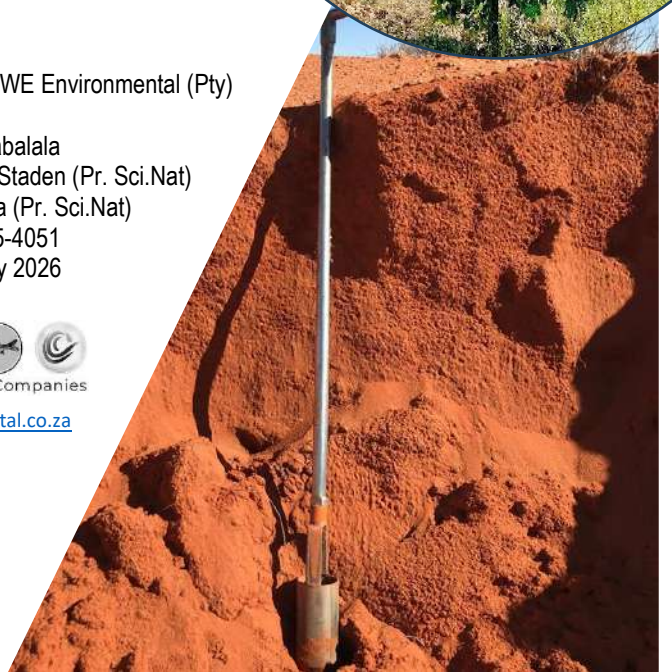


ZIMPANDE
RESEARCH COLLABORATIVE

Soil, Land Use, & Land Capability Assessment Report

FOR THE PROPOSED UNDERGROUND MINE IN ALLANRIDGE, FREE STATE PROVINCE.





Prepared for:	KONGIWE Environmental (Pty) Ltd
Report author:	L. Tshabalala
Report reviewers:	S. van Staden (Pr. Sci.Nat) B. Mzila (Pr. Sci.Nat)
Report Reference:	ZRC 25-4051
Date:	January 2026

Part of the SAS Environmental Group of Companies

Website: http://www.sasenvironmental.co.za

EXECUTIVE SUMMARY

The Zimpande Research Collaborative (ZRC) was appointed to conduct a soil, land use, and land capability assessment as part of the environmental authorisation (EA) process for the proposed underground mining activities in Allanridge in the Free State Province. The boundary for the proposed underground mine will henceforth be referred to as the "study area".

The objective of this study was to determine the impact of the proposed underground mining and related activities on the soil, land use and land capability through the evaluation of the following:

- Climatic conditions within the context of agricultural productivity and constraints;
- Landscape setting and presently occurring land uses;
- Dominant soil forms, their respective land capability and potential for agricultural productivity;
- Soil physical properties and current limitations of soils to various land use purposes in their present state; and
- Determine the impact of the proposed development on soil, land capability and agricultural potential.

The mean annual rainfall (MAR) for the entire study area ranges from 500 – 600 mm per annum. This rainfall is deemed adequate for a wide variety of crops (maize, wheat, sunflower, potatoes, etc.) for successful dryland farming. According to the desktop database, the entire study area is characterised by a mean annual evaporation ranging between 2001 – 2200 mm per annum. Therefore, crops under rainfed conditions should be cultivated with caution to realise commercially viable yields due to potential moisture stress.

Based on site assessment observations, the study area is primarily comprised of commercial agricultural (dryland) cultivation of crops such as maize and sunflower, open grassland often utilised for livestock (cattle and sheep) grazing, as well as several watercourses distributed across the study area.

The identified soil forms within the study area largely comprise dystrophic red and/or yellow brown apedal, infrastructural areas grouped as disturbed soils, shallow lithic soils, as well as soils susceptible to waterlogging conditions associated with the watercourses. These soils are further discussed below.

Arable Land

The arable soils in the study area were classified as Clovelly, Ermelo/Hutton, and Clovelly/Hutton. These soils typically exhibit a dystrophic red and/or yellow brown apedal textural class. These are oxidic soils which are highly weathered and are dominated by iron (hematite/goethite) oxides. The soils are deep, well aerated with good porosity to support agricultural crops. Although these soils are not inherently fertile, oxidic soils are suitable for agricultural cultivation of crops with relatively few physical limitations.

Wet-based Soils

The wet based soils were identified as Dundee (including surface water) and Katspruit. The topsoil directly overlies an alluvial/gleyed horizon which is characterised by prolonged periods of saturation with uniform grey colours which is an indication of waterlogging conditions. The wetness limitation associated with these soils means anaerobic conditions develop in the root-zone (30 cm) which is not suitable for cultivated crops. Consequently, these soils are classified as being of low to moderate agricultural value. However, these soils can be considered for marginal livestock grazing.

Grazing Land

The study area also comprised of shallow and lithic soil associated with the Glenrosa formation. This soil is associated with poor physical properties for plant root system penetration and water infiltration

due to the shallow nature of the soil and/or limiting impeding layer of the underlying parent material. Based on the degree of weathering some lithic material of varying sizes can be mixed closely with soil material. Glenrosa soil form is usually avoided for intensive use and thus left for grazing, forestry, and wildlife land uses.

Disturbed Soils

The Witbank (Disturbed) soil form is related to soil which has been subjected to physical disturbances. In this context, Witbank soil includes historical mining and related activities as well as surface infrastructure which buried the soil material such that the diagnostic horizons could not be identified. As a result, this soil is not ideal for agricultural cultivation.

Table A below indicates the dominant soils occurring within the study area, land capability, as well as agricultural land potential.

Table A: Dominant soil forms and their respective land capability and land potential classes.

Soil Forms	Average Soil Depth (cm)	DALRRD (2018) Classification	Land Potential	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	>120	11. High	Good – L3	361.9	36.8
Clovelly/Ermelo				134.9	13.7
Clovelly	100			106.0	10.7
Watercourses (Dundee – including surface water)	40	6. Low - Moderate	Wetland – L5	149.3	15.1
Katspruit	55				
Glenrosa	35	5. Low	Restricted – L5	224.4	22.8
Witbank	N/A	2. Very Low	Very Low – L8	6.3	0.6
Total Enclosed Area				**983.0**	**100**

The national web-based screening tool depicts the study area as having a very high agricultural sensitivity. Given that the site encompasses active commercial (rainfed) cultivation of crops and comprises of land capabilities varying from very high to low, the very high agricultural sensitivity allocated to the study area is valid and confirmed. However, it is the opinion of the study team that the risk of impact is significantly low given that no surface infrastructure is proposed within the project footprint.

Upon site assessment and verification, the agricultural sensitivity classes with varying degrees of impact depending on the type of land use and/or soil classification were determined as follows:

- Actively cultivated areas on high land capability soil [11. High (Class II)] – Rated as **very high sensitivity** due to ongoing and active dryland commercial farming.
- Wet-based soil [6. Low - Moderate (Class V)] – Rated as **low sensitivity** due to wetness limitation.
- Grazing land [5. Low (Class VI)] – Rated as **low sensitivity** due to the dominance of lithic material as well as exposed hard rock surfaces in some instances.
- Disturbed footprint areas [2. Very Low (Class VIII)] – Rated as **very low sensitivity** due to significant transformation and modification (residential and infrastructural developments) to the land which makes it unsuitable for agricultural activities.

Table B below summarizes the identified soils, and their respective field verified agricultural sensitivity.

Table B: Field verified agricultural sensitivity of the identified soils within the study area.

Soil Forms		DALRRD (2018) Classification	Field Verified Agricultural Sensitivity	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	Actively cultivated	11. High	Very High	603.0	61.3
Clovelly/Ermelo					
Clovelly					
Watercourses (Dundee – including surface water)		6. Low - Moderate	Low	149.3	15.1
Katspruit					
Glenrosa		5. Low	Medium	224.4	22.8
Witbank		2. Very Low	Very Low	6.3	0.6
Total Enclosed Area				**983.0**	**100.0**

According to (DALRRD, 2022) database, the study area is located within the rainfed (RF) protected agricultural areas. However, no surface infrastructure is proposed within the study area, only the underground mine and related activities. As a result, no impact is anticipated on the protected agricultural areas (provided no subsidence occurs) as well as the active commercial farming taking place within the study area. Therefore, it is recommended that all mine operation and related activities be restricted to underground. This is to ensure that impact on agricultural production as well as regional and provincial food security is preserved throughout the life of mine (LoM).

The proposed development does not include establishment of any additional surface infrastructure, thus, minimal to no direct impact on soil, land use, and agricultural land capability is anticipated. However, in the event of a possible ground subsidence, the cumulative loss and long-term impacts on arable soil and associated agricultural productivity of the study area is anticipated to be high since the proposed underground mine operation is directly beneath commercial agricultural cultivation of crops (maize, sunflower) as well as several farm dams providing drinking water for livestock (cattle and sheep). If properly managed or mitigated, the cumulative loss and long-term impacts can be reduced to low through monitoring, farm inspection (e.g., surface cracks) and adaptive management strategies. It is therefore the opinion of the specialist that the rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities.

Based on the Natural Agricultural Resources Atlas Manual (NAR Atlas Manual, 2018) database, the study area is characterised by approximately 7 hectare per large stock unit (ha/LSU). This grazing capacity potential is considered sufficient to support commercialised livestock farming with veld management practices in place. The proposed underground mine does not pose any risk on current livestock grazing activities since no surface infrastructure is to be established.

Following the assessment of the study area and the identified potential impacts as a result of the proposed underground mine and related activities; key mitigation as outlined below has been developed to minimise the impact on soil resources of the area:

- It must be ensured that areas of active cultivation are protected from subsidence;
- The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities;
- It is also recommended that the safety pillar factor under cultivated areas be included as an additional margin of safety to ensure that no subsidence takes place; and
- Regular monitoring of surface above the undermined areas must be considered to ensure that no subsidence occurs.

It is therefore the opinion of the soil study team that the proposed underground mine and related activities is deemed acceptable and within limits from a soil, land use, and agricultural capability point of view, provided that the risk of subsidence by the rock engineers is confirmed to be low for all phases of development.

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DOCUMENT GUIDE

The table below provides the criteria for the specialist assessment and minimum report content requirements for impacts on agricultural resources for activities requiring environmental authorisation as it relates to Government Notice No. 320 Protocol as published in Government Gazette 43110 dated 20 March 2020.

Theme-Specific Requirements as per Government Notice No. 320 Agricultural Resources Theme – Very High and High Sensitivity Rating as per Screening Tool Output		
No.	**SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**	**Section in report/Notes**
2	**Agricultural Agro-Ecosystem Specialist Assessment**	
2.1	The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professionals (SACNASP).	Appendix B
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1
2.3	**The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:**	
2.3.1	the extent of the impact of the proposed development on the agricultural resources; and	Section 5
2.3.2	whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.	Section 5.1.5
2.4	**The status quo of the site must be described, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:**	
2.4.1	the soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope;	Section 3 and 4.2
2.4.2	where applicable, the vegetation composition, available water sources as well as agro-climatic information;	
2.4.3	the current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units;	Section 1.2
2.4.4	the current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure; and	Section 1.2
2.4.5	existing impacts on the site, located on a map (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).	Section 4.1
2.5	**Assessment of impacts, including the following aspects which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:**	
2.5.1	change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units;	Section 1.2
2.5.2	change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure; and	Section 1.2
2.5.3	any alternative development footprints within the preferred site which would be of "medium" or "low" sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification.	Section 5.1.5
2.6	**The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be written up in an Agricultural Agro-Ecosystem Specialist Report.**	
2.7	**This report must contain the findings of the agro-ecosystem specialist assessment and the following information, as a minimum:**	
2.7.1	details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae;	Appendix B
2.7.2	A signed statement of independence by the specialist;	Appendix B

2.7.3	the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.2
2.7.4	a description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant;	Section 2.2
2.7.5	a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool;	Section 1
2.7.6	an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development;	Section 5.1.5
2.7.7	an indication of possible long-term benefits that will be generated by the project in relation to the benefits of the agricultural activities on the affected land;	Section 5.1.5
2.7.8	additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc.;	Section 5.1.1
2.7.9	information on the current agricultural activities being undertaken on adjacent land parcels;	Section 4.1
2.7.10	an identification of any areas to be avoided, including any buffers;	Section 5.3
2.7.11	a motivation must be provided if there were development footprints identified as per paragraph 2.5.3 above that were identified as having a “medium” or “low” agriculture sensitivity and that were not considered appropriate;	Section 5.1.5
2.7.12	confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities;	Section 2.4
2.7.13	a substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development;	Section 5.1.5
2.7.14	any conditions to which this statement is subjected;	Section 5.1.5
2.7.15	where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr); and	Section 5.3.2
2.7.16	a description of the assumptions made and any uncertainties or gaps in knowledge or data.	Section 1.3
2.8	**The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be incorporated into the Basic Assessment Report or Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which are to be contained in the EMPr.**	
2.9	**A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.**	

GLOSSARY OF TERMS

Albic	Grey colours, apedal to weak structure, few mottles (<10 %)
Alluvial soil	A deposit of sand, mud, etc. formed by flowing water, or the sedimentary matter deposited thus within recent times, especially in the valleys of large rivers.
Catena	A sequence of soils of similar age, derived from similar parent material, and occurring under similar macroclimatic condition, but having different characteristics due to variation in relief and drainage.
Chromic	Having within ≤150 cm of the soil surface, a subsurface layer ≥30 cm thick, that has a Munsell colour hue redder than 7.5YR, moist.
Ferralic	Having a ferralic horizon starting ≤150 cm of the soil surface.
Ferralic horizon	A subsurface horizon resulting from long and intense weathering, with a clay fraction that is dominated by low activity clays and contains various amounts of resistant minerals such as Fe, Al, and/or Mn hydroxides.
Hard Plinthic	Accumulative of vesicular Fe/Mn mottles, cemented
Hydrophytes	Plants that are adaptable to waterlogged soils
Lithic	Dominantly weathering rock material, some soil will be present.
Red Apedal	Uniform red colouring, apedal to weak structure, no calcareous
Runoff	Surface runoff is defined as the water that finds its way into a surface stream channel without infiltration into the soil and may include overland flow, interflow, and base flow.
Orthic	Maybe dark, chromic, or bleached.
Salinity	High Sodium Adsorption Ratio (SAR) above 15% are indicative of saline soils. The dominance of Sodium (Na) cations in relation to other cations tends to cause soil dispersion (deflocculation), which increases susceptibility to erosion under intense rainfall events.

ACRONYMS

AGIS	Agricultural Geo-Referenced Information Systems
MAP	Mean Annual Precipitation
EAP	Environmental Assessment Practitioner
EA	Environmental Authorisation
CARA	Conservation of Agricultural Resources Act
ET	Evapotranspiration
FAO	Food and Agriculture Organization
DFFE	Department of Fisheries, Forestry, and the Environment
MAE	Mean Annual Evaporation
GIS	Geographic Information System
GPS	Global Positioning System
m	Meter
MAR	Mean Annual Rainfall
DALRRD	Department of Agriculture, Land Reform and Rural Development
SACNASP	South African Council for Natural Scientific Professions
ZRC	Zimpande Research Collaborative
SOTER	Soil and Terrain
ha	Hectare
PAAs	Protected Agricultural Areas (RF) - DALRRD
RF	Rainfed

1. INTRODUCTION

1.1 Introduction & Background

The Zimpande Research Collaborative (ZRC) was appointed to conduct a soil, land use, and land capability assessment as part of the environmental authorisation (EA) process for the proposed underground mining activities in Allanridge in the Free State Province. The boundary for the proposed underground mine will henceforth be referred to as the "study area" (Refer to Figures 1 and 2).

1.2 Project Description

Jelani Resources (Pty) Ltd is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution). Following the exploration and licensing phases, Jelani is planning to apply for a Mining Rights over an area currently held under a Prospecting Right and has requested Kongiwe Environmental to compile a Scoping and EIA (in terms of the National Environmental Management Act, 1998) and a Water Use Licence Application (in terms of the National Water Act, 1998). No surface infrastructure is planned for onsite, and all mining and related activities will be accessed through Harmony's Target No 2 and Target No 3 shafts which will, over the course of the mine's life, be used. Based on the prefeasibility, there will be no air vents on the surface.

1.3 Scope of Work

The environmental authorisation process of the soil, land use and land capability assessment entailed the following aspects:

- As part of the desktop study, various datasets were consulted which includes but not limited to: Department of Agricultural (DALRRD) - Natural Agricultural Resources Atlas of South Africa (NAR Atlas Manual, 2018 - 2022) database, Soil and Terrain dataset (SOTER, 2013), and land capability maps to establish broad baseline conditions and sensitivity of the study area both on environmental and agricultural perspective;
- Compile various maps depicting the on-site conditions based on review of existing data and databases;
- Classification of the climatic conditions occurring within the study area;
- Conduct a soil classification survey within the study area;

- Assess the spatial distribution of various soil types within the study area and classify the dominant soil types according to the South African Soil Classification System: A Natural and Anthropogenic System for South Africa (Soil Classification Working Group, 2018);
- Identify restrictive soil properties on land capability under prevailing conditions;
- Identify and assess the potential impacts in relation to the proposed underground mining operation; and
- Compile soil, land use and land capability report under current on-site conditions based on the field data.

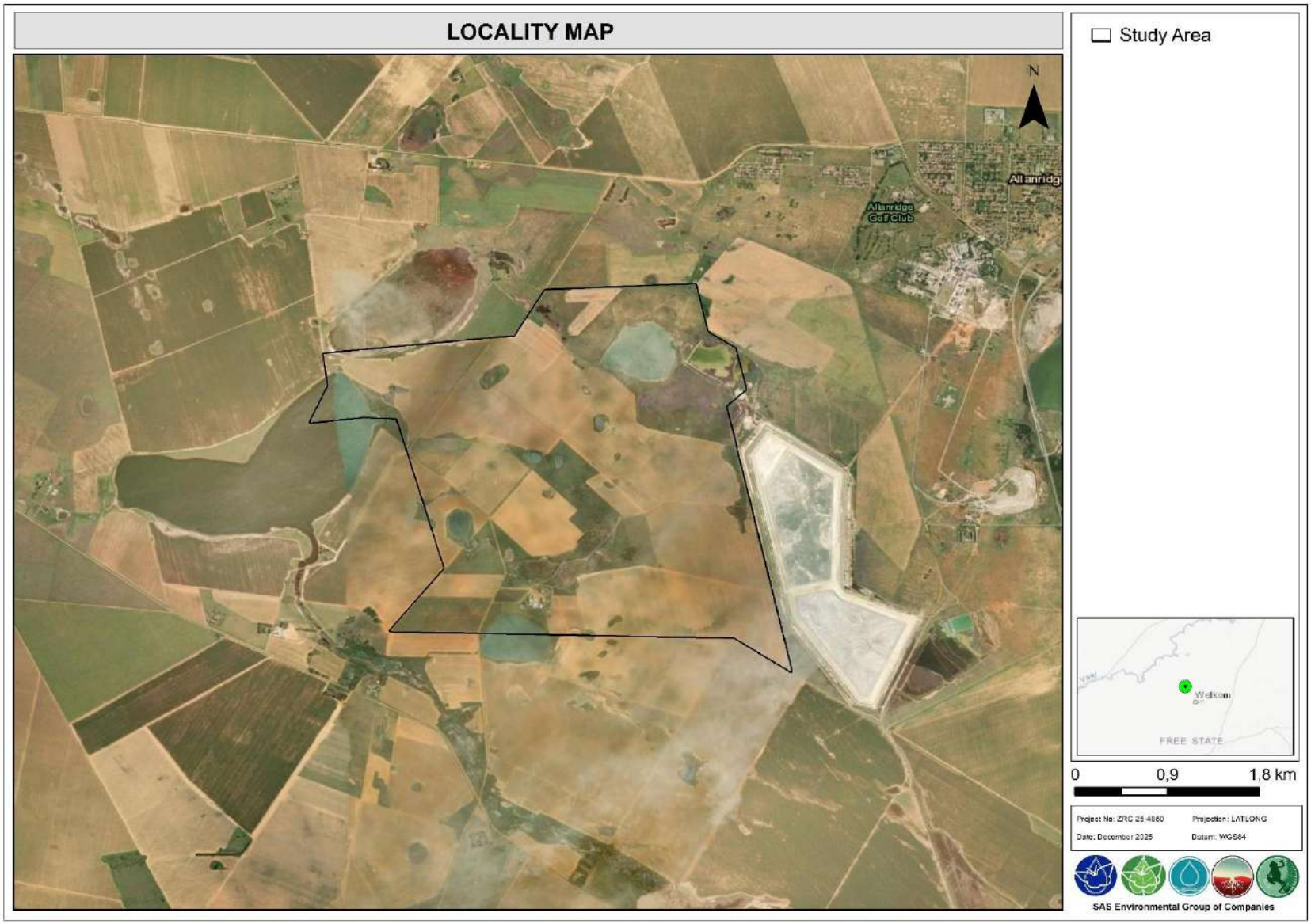


Figure 1: Locality map depicting the study area.

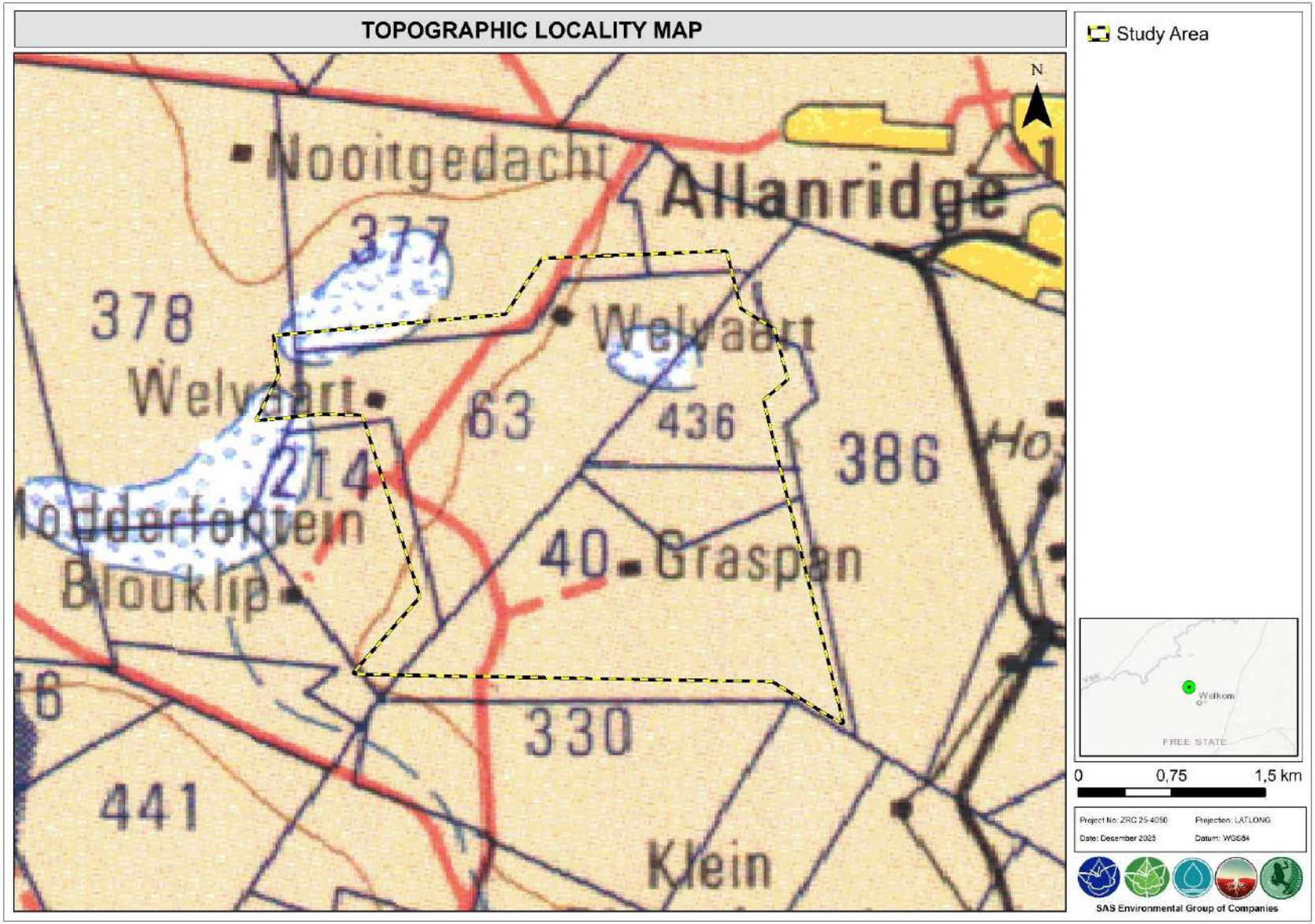


Figure 2: Location of the study area depicted on a topographical map.

1.4 Assumptions and Limitations

For the purpose of this assessment, the following assumptions and limitations are applicable:

- The information gathered during the desktop assessment must be considered with caution, as inaccuracies and data capturing errors are often present within these databases;
- The soil survey conducted as part of the land capability assessment was confined to within the study area outline. However, consideration of the immediately adjacent areas was given;
- A detailed investigation of economic aspects pertaining to the current agricultural activities was not undertaken as part of the specialist study;
- Sampling by definition means that not all areas are assessed, and therefore some aspects of soil characteristics may have been overlooked on this assessment; and
- Chemical analysis was not conducted as part of this soil study because the chemistry of the soils is not seen as a limitation, since the soil fertility status can be corrected based on the crop type being cultivated.

1.5 Legislative Requirements

The authorisation application must comply with the following legislative requirements:

- The Constitution of the Republic of South Africa;
- The Preservation and Development of Agricultural Land Act (PDALA), Act. No 39 of 2024;
- The National Water Act (NWA);
- National Environmental Management Act, (Act 107 of 1998) (NEMA);
- National Environmental Management: Waste Act (Act 59 of 2008); and
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA).

2. METHOD OF ASSESSMENT

2.1 Literature and Database Review

A background study, including a literature review was conducted prior to the commencement of the field investigation to collect the pre-determined soil, land use and land capability data in the vicinity of the investigated study area. Various data sources including but not limited to the Agricultural Geo-referenced Information System (AGIS) and Soil and Terrain (SOTER) as well as the Natural Agricultural Resources Atlas of South Africa (NAR Atlas Manual, 2018) database provided by the Department of Agriculture, Land Reform and Rural Development

(DALRRD) and other sources as listed under references were utilised to fulfil the objectives for the assessment.

2.2 Soil Classification and Sampling

A soil survey and soil classification were conducted in December 2025 at which time the identified soils within the study area were classified into soil forms according to the Soil Classification System: A Natural and Anthropogenic System for South Africa Soil Classification System (2018). The soil survey was restricted to the study area. Soil sampling activities were carried out using a manual hand auger and profile descriptions and soil classification were undertaken according to the Soil Classification Working Group (2018).

2.3 Land Capability Classification

Agricultural potential is directly related to land capability, as measured on a scale of I to VIII (Smith, 2006) and 1 – 15 (DALRRD, 2016 - 2022), as presented in Table 1 below; with classes I to IV classified as arable agricultural land that is well suited for annual cultivated crops, whereas class V - VII soils are grouped as soils suitable for livestock or wildlife (game farm) grazing. Land capability class VIII comprises of soils that are classified as unsuitable for agricultural cultivation and best suited for wildlife or wilderness.

Furthermore, the climate capability is also measured on a scale of C1 to C8 depending on the limitation rating (rainfall/moisture and temperature), as illustrated in Table 2 below. The land capability rating is therefore adjusted accordingly, depending on the prevailing climatic conditions as indicated by the respective climate capability rating.

Table 1: South Africa's agricultural land capability (DALRRD, 2018 - 2022).

DALRRD (2018) Classification	(Smith 2006) Land Capability Class	Land Capability Groups	Limitations
15 - Very High	I	Arable land	No or few limitations
14 – Very High			
13 High – Very high	II		Slight limitations
12 High – Very high			
11 High			
10 Moderate - High	III		Moderate limitations
9 Moderate - High			
8 Moderate	IV		Severe limitations
7 Low - Moderate	V	Grazing land	Water course and land with wetness limitations.
6 Low - Moderate			
5 Low	VI		Limitations preclude cultivation. Suitable for perennial vegetation.
4 Low – Very Low	VII		Very severe limitations. Suitable only for natural vegetation.
3 Low – Very Low			
2. Very Low	VIII	Wildlife	Extremely severe limitations. Not suitable for grazing or afforestation.
1 Very Low			

Table 2: Climate Capability Classification (Scotney et al., 1987).

Climate Capability Class	Mean Annual Rainfall (mm)	Limitation Rating	Description
C1	Greater than 1000mm	None to slight	Local climate is favorable for good yield for a wide range of adapted crops throughout the year.
C2	801 -1000 mm	Slight	Local climate is favorable for good yield for a wide range of adapted crops and a year-round growing season. Moisture stress and lower temperatures increase risk, and decrease yields relative to C1.
C3		Slight to moderate	Slightly restricted growing season due to the occurrence of low temperatures and frost. Good yield potential for a moderate range of adapted crops.
C4	601 -800 mm	Moderate	Moderately restricted growing season due to low temperatures and severe frost. Good yield potential for a moderate range of adapted crops but planting date options are more limited than C3.
C5	401 -600 mm	Moderate to severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may grow at risk of some yield loss.
C6		Severe	Moderately restricted growing season due to low temperatures, frost and/or moisture stress. Limited suitable crops for which frequently experience yield loss.
C7	201 - 400 mm	Severe to very severe	Severely restricted choice of crops due to heat, cold and/or moisture stress.
C8	Less than equal to 200mm	Very severe	Very severely restricted choice of crops due to heat and moisture stress. Suitable crops at high risk of yield loss.

The land potential assessment entails the combination of climatic, slope and soil condition characteristics to determine the agricultural land potential of the investigated area. The classification of agricultural land potential and knowledge of the geographical distribution of agricultural viable land within an area of interest. This is of importance for making an informed decision about land use. Table 3 below presents the land potential classes, whilst Table 4 presents a description thereof, according to Guy and Smith (1998).

Table 3: Table of Land Potential Classes (Guy and Smith, 1998).

Land Capability Class	Climate Capability Class							
	C1	C2	C3	C4	C5	C6	C7	C8
I	L1..	L1	L2	L2	L3	L3	L4	L4
II	L1	L2	L2	L3	L3	L4	L4	L5
III	L2	L2	L3	L3	L4	L4	L5	L6
IV	L2	L3	L3	L4	L4	L5	L5	L6
V	(L3) Wetland	(L3) Wetland	(L4) Wetland	(L4) Wetland	(L5) Wetland	(L5) Wetland	(L6) Wetland	(L6) Wetland
VI	L4	L4	L5	L5	L5	L6	L6	L7
VII	L5	L5	L6	L6	L7	L7	L7	L8
VIII	L6	L6	L7	L7	L8	L8	L8	L8

Table 4: The Land Potential Classes Description (Guy and Smith, 1998).

Land Potential	Description of Land Potential Class
L1	**Very high potential:** No limitations. Appropriate contour protection must be implemented and inspected.
L2	**High potential:** Very infrequent and/or minor limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L3	**Good potential:** Infrequent and/or moderate limitations due to soil, slope, temperatures or rainfall. Appropriate contour protection must be implemented and inspected.
L4	**Moderate potential:** Moderately regular and/or severe to moderate limitations due to soil, slope, temperature or rainfall. Appropriate permission is required before ploughing virgin land.
L5	**Restricted potential:** Regular and/or moderate to severe limitations due to soil, slope, temperature or rainfall.
L6	**Very restricted potential:** Regular and/or severe limitations due to soil, slope, temperature or rainfall. Non-arable.
L7	**Low potential:** Severe limitations due to soil, slope, temperature or rainfall. Non-arable.
L8	**Very low potential:** Very severe limitations due to soil, slope, temperature or rainfall. Non-arable.

2.4 Consideration of DEA Screening Tool

The Agricultural Agro-Ecosystem Assessment Protocol provides the criteria for the assessment and reporting of impacts on agricultural resources for activities requiring environmental authorisation. The assessment requirements of this protocol are associated with a level of environmental sensitivity determined by the national web-based environmental screening tool which for agricultural resources is based on the most recent land capability evaluation values as provided by the Department of Forestry, Fisheries and the Environment (DFFE). The national web-based environmental screening tool can be accessed at: https://screening.environment.gov.za/screeningtool

The main purpose of the Agricultural Agro-Ecosystem Assessment is to ensure that the sensitivity of the site to the change in land use is sufficiently considered. The information provided in this report aims to enable the Competent Authority to come to a sound conclusion on the impact the development may have on the food production potential of the site.

To achieve this objective, site sensitivity verification must be conducted, of which the results must meet the following objectives:

- It must confirm or dispute the current land use and the environmental sensitivity as indicated by the National Environmental Screening Tool;
- It must contain proof (e.g., photographs) of the current land use and environmental sensitivity pertaining to the study area;
- All data and conclusions are submitted together with the main report; and
- It must indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.

This report is thus compiled in a manner that meets the minimum report content requirements for impacts on agricultural resources.

3. DESKTOP ASSESSMENT RESULTS

This section aims to provide some background information in terms of the climatic conditions as well as the soils associated with the study area. Table 5 below presents the summary results from the desktop exercise.

Table 5: Desktop based soil background information sourced from various databases.

Parameters	Description
Mean Annual Rainfall (DALRRD, 2018 - 2022)	The mean annual rainfall (MAR) for the entire study area ranges from 500 – 600 mm per annum. This rainfall is deemed adequate for a wide variety of crops (maize, wheat, sunflower, potatoes, etc.) for successful dryland farming.
Mean Annual Evaporation (DALRRD, 2018 - 2022)	The entire study area is characterised by a mean annual evaporation ranging between 2001 – 2200 mm per annum. Therefore, crops under rainfed conditions should be cultivated with caution to realise commercially viable yields as a result of potential moisture stress.
Geology (DALRRD, 2018 - 2022)	The geological formations associated with the entire study area is the ECCA group. The ECCA group results in soils that may be shallow over lithic/rock material, thus limiting root depth.
Terrain Type (DALRRD, 2018 - 2022)	Most of the study area is dominated by level plains with some relief while a small portion is characterised by level plains terrain types. This means the terrain is suitable for agricultural cultivation activities (Figure 3).
Soil and Terrain (SOTER, 2013) soil classification	The Soil and Terrain (SOTER) database indicates that most of the study area is dominated by Ferric Luvisols while a small portion is comprised of Calcic Luvisols. Luvisols vary from shallow to relatively deep, either consist of a calcium carbonate layer or accumulation of clay in the subsoil (argic horizon) which forms as a result of the downward movement of fine clay particles from the upper horizons. Refer to Figure 4.
Land Type Data (DALRRD, 2018 - 2022)	Most of the study area is dominated by Ae40 while a small portion is characterised by the Dc9 land type class (Figure 5). In Bb land types, dystrophic yellow brown apedal and grey soils are widespread while the Fa land type accommodates soils lithocutanic horizons characterised by rock weathering and orthic topsoil horizons.
Desktop land capability (DALRRD, 2018 - 2022)	Most of the study area is dominated by moderate and moderate to high (08. Moderate) – (09. Moderate – High) land capability rating, while the remaining patches are characterised by (Low – Moderate) with a rating score of 06 – 07. The study area can be classified as having a good land capability to support agricultural cultivation of crops. This information will be verified during site assessment (Figure 6).
Land Cover & Land Use (DALRRD, 2021)	According to the Natural Agricultural Resources Atlas Manual (NAR Atlas Manual, 2021) database, the study area comprises of cultivated fields (rainfed annual crops/planted pastures) occupying approximately 523 hectares (ha) of the entire study area. This information will be verified during the site assessment. Refer to Figure 7.
Grazing Capacity (DALRRD, 2018 - 2022)	Based on the Natural Agricultural Resources Atlas Manual (NAR Atlas Manual, 2018) database, the study area is characterised by approximately 7 hectare per large stock unit (ha/LSU). This grazing capacity potential is considered sufficient to support commercialised livestock farming with veld management practices in place. Refer to Figure 8.

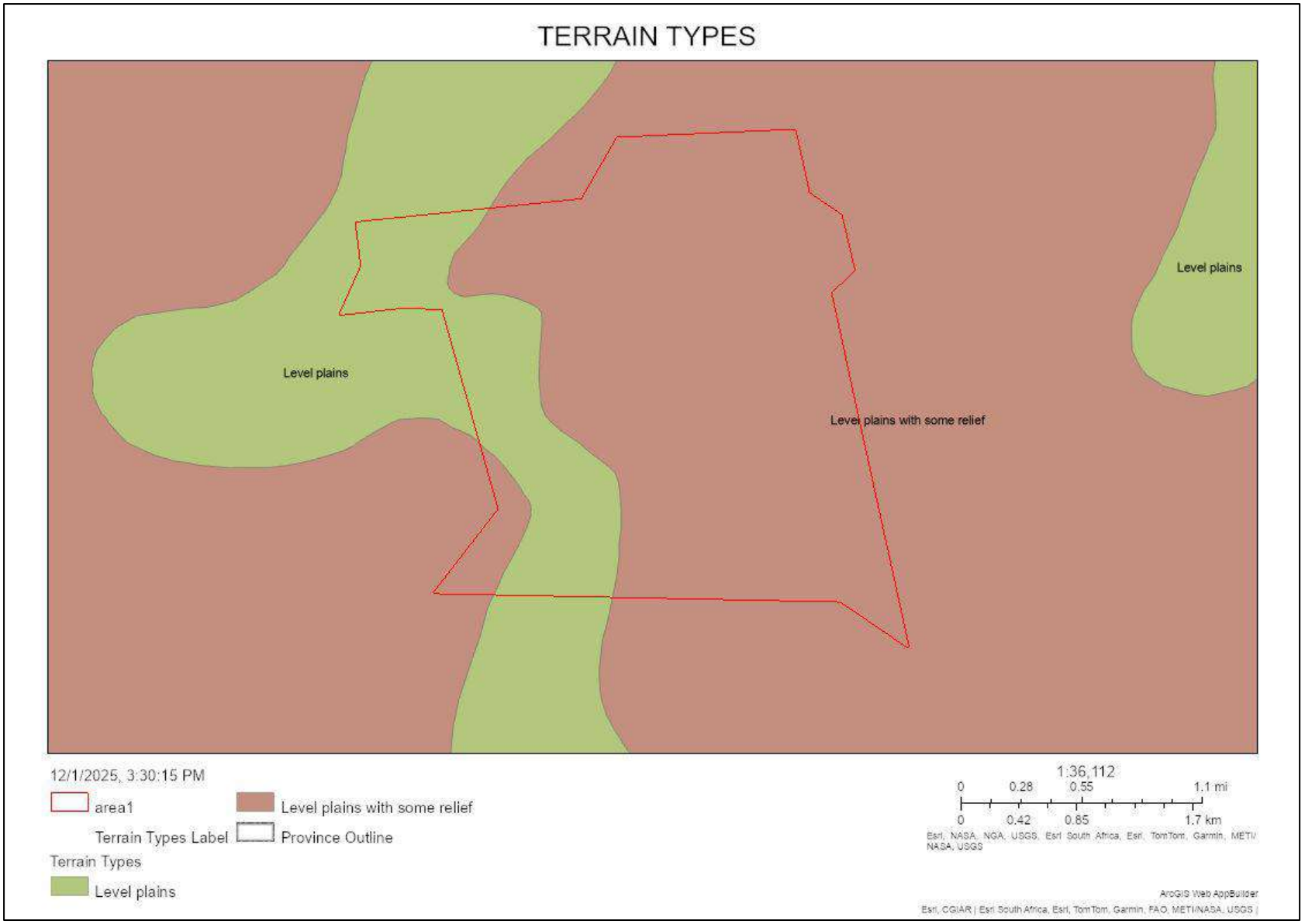


Figure 3: Terrain types characterising the study area.

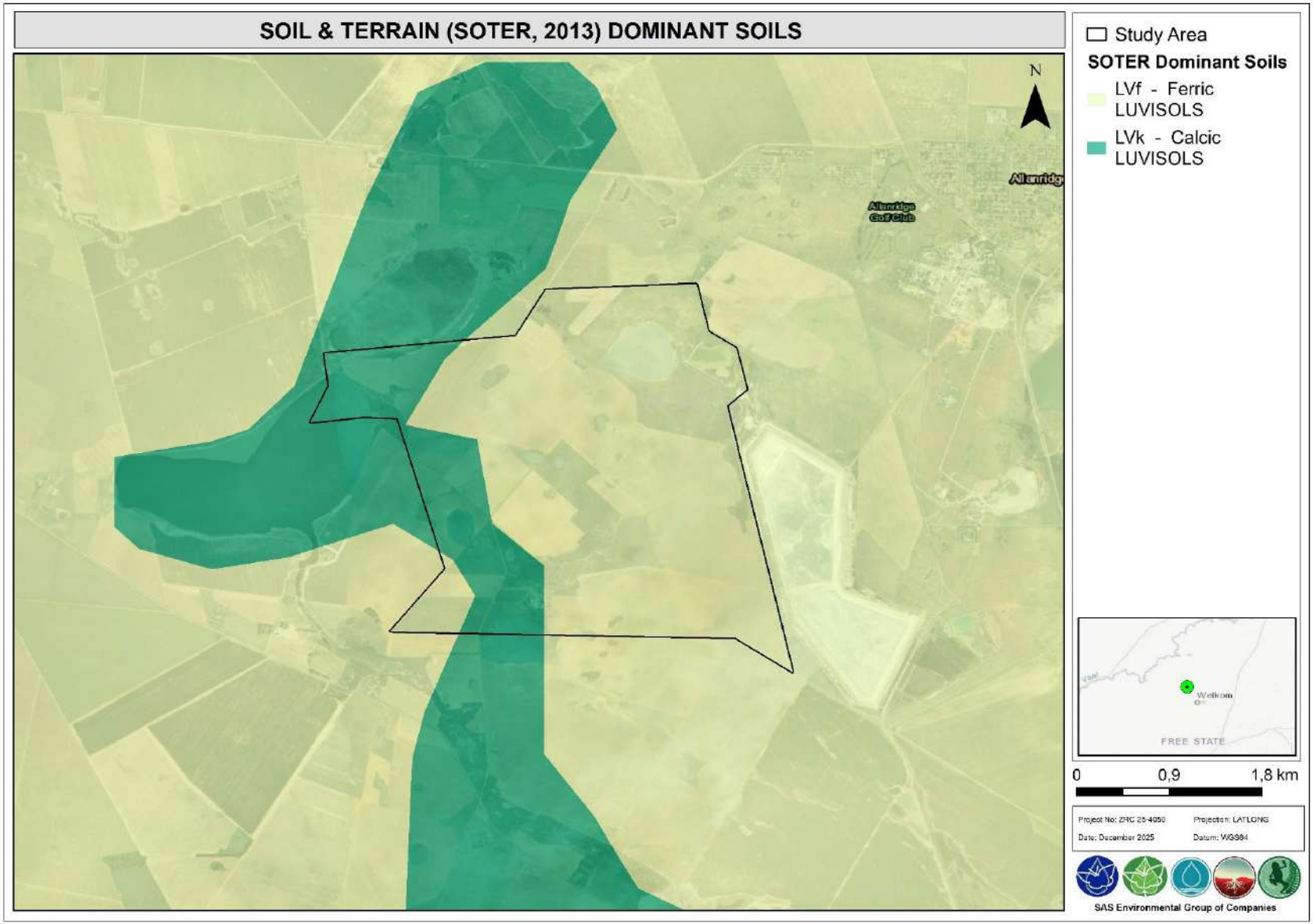


Figure 4: Soil and Terrain (SOTER, 2013) associated with the study area.

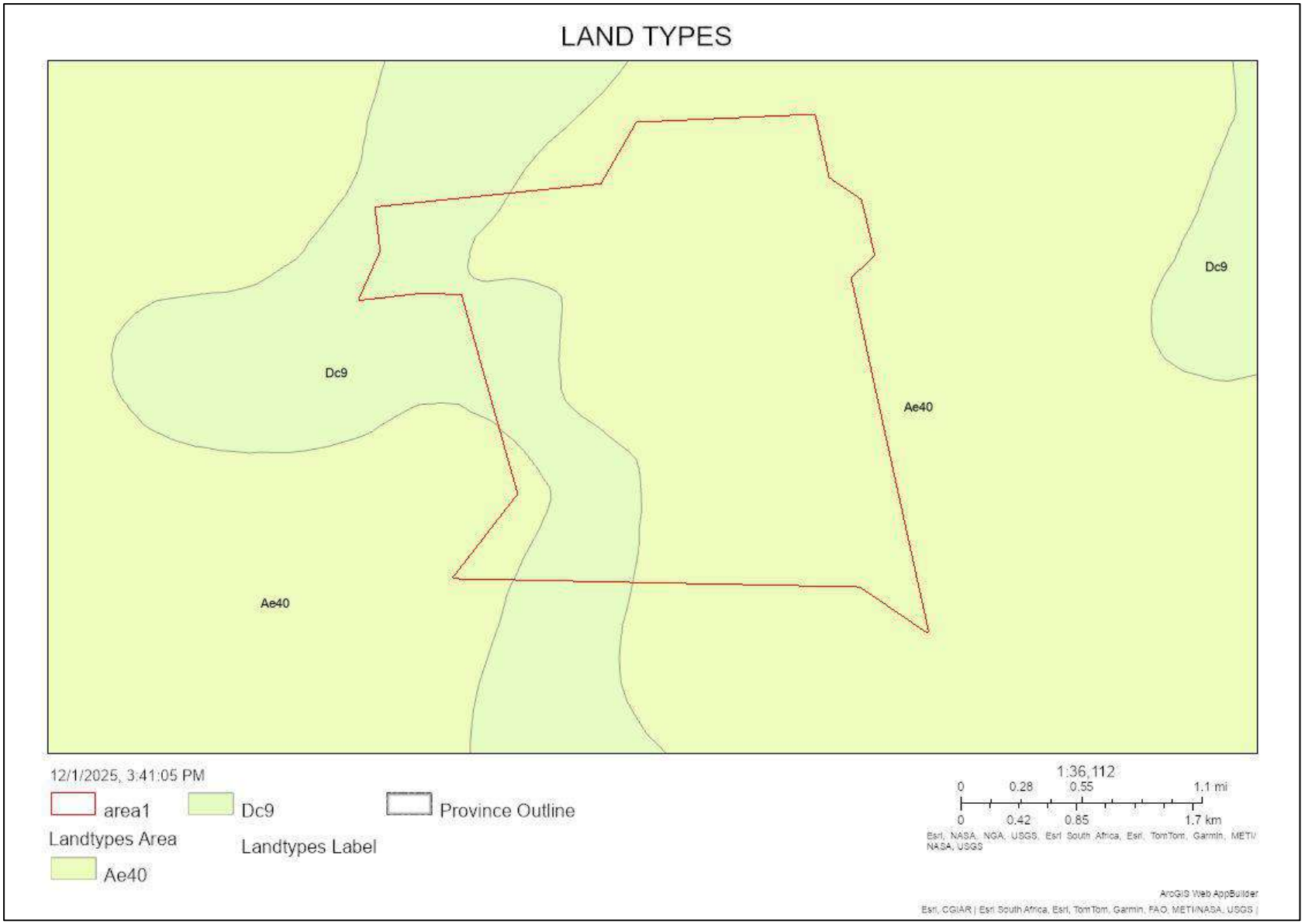


Figure 5: Land types associated with the study area.

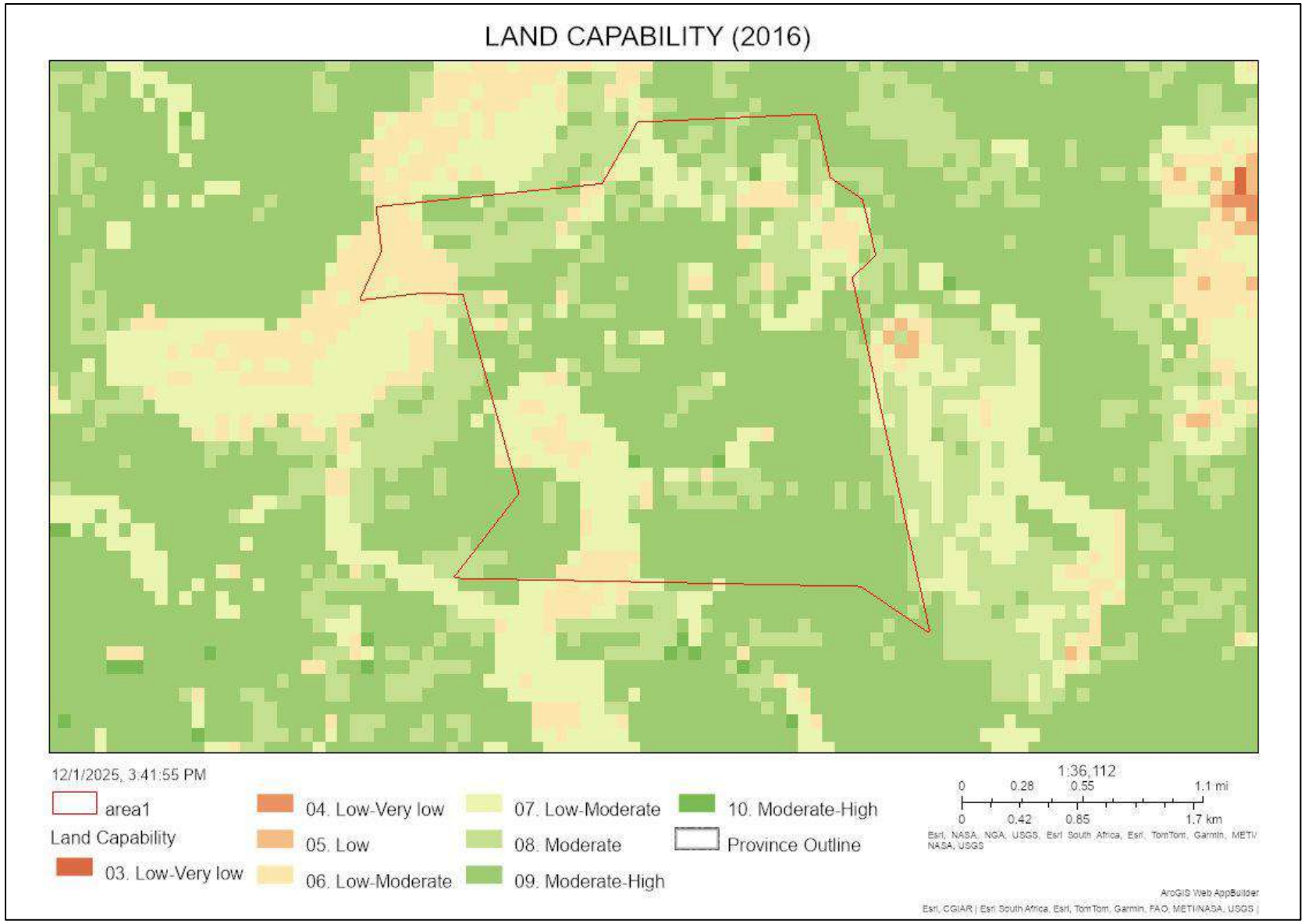


Figure 6: Land capability rating associated with the study area.

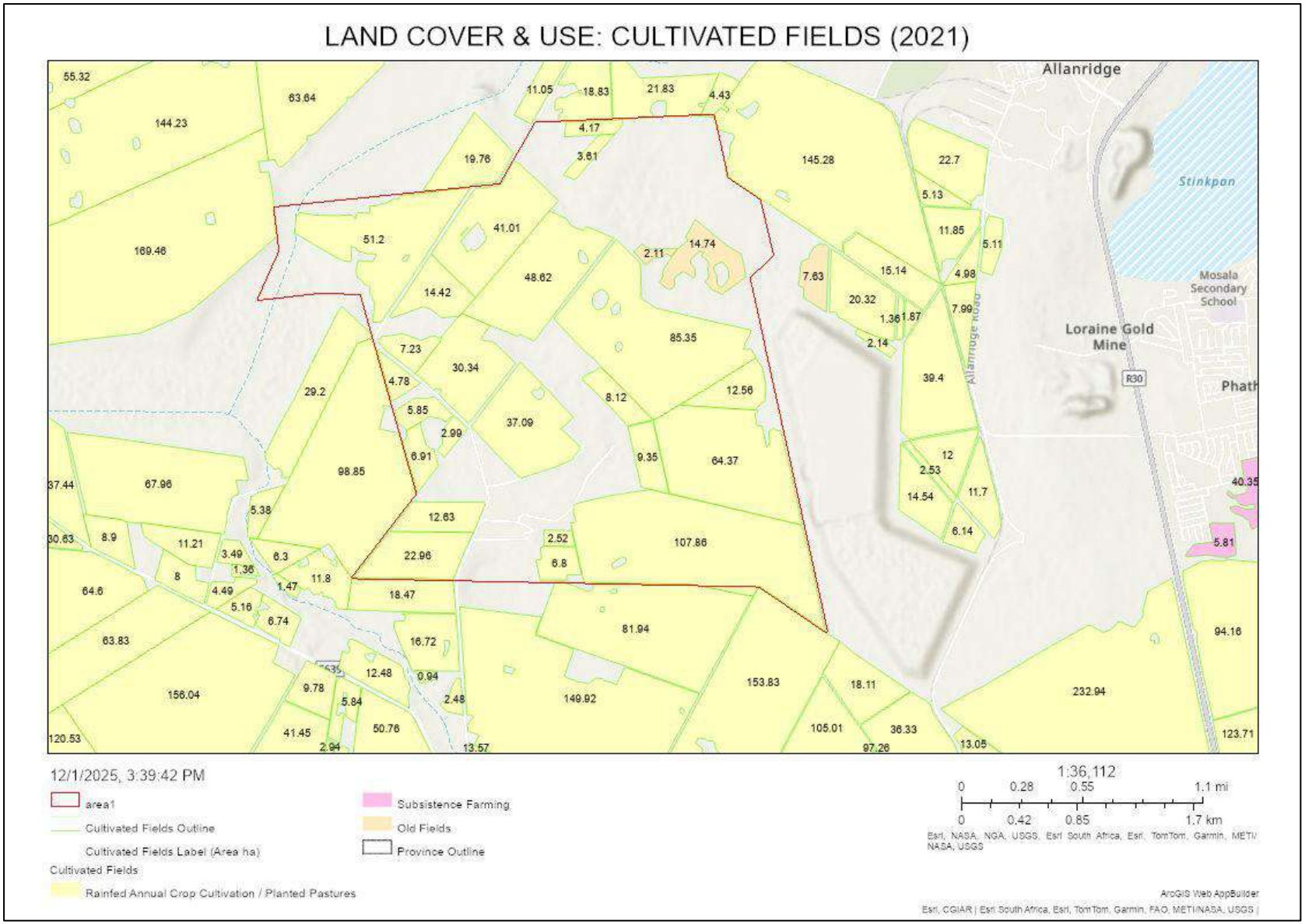


Figure 7: Land cover and use (Cultivated Fields) associated with the study area.

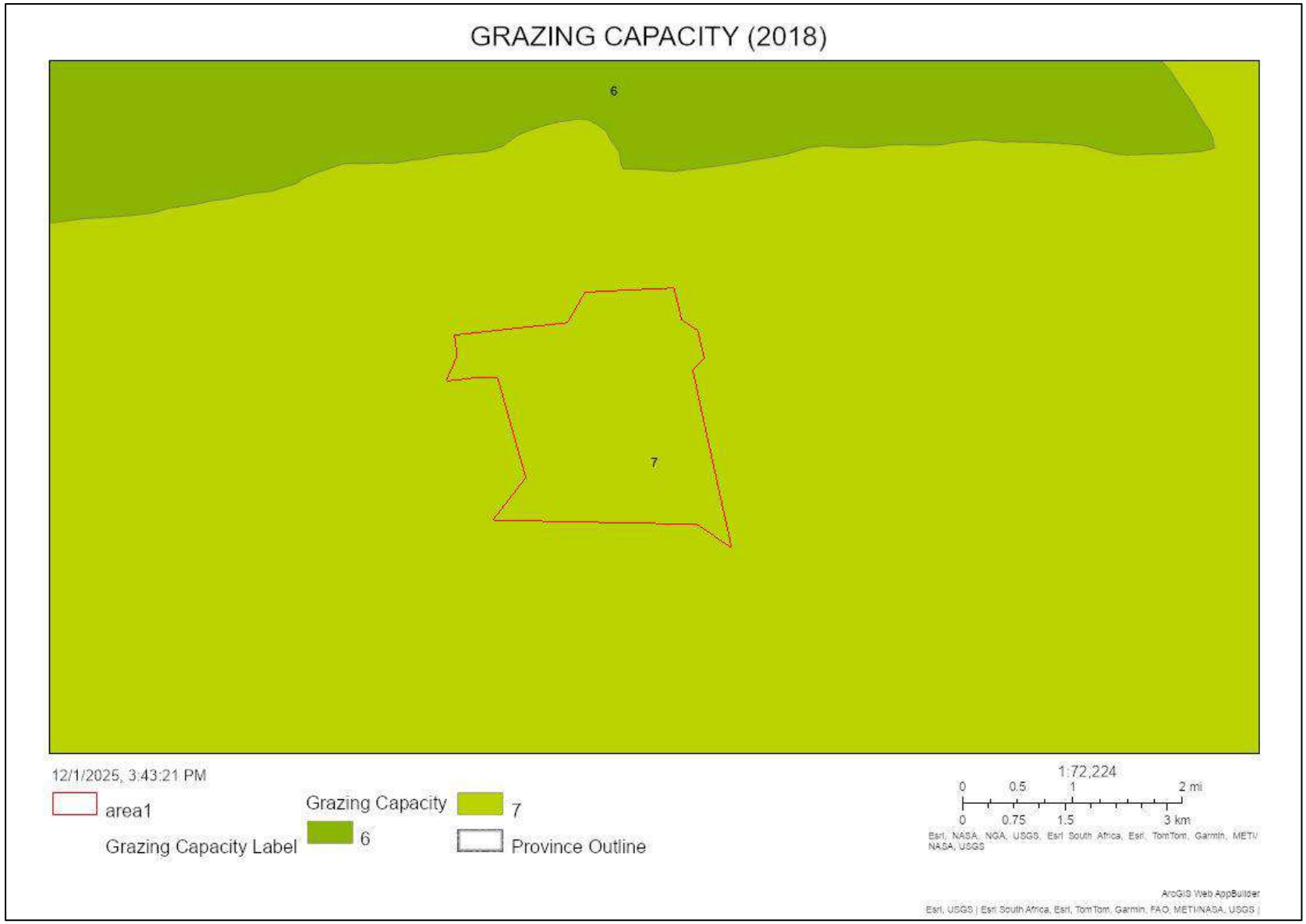


Figure 8: Grazing capacity potential associated with the study area.

4. FIELD ASSESSMENT RESULTS

4.1 Current Land Use

Based on site assessment observations, the study area is primarily comprised of commercial agricultural (dryland) cultivation of crops such as maize and sunflower, open grassland often utilised for livestock (cattle and sheep) grazing, as well as several watercourses distributed across the study area.

The current land uses identified within the study area are illustrated in Figures 9 and 10 below.

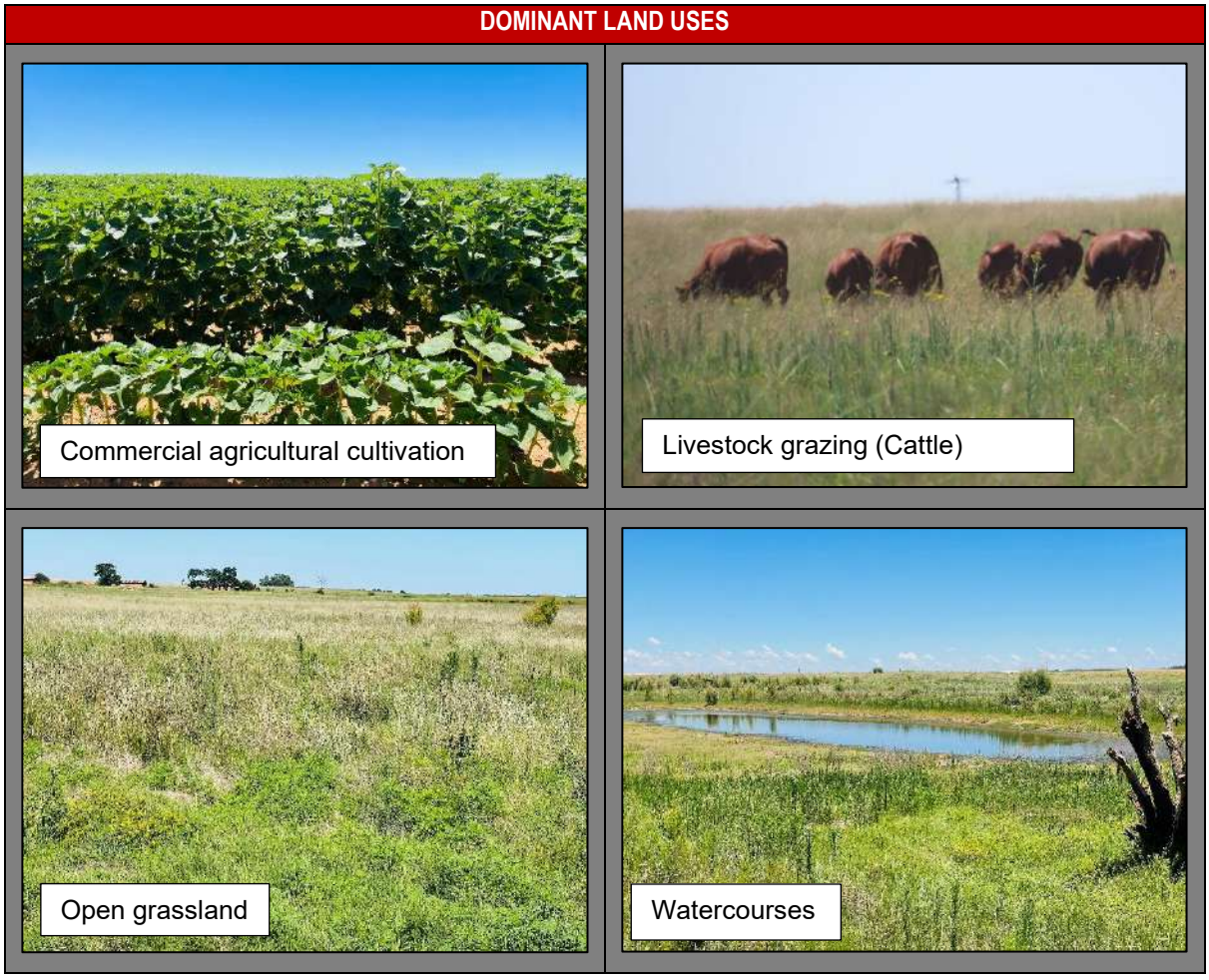


Figure 9: Photographs depicting the current land uses within the study area.

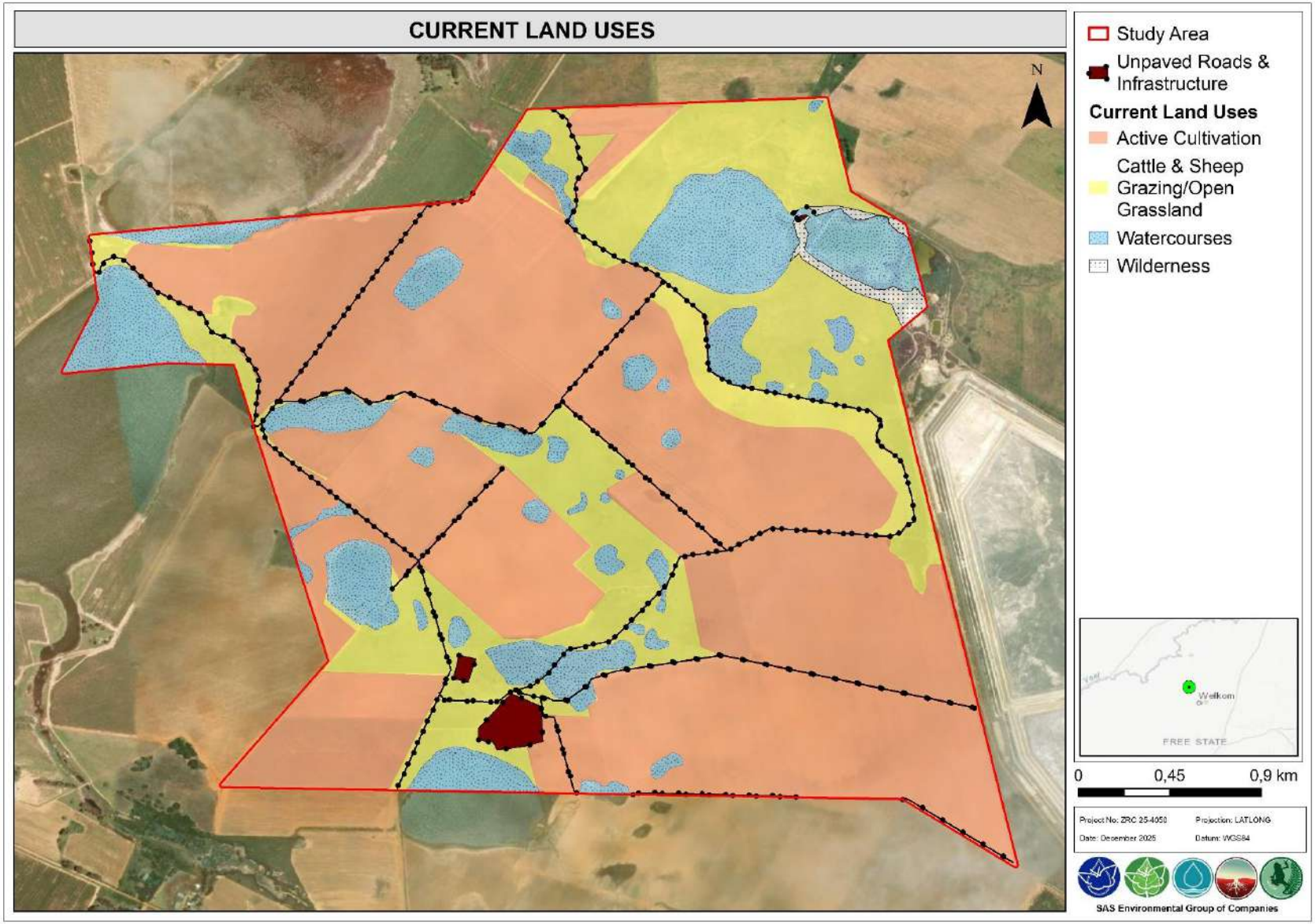


Figure 10: Current land uses identified within the study area during the time of site assessment.

4.2 Dominant Soil Forms

The identified soil forms within the study area largely comprise dystrophic red and/or yellow brown apedal, infrastructural areas grouped as disturbed soils, shallow lithic soils, as well as soils susceptible to waterlogging conditions associated with the watercourses. These soils are further discussed below.

Arable Land

The arable soils in the study area were classified as Clovelly, Ermelo/Hutton, and Clovelly/Hutton. These soils typically exhibit a dystrophic red and/or yellow brown apedal textural class. These are oxidic soils which are highly weathered and are dominated by iron (hematite/goethite) oxides. The soils are deep, well aerated with good porosity to support agricultural crops. Although these soils are not inherently fertile, oxidic soils are suitable for agricultural cultivation of crops with relatively few physical limitations.

Grazing Land (Watercourses)

The wet based soils were identified as Dundee (including surface water) and Katspruit. The topsoil directly overlies an alluvial/gleyed horizon which is characterised by prolonged periods of saturation with uniform grey colours which is an indication of waterlogging conditions. The wetness limitation associated with these soils means anaerobic conditions develop in the root-zone (30 cm) which is not suitable for cultivated crops. Consequently, these soils are classified as being of low to moderate agricultural value. However, these soils can be considered for marginal livestock grazing.

Grazing Land

The study area also comprised of shallow and lithic soil associated with the Glenrosa formation. This soil is associated with poor physical properties for plant root system penetration and water infiltration due to the shallow nature of the soil and/or limiting impeding layer of the underlying parent material. Based on the degree of weathering some lithic material of varying sizes can be mixed closely with soil material. Glenrosa soil form is usually avoided for intensive use and thus left for grazing, forestry, and wildlife land uses.

Disturbed Soils

The Witbank (Disturbed) soil form is related to soil which has been subjected to physical disturbances. In this context, Witbank soil includes historical mining and related activities as well as surface infrastructure which buried the soil material such that the diagnostic horizons could not be identified. As a result, this soil is not ideal for agricultural cultivation.

The spatial distribution of all identified soil forms within the study area is presented in a soil map in Figure 11. Table 6 below presents the dominant soil forms and their respective diagnostic horizon sequence.

Table 6: Dominant soil forms as identified within the study area and their respective diagnostic horizon sequence.

Soil Form	Code	Diagnostic Horizon Sequence
Ermelo/Hutton	Er/Hu	Orthic/ Yellow Brown/ Red Apedal (thick)
Clovelly/Ermelo	Cv/Er	Orthic/ Yellow Brown (thick)/ Lithic/
Clovelly	Cv	Orthic/ Yellow Brown/ Lithic/
Watercourses (Dundee – including surface water)	Du	Orthic A/ Alluvial (thick)
Katspruit	Ka	Orthic A Gley
Glenrosa	Gs	Orthic A/ Lithic
Witbank	Wb	Anthrosols

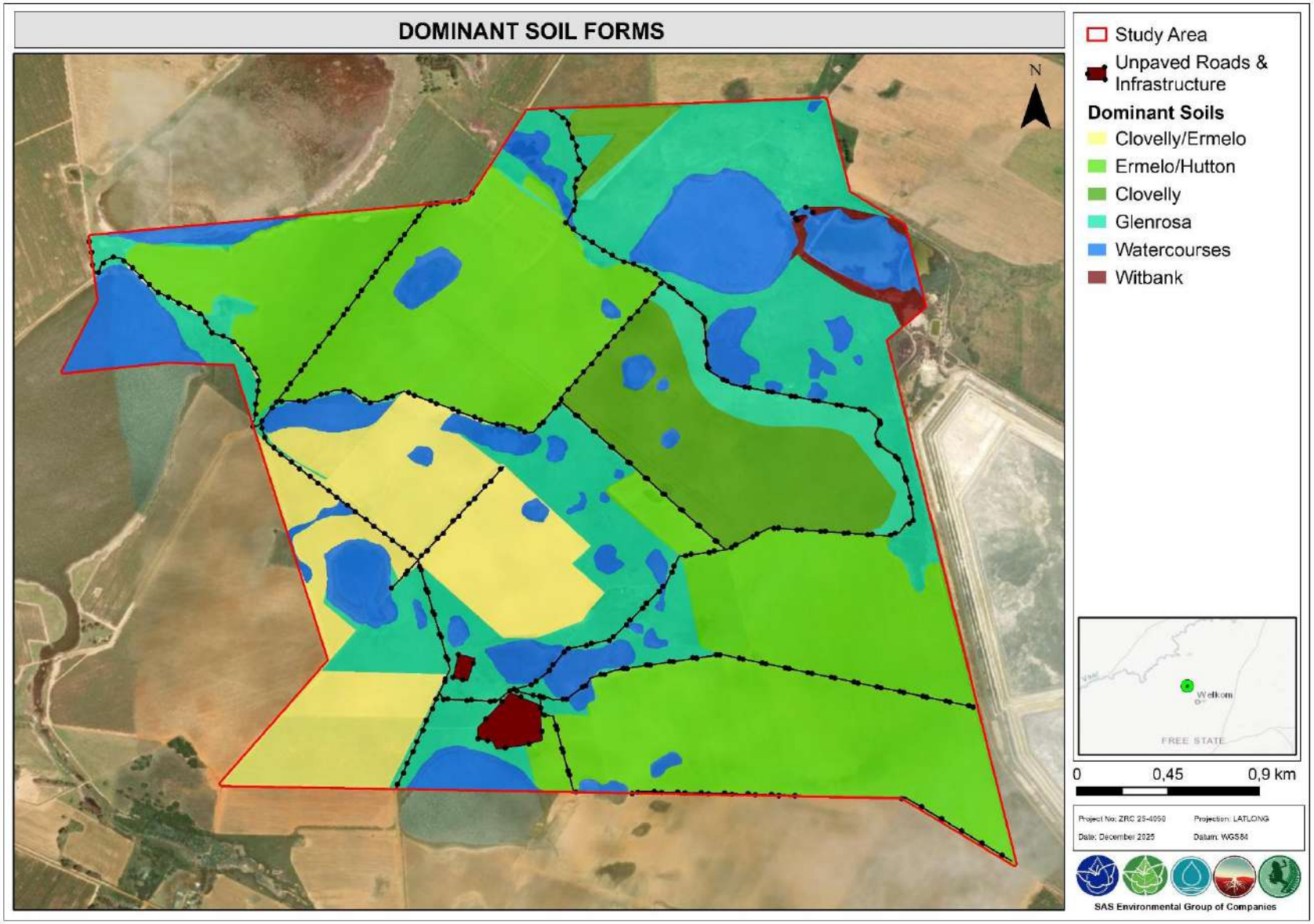


Figure 11: Dominant soil forms identified within the study area.

4.3 Land Capability Classification

The study area falls under Climate Capability Class 5 which has a moderately restricted growing season due to low temperatures, frost and/or moisture stress. Suitable crops may grown at risk of some yield loss.

The identified land capability limitations for the identified soils are discussed in comprehensive "dashboard style" summary tables presented from Tables **8, 9, 10,** and **11** below. The dashboard report's aim is to present all the pertinent information in a concise and visually engaging fashion.

Table 7: Identified soil forms within the study area and their respective land capability classification.

Soil Forms	Average Soil Depth (cm)	DALRRD (2018) Classification	Land Potential	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	>120	11. High	Good – L3	361.9	36.8
Clovelly/Ermelo				134.9	13.7
Clovelly	100			106.0	10.7
Watercourses (Dundee – including surface water)	40	6. Low - Moderate	Wetland – L5	149.3	15.1
Katspruit	55				
Glenrosa	35	5. Low	Restricted – L5	224.4	22.8
Witbank	N/A	2. Very Low	Very Low – L8	6.3	0.6
Total Enclosed Area				**983.0**	**100**

Table 8: Summary discussion of the [11. High) land capability class currently under active agricultural cultivation of crops.

<table>
<tr><th colspan="5">Land Capability: 11. High (Arable - Class II)</th></tr>
<tr><td colspan="5">View of the identified class II soil forms currently cultivated under rainfed farming
</td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td colspan="2">Relatively flat terrain with less than 0.5% slope.</td><td>Photograph notes</td><td>View of the identified red and/or yellow brown apedal horizons associated with the idenitfied soil forms.</td></tr>
<tr><td>Soil Form(s)</td><td colspan="2">Clovelly, Ermelo/Hutton, and Clovelly/Ermelo</td><td>Area Extent (ha)</td><td>602.9 ha (61.3%)</td></tr>
<tr><td>Diagnostic Horizon Sequence</td><td colspan="2">Orthic A/ Red/ Yellow Brown Apedal B/ (thick)/ Lithic</td><td colspan="2" rowspan="3">Land Capability

The (11. High) land capability (Class II) is suitable for arable agricultural land use with relatively few to no restrictions. The identified soil forms are of good potential (L3) particularly when they occur under Climate Capability Class (C5) which is characterised by moderately restricted growing season due to low temperatures and severe frost. Therefore, these soils are considered to make a significant contribution to agricultural productivity on a regional and provincial scale.</td></tr>
<tr><td>Land Potential</td><td colspan="2">Good Potential – L3: Infrequent and/or moderate limitations due to soil, slope, temperatures, or rainfall. Appropriate contour protection must be implemented and inspected.</td></tr>
<tr><td>Physical Limitations</td><td colspan="2">No significant constraints. These soils are relatively deep (approximately >120 cm) which is considered sufficient to allow plants' roots to extract moisture to sustain growth and development.</td></tr>
<tr><td>Overall impact significance prior to mitigation</td><td>M</td><td rowspan="2">The overall impact on land capability is anticipated to be medium (M) without mitigation due to these soils being currently under dryalnd cultivation and contributing significantly towards provincial food production. However, if better managed, the overall anticipated impacts can be reduced to a very low level (VL) with effective application of soil conservation mitigation measures.</td><td colspan="2" rowspan="2">Consideration of Integrated Environmental Management and Sustainable Development principles:

These are prime agricultural soils and are highly suitable for arable crops and can yield good profit returns under prudent crop selection and soil conservation management practices. However, with mitigatory measures such as avoidance of infrastructure placement on cultovated farming plots and minimisation of impact on arable soils, the proposed development and related activities remain viable. The co-existence of both must aim to ensure preservation of soil resources while ensuring sustainable development principles without compromising food safety and security as advocated for by CARA and PDALA acts.</td></tr>
<tr><td>Overall impact significance post mitigation</td><td>VL</td></tr>
</table>

Table 9: Summary discussion of the [6. Low – Moderate] – (Watercourses)] land capability class associated with watercourses.

<table>
<tr><th colspan="5">Land Capability: 6. Low - Moderate (Watercourse - Class V)</th></tr>
<tr><td colspan="5">View of the identified class V soil forms within the study area
</td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td colspan="2">Relatively flat landscapes of < 0.5% slope gradient.</td><td>Photograph notes</td><td>View of the identified wet-based soils characterised by watercourses within the study area.</td></tr>
<tr><td>Soil Form(s)</td><td colspan="2">Dundee (including surface water), and Katspruit</td><td>Area Extent</td><td>149.3 ha (15.1%)</td></tr>
<tr><td>Physical Limitations</td><td colspan="2">These soils are not ideal for cultivation due to their occurrence within watercourses. Furthermore, the susceptibility to waterlogging conditions disqualifies these soils from both subsistence and commercial agriculture.</td><td colspan="2" rowspan="2">Land Capability
These soils were classified as (6. Low – Moderate: Class V – Wetland/Watercourse) land capability due to land use limitations related to their occurrence within a watercourse. These soils are not considered to contribute significantly to local, provincial and/or national agricultural productivity.</td></tr>
<tr><td>Land Potential</td><td colspan="2">Watercourse/Wetland - L4: Watercourse and land with wetness limitations.</td></tr>
<tr><td>Overall impact significance prior to mitigation</td><td>L</td><td rowspan="2">The overall impact of the proposed development and related activities on land capability and land potential is anticipated to be low (L) prior to mitigation and very low (VL) with mitigation measures in place. Although these are not considered prime agricultural soils, development must be cognisant of these areas and mitigate sufficiently to prevent and/or avoid contamination and sedimentation of these watercourses.</td><td colspan="2" rowspan="2">Consideration of Integrated Environmental Management and Sustainable Development Principles:
These soils are not considered prime agricultural production soils due to the limitations in terms of the type of plants (hydrophytes) that can be grown. The cultivation of common crops is not feasible in these areas due to waterlogging conditions, anaerobic conditions in the root zone, as well as nutrient eluviation; thus, rendering the soils most suitable for livestock grazing under intensive management practices. The development has the potential to have an impact on the water quality of the study area. Thus, monitoring and protection of these watercourses under the National Water Act (36 of 1998) is deemed essential.</td></tr>
<tr><td>Overall impact significance post to mitigation</td><td>VL</td></tr>
</table>

Table 10: Summary discussion of the [5. Low] grazing land capability class associated with the identified soil forms.

<table>
<tr><th colspan="5">Land Capability: 5. Low (Grazing - Class VI)</th></tr>
<tr><td colspan="5">View of the identified class VI soil forms within the study area
</td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td colspan="2">Relatively flat to gently sloping landscape of < 1.5% slope gradient.</td><td>Photograph notes</td><td>View of the morphology of lithic and shallow soils as identified within the study area.</td></tr>
<tr><td>Soil Form(s)</td><td colspan="2">Glenrosa</td><td>Areal Extent</td><td>224.4 ha (22.8%)</td></tr>
<tr><td>Physical Limitations</td><td colspan="2">Shallow effective rooting depth is the primary limitation of the land capability of the Glenrosa soil form, which is due to the occurrence of an impermeable lithic material at a relatively shallow depth (<35 cm) and/or exposed hard rock surfaces which hinders penetration of plant roots.</td><td colspan="2" rowspan="2">Land Capability
The identified soils are of (5. Low: (Class VI) poor land capability and are not suitable for arable agricultural land use. These soils are, at best, suitable for natural pastures and light grazing. Therefore, these soils make a limited contribution towards local and regional scale.</td></tr>
<tr><td>Land Potential</td><td colspan="2">Restricted Potential – L5: Regular and/or moderate to severe limitations due to soil, slope, temperature or rainfall.</td></tr>
<tr><td>Overall impact significance prior to mitigation</td><td>M</td><td rowspan="2">The overall impact of the proposed development and related activities is anticipated to be medium (M) without mitigation and low (L) with mitigation measures in place. This is due to the inherently poor land capability of the identified soil forms for arable agricultural cultivation of crops.</td><td colspan="2" rowspan="2">Consideration of Integrated Environmental Management and Sustainable Development Principles:
The identified soil forms are, at best, suited for grazing and/or wilderness practices. These soils are generally not considered of significant agricultural productivity as any agricultural cultivation will require extensive management practices and therefore limiting the choice of crops. Future developments are viable on these soils due to their low agricultural potential.</td></tr>
<tr><td>Overall impact significance post to mitigation</td><td>L</td></tr>
</table>

Table 11: Summary discussion of the [2. Very Low] wilderness land capability class associated with the identified soils.

<table>
<tr><th colspan="5">Land Capability: 2. Very Low: (Wilderness - Class VIII)]</th></tr>
<tr><td colspan="5">View of the identified class VIII soil forms within the study area
</td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td colspan="2">Witbank; highly disturbed areas.</td><td>Photograph notes</td><td>View of the morphology of the anthropogenically disturbed soils.</td></tr>
<tr><td>Soil Form(s)</td><td colspan="2">Witbank - (Transported Technosols)</td><td>Area Extent</td><td>6.3 ha (0.6%)</td></tr>
<tr><td>Physical Limitations</td><td colspan="2">Comprises of significantly disturbed areas due to anthropogenic activities (i.e. farmhouses and related infrastructure) to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils are characterised by various limitations, primarily the absence of soil horizon as a growth medium.</td><td colspan="2" rowspan="2">Land Capability
The identified soils have a (2. Very Low) very poor (Class VIII) wilderness land capability due to the significant disturbance that has occurred because of infrastructural developments and related activities. This has led to the long-term alteration of the soil physical properties such that these soils are no longer viable for agriculture. These soils are not considered to make any contribution towards agricultural productivity even on a local scale.</td></tr>
<tr><td>Land Potential</td><td colspan="2">Very Low Potential – L8: Severe limitations due to soil, slope, temperature or rainfall. Non-arable.</td></tr>
<tr><td>Overall impact significance</td><td>VL</td><td>The overall impact on land capability of these soils is anticipated to be very low (VL) due to their already existing poor land capability because of existing infrastructural developments.</td><td colspan="2">Consideration of Integrated Environmental Management and Sustainable Development Principles:
The current state of these soils requires significant rehabilitation already. The development is not anticipated to cause any loss of agricultural resources since these soils have been disturbed and therefore are not ideal for cultivation.</td></tr>
</table>

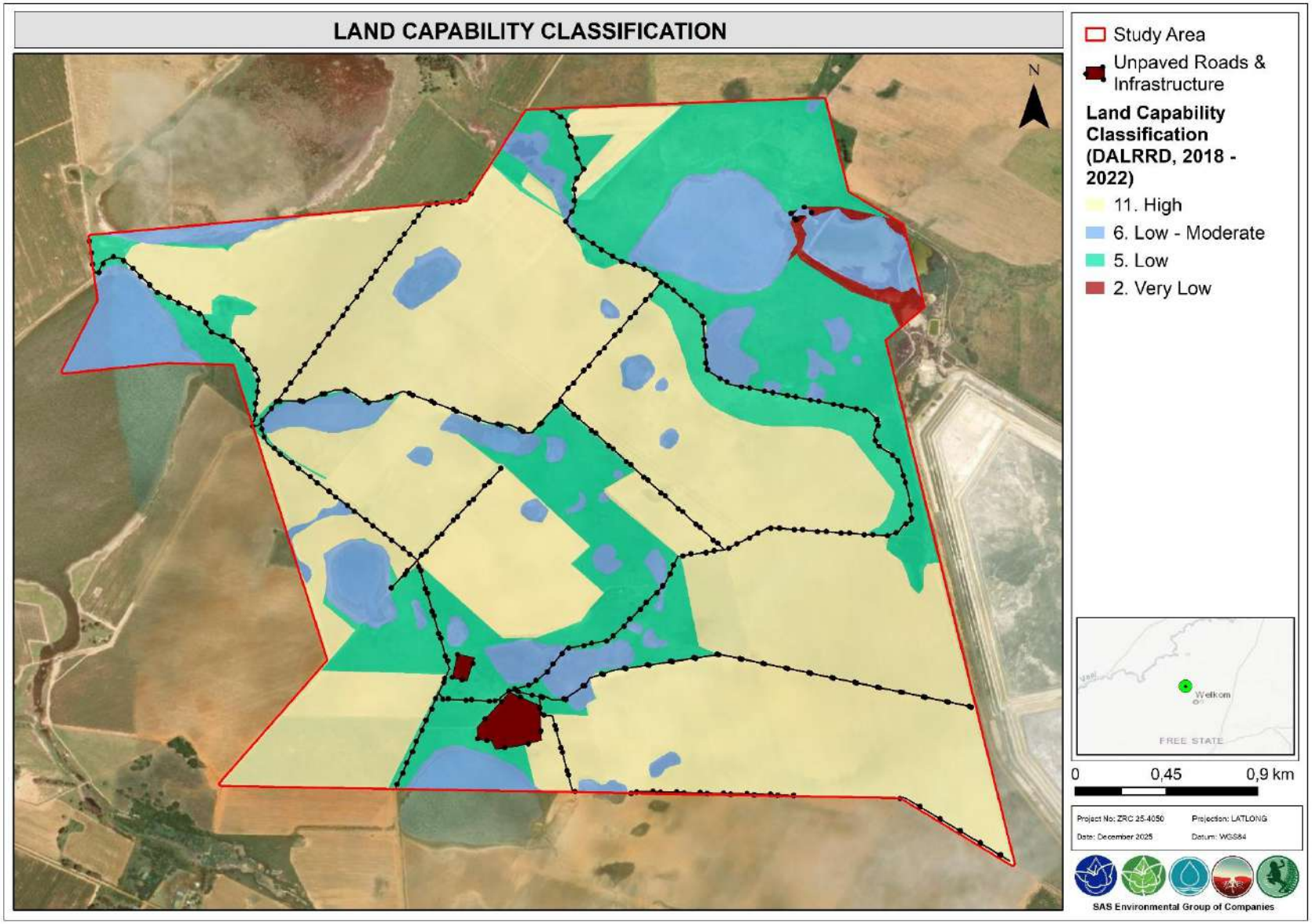


Figure 12: Land capability of soils identified within the study area.

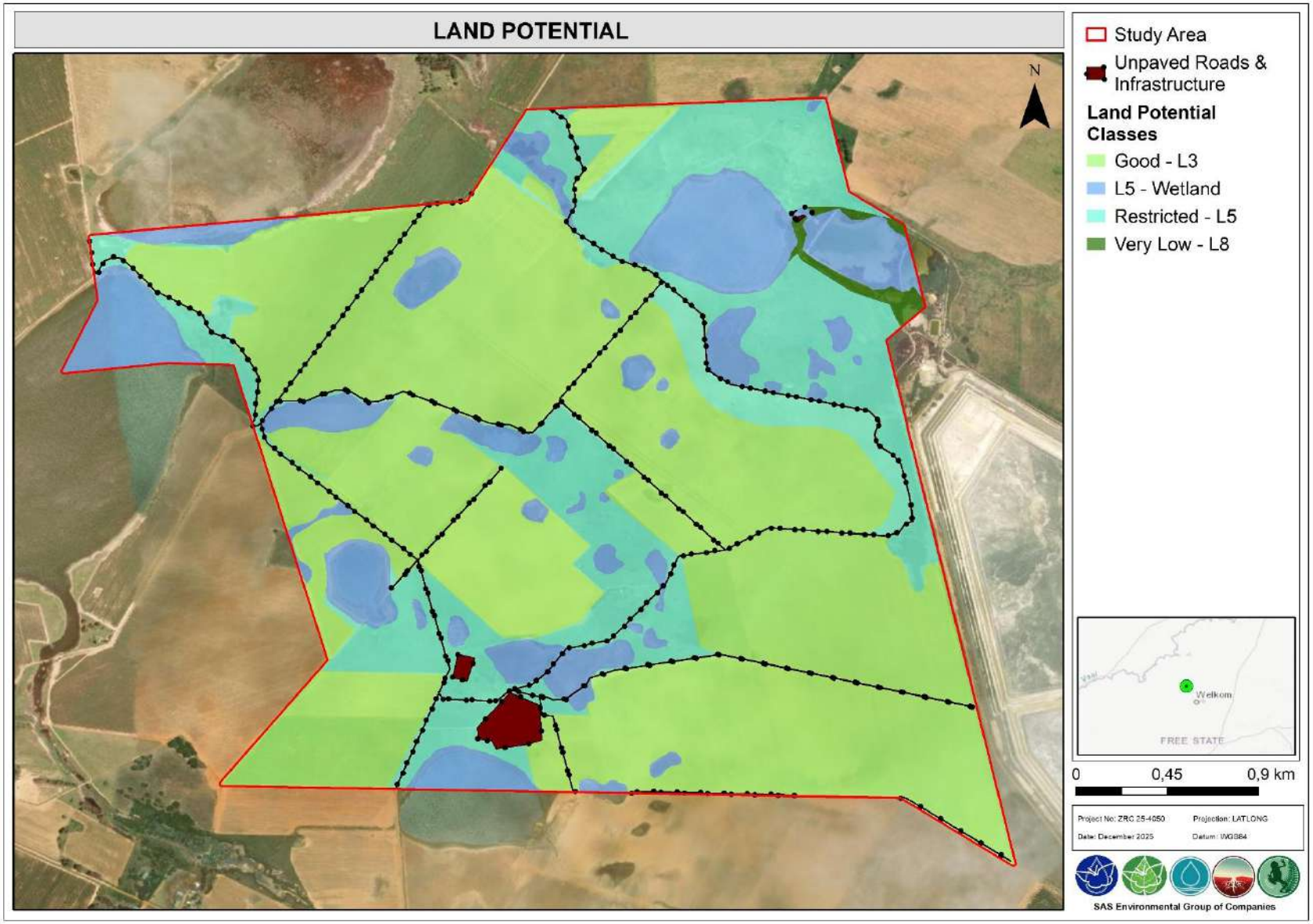


Figure 13: Land potential classes of the soil forms identified within the study area.

5. AGRICULTURAL SENSITIVITY

5.1 Agricultural Sensitivity & Screening Tool Verification

The national web-based screening tool depicts the study area as having a very high agricultural sensitivity (Figure 14). Given that the site encompasses active commercial (rainfed) cultivation of crops and comprises of land capabilities varying from very high to low, the very high agricultural sensitivity allocated to the study area is valid and confirmed. However, it is the opinion of the study team that the risk of impact is significantly low given that no surface infrastructure is proposed within the project footprint.

Upon site assessment and verification, the agricultural sensitivity classes with varying degrees of impact depending on the type of land use and/or soil classification were determined as follows:

- Actively cultivated areas on high land capability soil [11. High (Class II)] – Rated as **very high sensitivity** due to ongoing and active dryland commercial farming.
- Wet-based soil [6. Low - Moderate (Class V)] – Rated as **low sensitivity** due to wetness limitation.
- Grazing land [5. Low (Class VI)] – Rated as **low sensitivity** due to the dominance of lithic material as well as exposed hard rock surfaces in some instances.
- Disturbed footprint areas [2. Very Low (Class VIII)] – Rated as **very low sensitivity** due to significant transformation and modification (residential and infrastructural developments) to the land which makes it unsuitable for agricultural activities.

Table 12 below summarizes the identified soils, and their respective field verified agricultural sensitivity while Figure 15 depicts field verified agricultural sensitivity of the study area.

Table 12: Field verified agricultural sensitivity of the identified soils within the study area.

Soil Forms		DALRRD (2018) Classification	Field Verified Agricultural Sensitivity	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	Actively cultivated	11. High	Very High	603.0	61.3
Clovelly/Ermelo					
Clovelly					
Watercourses (Dundee – including surface water)		6. Low - Moderate	Low	149.3	15.1
Katspruit					
Glenrosa		5. Low	Medium	224.4	22.8
Witbank		2. Very Low	Very Low	6.3	0.6
Total Enclosed Area				**983.0**	**100.0**

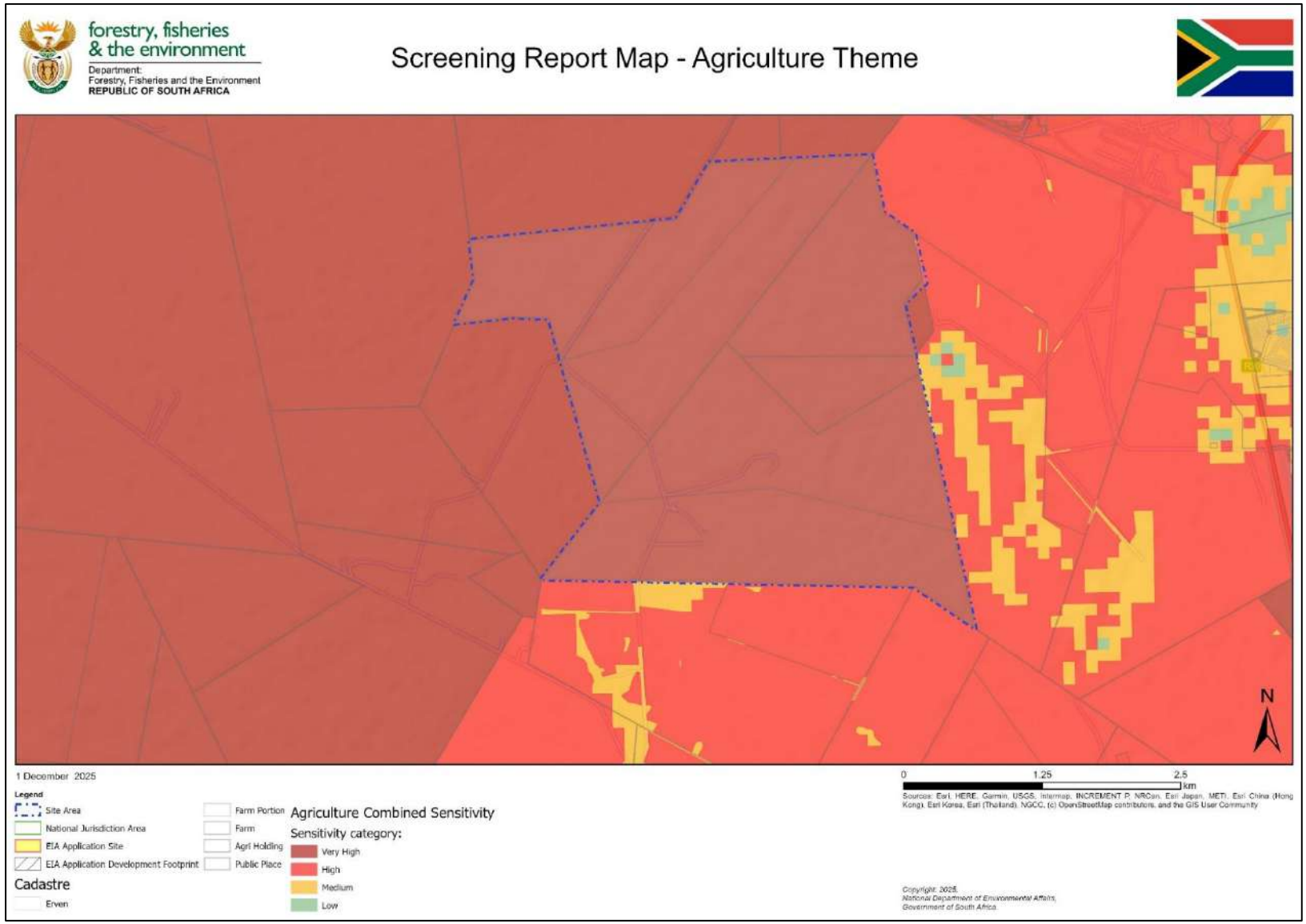


Figure 14: Screening tool analysis for agricultural sensitivity associated with the study area.

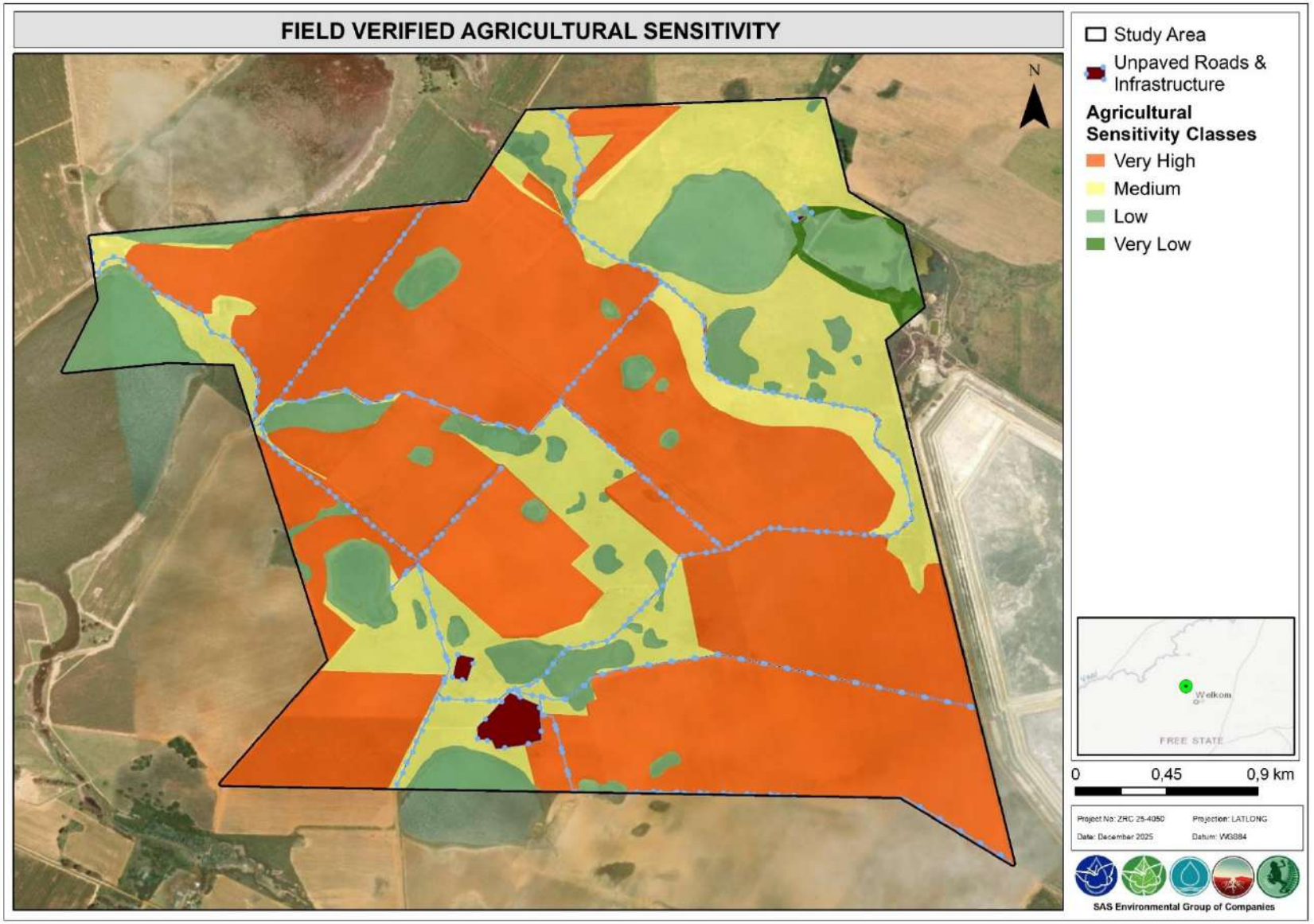


Figure 15: Field verified agricultural sensitivity of the study area.

5.2 Free State Protected Agricultural Areas (PAAs)

The Protected Agricultural Areas (PAA) have been mapped out according to their agricultural potential within the Free State Province by the Department of Agriculture, Land Reform and Rural Development (DALRRD, 2018 - 2022). These PAAs are classified into two categories, the irrigated (IR) and the rainfed (RF) agricultural production systems.

It is of importance to identify and demarcate agricultural land, based on its inherent capability and suitability (agricultural potential), for it to be preserved for exclusive agricultural use. Preservation and Development of Agricultural Land Bill (PDALB) defined the "*Protected Agricultural Areas*" as a:

"Cartographic delineated area of agricultural land –

- preserved for purposes of ensuring high value agricultural land is protected against non- agricultural land uses to promote long-term agricultural production and food security;
- includes all areas demarcated as such."

According to (DALRRD, 2022) database, the study area is located within the rainfed (RF) protected agricultural areas. However, no surface infrastructure is proposed within the study area, only the underground mine and related activities. As a result, no impact is anticipated on the protected agricultural areas (provided no subsidence occurs) as well as the active commercial farming taking place within the study area. Therefore, it is recommended that all mine operation and related activities be restricted to underground. This is to ensure that impact on agricultural production as well as well as regional and provincial food security is preserved throughout the life of mine (LoM).

Figure 16 below give an indication of the PAAs in relation to the proposed underground mine and related activities on a high level for planning purposes. This is in line with the Conservation of Agricultural Resources Act (CARA) 1983 (Act No. 43 of 1983) and the Preservation and Development of Agricultural Land Act (PDALA), Act. No 39 of 2024 which advocates for the protection of scarce agricultural resources of the Republic of South Africa.



Figure 16: Protected Agricultural Areas (PAAs) in relation to the proposed development.

6. IMPACT ASSESSMENT AND MITIGATION MEASURES

This section presents the significance of potential impacts on the soil resources within the study area based on the nature of the proposed development and related activities while considering that no new surface infrastructure is proposed within the study area. In addition, it also provides the recommended mitigatory measures to minimise the perceived impacts, assuming that they are fully implemented.

The following impact significance tables consider all phases of development since only ground subsidence (and residual impacts) is a possible risk in the absence of no surface infrastructure proposed within the project footprint.

6.1 Impact: Loss of Agricultural Land Capability

Loss of agricultural land capability can result from a variety of direct and indirect factors. These factors can degrade soil health, alter the landscape, and reduce the land's ability to support productive agriculture. Loss of agricultural land capability may result from ground subsidence. This may cause soil cracking, or uneven terrain, reducing soil fertility and arability. Subsidence can lower water tables, damage wells, alter drainage, and cause waterlogging or drought stress. Based on field verified agricultural productivity of the land, the impact is considered medium without mitigation and low with mitigation measures sufficiently and appropriately implemented.

Table 13: Identification and classification of significance on loss of agricultural land capability.

NATURE OF THE IMPACT: Loss of Agricultural Land Capability		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	**Regional**	**Local**
Duration *(Short term, medium term, long term)*	**Long**	**Medium**
Magnitude *(Major, Moderate, Minor)*	**Major**	**Moderate**
Probability *(Definite, Possible, Unlikely)*	**Unlikely**	**Unlikely**
Calculated Significance Rating *(Low, Medium, High)*	**Medium**	**Low**
Reversibility: *(Reversible or Irreversible)*	**Irreversible**	
Irreplaceable loss of resources: *(Yes or No)*	**Yes**	
Can impacts be enhanced: *(Yes or No)*	**No**	
Residual impacts ❖ Land instability and possible fragmentation; ❖ Loss of growth medium (soil); ❖ Erosion; ❖ Contamination; and ❖ Uneven land or sinkholes increase injury risk to livestock and reduce pasture usability.		
Mitigation measures		

- It must be ensured that areas of active cultivation are protected from subsidence;
- The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities;
- Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs.

6.2 Soil Erosion & Surface Cracking

Soil erosion is largely dependent on land use and soil management and is generally accelerated by anthropogenic activities. In the absence of detailed South African guidelines on erosion classification, erosion potential and interpretation are based on field observations as well as observed soil profile characteristics. In the event of ground subsidence, the perceived impacts (soil erosion and cracking) are anticipated to be high without mitigation and medium with mitigation measures.

Table 14: Identification and classification of significance on loss of agricultural land capability.

NATURE OF THE IMPACT: Soil Erosion & Contamination		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	**Local**	**Local**
Duration *(Short term, medium term, long term)*	**Medium**	**Short**
Magnitude *(Major, Moderate, Minor)*	**Moderate**	**Minor**
Probability *(Definite, Possible, Unlikely)*	**Possible**	**Unlikely**
Calculated Significance Rating *(Low, Medium, High)*	**High**	**Medium**
Reversibility: *(Reversible or Irreversible)*	**Reversible**	
Irreplaceable loss of resources: *(Yes or No)*	**Yes**	
Can impacts be enhanced: *(Yes or No)*	**No**	
Residual impacts ❖ Loss of arable land quality; ❖ Reduced crop yields; ❖ higher cultivation costs; ❖ Reduced water availability for irrigation and livestock, or increased salinity and contamination risks; and ❖ Reduced land value and farm viability over time.		
Mitigation measures ❖ It must be ensured that areas of active cultivation are protected from subsidence; ❖ The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities; ❖ Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs.		

6.3 Cumulative Loss & Long-Term Impacts

The proposed development does not include establishment of any additional surface infrastructure, thus, minimal to no direct impact on soil, land use, and agricultural land capability is anticipated. However, in the event of a possible ground subsidence, the cumulative loss and long-term impacts on arable soil and associated agricultural productivity of the study area is anticipated to be high since the proposed underground mine operation is

directly beneath commercial agricultural cultivation of crops (maize, sunflower) as well as several farm dams providing drinking water for the livestock (cattle and sheep). If appropriately managed or mitigated, the cumulative loss and long-term impacts can be reduced to low through monitoring, farm inspection (e.g., surface cracks) and adaptive management strategies. It is therefore the opinion of the specialist that the rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities.

Table 15: Significance of identified cumulative impacts.

NATURE OF THECUMULATIVE IMPACT: Loss of Agricultural Capability & Commercial Productivity		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	**Local**	**Local**
Duration *(Short term, medium term, long term)*	**Long**	**Short**
Magnitude *(Major, Moderate, Minor)*	**Major**	**Moderate**
Probability *(Definite, Possible, Unlikely)*	**Possible**	**Unlikely**
Calculated Significance Rating *(Low, Medium, High)*	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	**Irreversible**	
Irreplaceable loss of resources: *(Yes or No)*	**Yes**	
Can impacts be enhanced: *(Yes or No)*	**No**	
Residual impacts ❖ Permanent land deformation which may result in irreversible loss of agricultural value.		
Mitigation measures ❖ It must be ensured that areas of active cultivation are protected from subsidence; ❖ The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities; ❖ Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs.		

Based on the Natural Agricultural Resources Atlas Manual (NAR Atlas Manual, 2018) database, the study area is characterised by approximately 7 hectare per large stock unit (ha/LSU). This grazing capacity potential is considered sufficient to support commercialised livestock farming with veld management practices in place. The proposed underground mine does not pose any risk on current livestock grazing activities since no surface infrastructure is to be established.

It is therefore the opinion of the soil study team that the proposed underground mine and related activities is deemed acceptable from a soil, land use, and agricultural capability point of view, provided that the risk of subsidence by the rock engineers is confirmed to be low for all phases of development.

7. CONCLUSION AND RECOMMENDATIONS

The Zimpande Research Collaborative (ZRC) was appointed to conduct a soil, land use, and land capability assessment as part of the environmental authorisation (EA) process for the proposed underground mining activities in Allanridge in the Free State Province. The boundary for the proposed underground mine will henceforth be referred to as the “study area”.

The objective of this study was to determine the impact of the proposed underground mining and related activities on the soil, land use and land capability through the evaluation of the following:

- Climatic conditions within the context of agricultural productivity and constraints;
- Landscape setting and presently occurring land uses;
- Dominant soil forms, their respective land capability and potential for agricultural productivity;
- Soil physical properties and current limitations of soils to various land use purposes in their present state; and
- Determine the impact of the proposed development on soil, land capability and agricultural potential.

The mean annual rainfall (MAR) for the entire study area ranges from 500 – 600 mm per annum. This rainfall is deemed adequate for a wide variety of crops (maize, wheat, sunflower, potatoes, etc.) for successful dryland farming. According to the desktop database, the entire study area is characterised by a mean annual evaporation ranging between 2001 – 2200 mm per annum. Therefore, crops under rainfed conditions should be cultivated with caution to realise commercially viable yields due to potential moisture stress.

Based on site assessment observations, the study area is primarily comprised of commercial agricultural (dryland) cultivation of crops such as maize and sunflower, open grassland often utilised for livestock (cattle and sheep) grazing, as well as several watercourses distributed across the study area.

The identified soil forms within the study area largely comprise dystrophic red and/or yellow brown apedal, infrastructural areas grouped as disturbed soils, shallow lithic soils, as well as soils susceptible to waterlogging conditions associated with the watercourses. These soils are further discussed below.

Arable Land

The arable soils in the study area were classified as Clovelly, Ermelo/Hutton, and Clovelly/Hutton. These soils typically exhibit a dystrophic red and/or yellow brown apedal

textural class. These are oxidic soils which are highly weathered and are dominated by iron (hematite/goethite) oxides. The soils are deep, well aerated with good porosity to support agricultural crops. Although these soils are not inherently fertile, oxidic soils are suitable for agricultural cultivation of crops with relatively few physical limitations.

Wet-based Soils

The wet based soils were identified as Dundee (including surface water) and Katspruit. The topsoil directly overlies an alluvial/gleyed horizon which is characterised by prolonged periods of saturation with uniform grey colours which is an indication of waterlogging conditions. The wetness limitation associated with these soils means anaerobic conditions develop in the root-zone (30 cm) which is not suitable for cultivated crops. Consequently, these soils are classified as being of low to moderate agricultural value. However, these soils can be considered for marginal livestock grazing.

Grazing Land

The study area also comprised of shallow and lithic soil associated with the Glenrosa formation. This soil is associated with poor physical properties for plant root system penetration and water infiltration due to the shallow nature of the soil and/or limiting impeding layer of the underlying parent material. Based on the degree of weathering some lithic material of varying sizes can be mixed closely with soil material. Glenrosa soil form is usually avoided for intensive use and thus left for grazing, forestry, and wildlife land uses.

Disturbed Soils

The Witbank (Disturbed) soil form is related to soil which has been subjected to physical disturbances. In this context, Witbank soil includes historical mining and related activities as well as surface infrastructure which buried the soil material such that the diagnostic horizons could not be identified. As a result, this soil is not ideal for agricultural cultivation.

Table A below indicates the dominant soils occurring within the study area, land capability, as well as agricultural land potential.

Table A: Dominant soil forms and their respective land capability and land potential classes.

Soil Forms	Average Soil Depth (cm)	DALRRD (2018) Classification	Land Potential	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	>120	11. High	Good – L3	361.9	36.8
Clovelly/Ermelo				134.9	13.7
Clovelly	100			106.0	10.7
Watercourses (Dundee – including surface water)	40	6. Low - Moderate	Wetland – L5	149.3	15.1
Katspruit	55				
Glenrosa	35	5. Low	Restricted – L5	224.4	22.8
Witbank	N/A	2. Very Low	Very Low – L8	6.3	0.6
Total Enclosed Area				**983.0**	**100**

The national web-based screening tool depicts the study area as having a very high agricultural sensitivity. Given that the site encompasses active commercial (rainfed) cultivation of crops and comprises of land capabilities varying from very high to low, the very high agricultural sensitivity allocated to the study area is valid and confirmed. However, it is the opinion of the study team that the risk of impact is significantly low given that no surface infrastructure is proposed within the project footprint.

Upon site assessment and verification, the agricultural sensitivity classes with varying degrees of impact depending on the type of land use and/or soil classification were determined as follows:

- Actively cultivated areas on high land capability soil [11. High (Class II)] – Rated as **very high sensitivity** due to ongoing and active dryland commercial farming.
- Wet-based soil [6. Low - Moderate (Class V)] – Rated as **low sensitivity** due to wetness limitation.
- Grazing land [5. Low (Class VI)] – Rated as **low sensitivity** due to the dominance of lithic material as well as exposed hard rock surfaces in some instances.
- Disturbed footprint areas [2. Very Low (Class VIII)] – Rated as **very low sensitivity** due to significant transformation and modification (residential and infrastructural developments) to the land which makes it unsuitable for agricultural activities.

Table B below summarizes the identified soils, and their respective field verified agricultural sensitivity.

Table B: Field verified agricultural sensitivity of the identified soils within the study area.

Soil Forms		DALRRD (2018) Classification	Field Verified Agricultural Sensitivity	Area Extent (ha)	Percentage (%)
Ermelo/Hutton	Actively cultivated	11. High	Very High	603.0	61.3
Clovelly/Ermelo					
Clovelly					
Watercourses (Dundee – including surface water)		6. Low - Moderate	Low	149.3	15.1
Katspruit					
Glenrosa		5. Low	Medium	224.4	22.8
Witbank		2. Very Low	Very Low	6.3	0.6
Total Enclosed Area				**983.0**	**100.0**

According to (DALRRD, 2022) database, the study area is located within the rainfed (RF) protected agricultural areas. However, no surface infrastructure is proposed within the study area, only the underground mine and related activities. As a result, no impact is anticipated on the protected agricultural areas (provided no subsidence occurs) as well as the active commercial farming taking place within the study area. Therefore, it is recommended that all mine operation and related activities be restricted to underground. This is to ensure that impact on agricultural production as well as regional and provincial food security is preserved throughout the life of mine (LoM).

The proposed development does not include establishment of any additional surface infrastructure, thus, minimal to no direct impact on soil, land use, and agricultural land capability is anticipated. However, in the event of a possible ground subsidence, the cumulative loss and long-term impacts on arable soil and associated agricultural productivity of the study area is anticipated to be high since the proposed underground mine operation is directly beneath commercial agricultural cultivation of crops (maize, sunflower) as well as several farm dams providing drinking water for livestock (cattle and sheep). If properly managed or mitigated, the cumulative loss and long-term impacts can be reduced to low through monitoring, farm inspection (e.g., surface cracks) and adaptive management strategies. It is therefore the opinion of the specialist that the rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities.

Based on the Natural Agricultural Resources Atlas Manual (NAR Atlas Manual, 2018) database, the study area is characterised by approximately 7 hectare per large stock unit (ha/LSU). This grazing capacity potential is considered sufficient to support commercialised livestock farming with veld management practices in place. The proposed underground mine

does not pose any risk on current livestock grazing activities since no surface infrastructure is to be established.

Following the assessment of the study area and the identified potential impacts as a result of the proposed underground mine and related activities; key mitigation as outlined below has been developed to minimise the impact on soil resources of the area:

- It must be ensured that areas of active cultivation are protected from subsidence;
- The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities;
- It is also recommended that the safety pillar factor under cultivated areas be included as an additional margin of safety to ensure that no subsidence takes place; and
- Regular monitoring of surface above the undermined areas must be considered to ensure that no subsidence occurs.

It is therefore the opinion of the soil study team that the proposed underground mine and related activities is deemed acceptable and within limits from a soil, land use, and agricultural capability point of view, provided that the risk of subsidence by the rock engineers is confirmed to be low for all phases of development.

8. REFERENCES

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Soil Classification Working Group, 2018. Soil classification. A Natural and Anthropogenic System for South Africa. Mem. agric. nat. Resource. S. Afr. No. 15. Dept. Agric. Dev., Pretoria.

APPENDIX A: ASSESSMENT METHODOLOGY

Please use the methodology below, and the Risk Assessment Matrix when determining the significance of impacts associated with the proposed project.

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impact significance rating system is presented in Table 16, Table 17, and Table 18 and involves three parts:

1. **Part A**: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;
2. **Part B**: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and
3. **Part C**: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

Please make use of the excel spreadsheet attached to this docket to do the impact calculations.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequence in Part B.

Table 16: Consequence Rating Methodology

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration.

Table 17: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
Magnitude					
Minor	**DURATION**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**DURATION**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**DURATION**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability.

Table 18: Significance Rating Methodology

Probability (of Exposure to Impacts)	**Consequence Negative**			**Consequence Positive**		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

Impact Tables

Please use the table below to rank impacts and propose mitigation measures.

Table 19: Typical tables used to identify and classify the significance of identified impacts

NATURE OF THE IMPACT: DESCRIBE THE IMPACT IN RESPECT TO THE ACTIVITY TO BE UNDERTAKEN		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: (positive or negative)		
Extent (Local, Regional, International)		
Duration (Short term, medium term, long term)		
Magnitude (Major, Moderate, Minor)		
Probability (Definite, Possible, Unlikely)		
Calculated Significance Rating (Low, Medium, High)		
Reversibility: (Reversible or Irreversible)		
Irreplaceable loss of resources: (Yes or No)		
Can impacts be enhanced: (Yes or No)		
Residual impacts ❖ (List these below)		
Mitigation measures ❖ (List these below)		

Cumulative Impact

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Table 20: Typical table used to identify and classify the significance of identified cumulative impacts

NATURE OF THECUMULATIVE IMPACT: DESCRIBE THE IMPACT IN RESPECT TO THE ACTIVITY TO BE UNDERTAKEN		
	Impact Rating Without Mitigation	Impact Rating with Mitigation
Impact Status: (positive or negative)		
Extent (Local, Regional, International)		
Duration (Short term, medium term, long term)		
Magnitude (Major, Moderate, Minor)		
Probability (Definite, Possible, Unlikely)		
Calculated Significance Rating (Low, Medium, High)		
Reversibility: (Reversible or Irreversible)		
Irreplaceable loss of resources: (Yes or No)		
Can impacts be enhanced: (Yes or No)		
Residual impacts ❖ (List these below)		
Mitigation measures ❖ (List these below)		

APPENDIX B: DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

1. (a) (i) Details of the specialist who prepared the report.

Stephen van Staden MSc (Environmental Management) (University of Johannesburg)

Braveman Mzila BSc (Hons) Environmental Hydrology University of KwaZulu-Natal

Lourens Tshabalala BSc (Soil Science & Agronomy) University of the Free State

1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Zimpande Research Collaborative		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Stephen van Staden, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

1.(b) A declaration that the specialist is independent in a form as may be specified by the competent authority

I, Braveman Mzila, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct

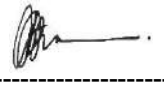


Signature of the Specialist

1. (c) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Lourens Tshabalala, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES –

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Group CEO, Water Resource discipline lead, Managing member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum;
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc Environmental Management (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000
Tools for wetland assessment short course Rhodes University	2016
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2013

Short Courses

Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA)	2009
Introduction to Project Management - Online course by the University of Adelaide	2016
Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant species and Landscape Plan
- Freshwater Offset Plan
- Hydropedological Assessment
- Pit Closure Analysis

Aquatic Ecological Assessment and Water Quality Studies

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

Soil and Land Capability Assessment

- Soil and Land Capability Assessment
- Soil Monitoring
- Soil Mapping

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

SAS ENVIRONMENTAL GROUP OF COMPANIES (SEGC) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF LOURENS TSHABALALA

PERSONAL DETAILS

Position in Company	Soil Scientist/Hydropedologist
Joined SAS Environmental Group of Companies	2023

MEMBERSHIP IN PROFESSIONAL SOCIETIES

South African Council for Natural Scientist Professions (SACNASP) – Reg. No: 144043

Member of the South African Soil Surveyors Organization (SASSO)

EDUCATION

Qualifications

B.Sc. (Agric) Honours Soil Science	(University of the Free State)	2020

COUNTRIES OF WORK EXPERIENCE

South Africa – Kwa-Zulu Natal, Mpumalanga, Limpopo, Western Cape, Gauteng North West, Eastern Cape and Free State

KEY SPECIALIST DISCIPLINES

Hydropedological Assessments:

- Soil Survey & Profile Description
- Soil Delineation
- Hydrological hillslope classification

Soil, Land use, Land Capability and Agricultural Potential Studies

- Soil Desktop assessment
- Soil classification
- Agricultural Soil Potential
- Agricultural Impact Assessments

SAS ENVIRONMENTAL GROUP OF COMPANIES –

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF BRAVEMAN MZILA

PERSONAL DETAILS

Position in Company	Wetland Ecologist and Soil Scientist
Joined SAS Environmental Group of Companies	2017

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Soil Science Society (SASSO)

Member of the Gauteng Wetland Forum (GWF)

EDUCATION

Qualifications

BSc (Hons) Environmental Hydrology (University of Kwazulu-Natal)	2013
BSc Hydrology and Soil Science (University of Kwazulu-Natal)	2012

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Free State, North West, Limpopo, Northern Cape, Eastern Cape, KwaZulu-Natal

KEY SPECIALIST DISCIPLINES

Hydropedological Assessments:

- Soil Survey
- Soil Delineation
- Hydrological hillslope classification
- Hydropedological loss Quantification
- Hydropedological impact assessment
- Scientific buffer determination

Soil, Land use, Land Capability and Agricultural Potential Studies

- Soil Desktop assessment
- Soil classification
- Agricultural potential
- Agricultural Impact Assessments

Appendix D8 - Desktop Heritage and Palaeontology Impact Assessment

Desktop Heritage Impact Assessment for the proposed Jelani Joint Venture (JV) Area Underground Mining Operation on Portions of the Farms Graspan 40, Diamant 37, Swartpan 436 and Welvaart 63 within the Mathjabeng Local Municipality, Lejeweleputswa District Municipality, Free State Province.

Desktop Heritage Impact Assessment

Document Number	Revision	Date
PGS-957HIA-001-RPT_02	2.0	07/09/2029

PGS HERITAGE
+ 27 (0) 12 332 5305
+27 (0) 86 675 8077
contact@pgsheritage.com
Block D, The Village,
307 Glenwood Drive,
Fearie Glen, 0043

Offices in South Africa, Kingdom of Lesotho, Mozambique and Portugal

Head Office:
Block D
The Village
307 Glenwood Road
Faerie Glen Pretoria,
South Africa

Directors: HS Steyn, PD Birkholtz, W Fourie

REVISION HISTORY

Version	Issue Date	Description of Changes
0.1	19/12/2025	First draft
2.0	07/09/2026	Updated following client comments

Specialist Declaration for assessments undertaken for application for authorisation in terms of the National Environmental Management Act (Act 107 of 1998) as amended and the Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) as amended

I, Alexander Andreou declare that –

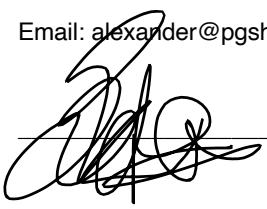
- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (Act 107 of 1998) as amended, when applying for environmental authorisation which were promulgated in Government Notice 320 (Government Gazette 43110, 20 March 2020) and in Government Notice 1150 (Government Gazette 43855, 30 October 2020).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
- any decision to be taken with respect to the application by the competent authority; and;
- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of the Environmental Impact Assessment Regulations (Government Notice R982, Government Gazette 38282, 4 December 2014) as amended and is punishable in terms of section 24F of the National Environmental Management Act (Act 107 of 1998).
- I will take into account, to the extent possible, the matters listed in section 38 of the National Heritage Resources Act (Act 25 of 1999) when preparing the application and any report relating to the application.

HERITAGE CONSULTANT: PGS Heritage (Pty) Ltd

CONTACT PERSON: Alexander Andreou – Heritage Advisory Unit Manager

Tel: +27 (0) 12 332 5305

Email: alexander@pgsheritage.com

SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title	Heritage Impact Assessment for the proposed Jelani Joint Venture (JV) Area Underground Mining Operations on Portions of the Farms Graspan 40, Diamant 37, Swartpan 436 and Welvaart 63. Mathjabeng Local Municipality, Lejeweleputswa District Municipality, Free State Province.		
Control	**Name**	**Signature**	**Designation**
Author	Alexander Andreou		**PGS Heritage** - Heritage Advisory Unit Manager and Senior Heritage Specialist
Reviewed	Wouter Fourie		**PGS Heritage** - Chief Executive Officer and Principal Heritage Specialist

CLIENT: **Kongiwe Environmental (Pty) Ltd**

CONTACT PERSON: **Umeshree Naicker**
Principal Environmental Consultant
unaicker@kongiwe.com

SIGNATURE: _____

The Desktop Heritage Impact Assessment Report has been compiled considering the requirements of Section 38(4) the National Heritage Resources Act (Act 25 of 1999) as indicated in the table below.

Section 38(4) of the NHRA	Relevant section in report
(a) The identification and mapping of all heritage resources in the area affected;	Section **4**
(b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;	Section **4**
(c) an assessment of the impact of the development on such heritage resources;	Section **5**
(d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;	Section **5**
(e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;	**To be supplied by Kongiwe Environmental**
(f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and	Section **6**
(g) plans for mitigation of any adverse effects during and after the completion of the proposed development.	Section **6**

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd was appointed by Kongiwe Environmental (Pty) Ltd (Kongiwe Environmental) to undertake a Desktop Heritage Impact Assessment that forms part of the proposed Jelani Joint Venture (JV) Area Underground Mining Operations (Proposed Project) on Portions of the Farms Graspan 40, Diamant 37, Swartpan 436 and Welvaart 63. Mathjabeng Local Municipality, Lejeweleputswa District Municipality, Free State Province.

A further standalone Paleontological Desktop Assessment was completed by PGS Heritage (Pty Ltd) by Elize Butler (Butler 2025).

No fieldwork or ground-truthing was conducted for either the heritage or palaeontological components of this study. Therefore it is of utmost importance that should any such resources be discovered during forthcoming investigation, construction or operational phases that the **Chance Finds Procedure** as laid out in **Section 6.2** be actioned immediately.

As a result, the following need to be acknowledged:

Assumptions

- *Unchanged Site Conditions:* It is assumed that the physical condition of the site has not materially changed since both Google and ESRI satellite imagery were captured.
- *Historical Map Accuracy:* It is assumed that the initial historical mapping (and subsequent cartography) is accurate of all known and surveyed markers at that time.

Limitations

- *No Physical Site Inspection:* No site visit was undertaken; therefore, the assessment could not confirm existing conditions, ground truthing, or to verify features on-site.
- *No Archaeological Investigation:* Sub-surface or concealed heritage resources could not be evaluated due to the lack of intrusive testing or ground inspection.
- *Environmental and Contextual Factors:* The surrounding landscape, setting, and potential visual or spatial relationships could not be fully assessed without a field survey.
- *Temporal Limitations:* The statement reflects the physical condition of the site at which both Google and ESRI satellite imagery was captured.

In terms of heritage resources, the following was ascertained:

Historical Structures – homesteads, farmsteads, kraals and trig beacons

With the use of historical and archival maps, the following resources were identified**. Seven** rectilinear structures (**JR_02**, **JR_03**, **JR_04**, **JR_05**, **JR_06**, **JR_15**, and **JR_16**); **five** 'hut' structures (**JR_07**, **JR_12**, **JR_13**, **JR_14**, and **JR_17**); **one** kraal (**JR_01**) and **one** trigonometrical survey beacon (**JR_11**). With the use of ESRI and Google satellite imagery, **three** (**JR_04**, **JR_05**, and **JR_11**) of the **14** resources were able to be verified (**Figure 7**).

Due to there not being fieldwork that was conducted, it is not possible to ascertain full site extents or any status of these or other resources within the project area. As such, **JR_04**, **JR_05** and **JR_11** are graded by *sine aspectu* inference as **NCW** with **low local heritage significance**.

Burial grounds and graves

No burial grounds or graves were identified on the historical or archival maps, nor in the remote sensing process. This does not exclude their presence, however.

Palaeontology

Desktop research has found that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the South African Heritage Resources Information System (SAHRIS) Palaeosensitivity Map and Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool. **A high palaeontological significance has been allocated for the mining /operational phase of the development pre-mitigation and a low significance post mitigation**. The **mining /operational** will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the decommissioning phase**. The No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, will have a neutral impact on the Palaeontological Heritage of the development. The **cumulative impacts of the development are considered to be medium pre- mitigation and low post mitigation and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that **no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils**.

These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Proposed Project, as well as included as conditions for Environmental Authorisation.

Mitigation measures

As aforementioned, fieldwork and ground-truthing were not conducted for this site. As such, the Heritage Management Plan (HMP) laid out in **Table 13**, is written inclusive of the resources as identified on the First Edition 1965 Historical Map (**Figure 4** and **Figure 6**), as hypotheticals. This does not absolve Jelani Resources (Pty) Ltd, involved on this site from the due process as per **6.2 Chance Finds Procedure**.

Conclusion

It is the combined considered opinion of the heritage specialists that the proposed project will have no direct impact on any known cultural heritage resources, should they remain as those verified (**JR_04**, **JR_05** and **JR_11**).

With the implementation of recommended mitigation measures in case of a chance find, the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project.

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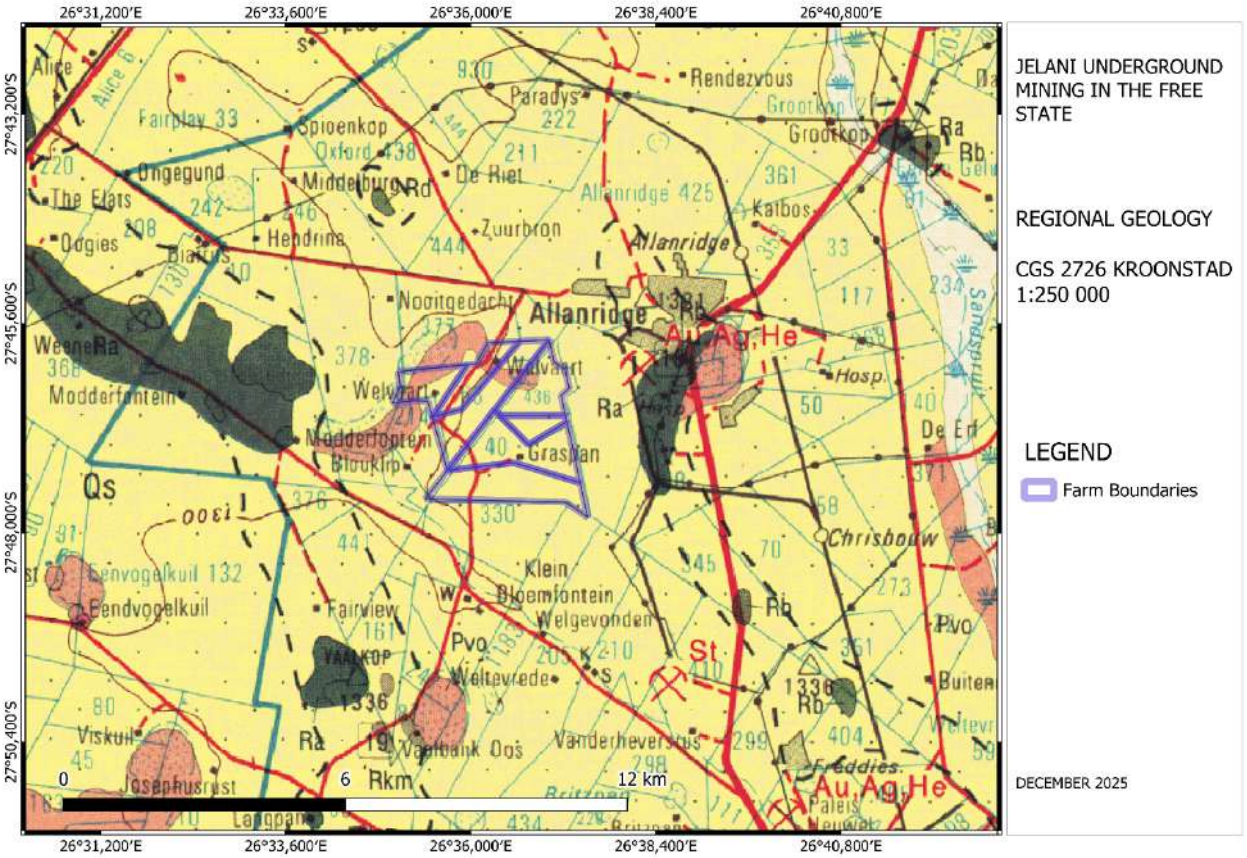


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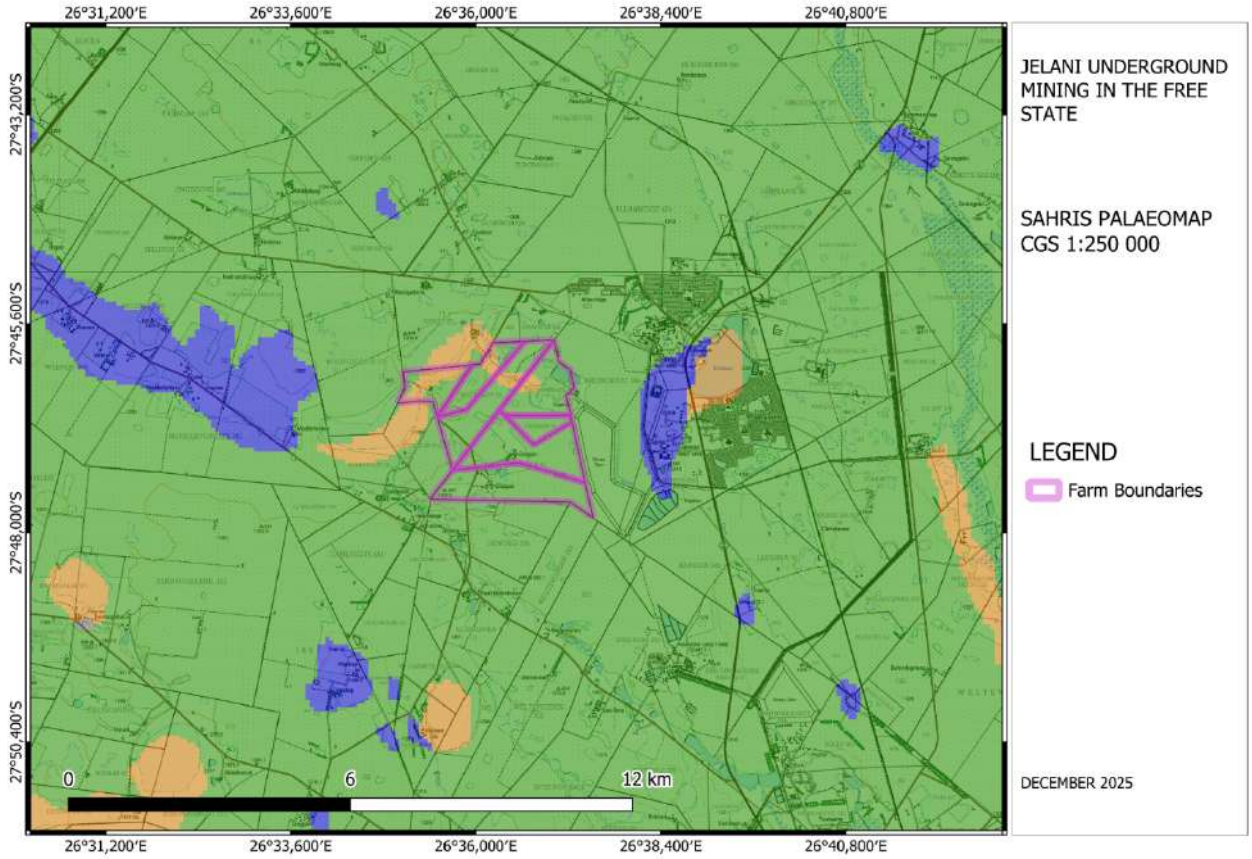


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ABBREVIATIONS AND TERMINOLOGY

Abbreviations	Description
AIA	Archaeological Impact Assessment
APHP	Association of Professional Heritage Practitioners
ASAPA	Association of South African Professional Archaeologists
BA-	Basic Assessment-
BGG-	Burial Ground and Graves-
CFP	Chance Finds Procedure
CRM	Cultural Resource Management
CVs	Curriculum Vitae
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorization
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Program
ESA	Early Stone Age
ESRI	Environmental Systems Research Institute
GN 320	Government Notice 320 (Government Gazette 43110, 20 March 2020)
GN 326	Government Notice 326 (Government Gazette 40772, 7 April 2017)
GN 982	Government Notice 982 (Government Gazette 38282, 4 December 2014)
GPS	Global Positioning System
HIA	Heritage Impact Assessment
JV	Joint Venture
KNARIA	KwaZulu-Natal Amafa and Research Institute Act, 2018 (Act No. 5 of 2018)
IAIAsa	International Association for Impact Assessment
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
NCW	Not Conservation Worthy
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NHRA	National Heritage Resources Act (Act 25 of 1999) as amended
PDA	Paleontological Desktop Assessment
PGS	PGS Heritage (Pty) Ltd
PIA	Paleontological Impact Assessment
PHRA	Provincial Heritage Resources Authority
PR	Prospecting Right
PSSA	Palaeontological Society of South Africa
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures,

- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10 m of such representation,
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritime Zones Act (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which the South African Heritage Resources Agency considers to be worthy of conservation,
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place,
- carrying out any works on or over or under a place,
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place,
- constructing or putting up for display signs or boards,
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil.

Early Stone Age

The archaeology of the earlier stone age between 700 000 and 2 500 000 years ago (Refer **Figure 1**).

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act (Act 25 of 1999) as amended.

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under section 3 of the National Heritage Resources Act (Act 25 of 1999) as amended,

- places, buildings, structures and equipment of cultural significance,
- places to which oral traditions are attached, or which are associated with living heritage,
- historical settlements and townscapes,
- landscapes and natural features of cultural significance,
- geological sites of scientific or cultural importance,
- archaeological and palaeontological sites,
- graves and burial grounds and
- sites of significance relating to the history of slavery in South Africa.

Holocene

The most recent geological time period which commenced 12 000 years ago (Refer **Figure 1**).

Late Stone Age

The archaeology of the later stone age associated with fully modern people during the last 30 000 years (Refer **Figure 1**).

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with settled lifeways, iron-working and farming activities such as herding and agriculture (Refer **Figure 1**).

Middle Stone Age

The archaeology of the middle stone age between 30 000-300 000 years ago, associated with early modern humans (Refer **Figure 1**).

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Tracklogs

Movements during field survey documented by means of Global Positioning System.

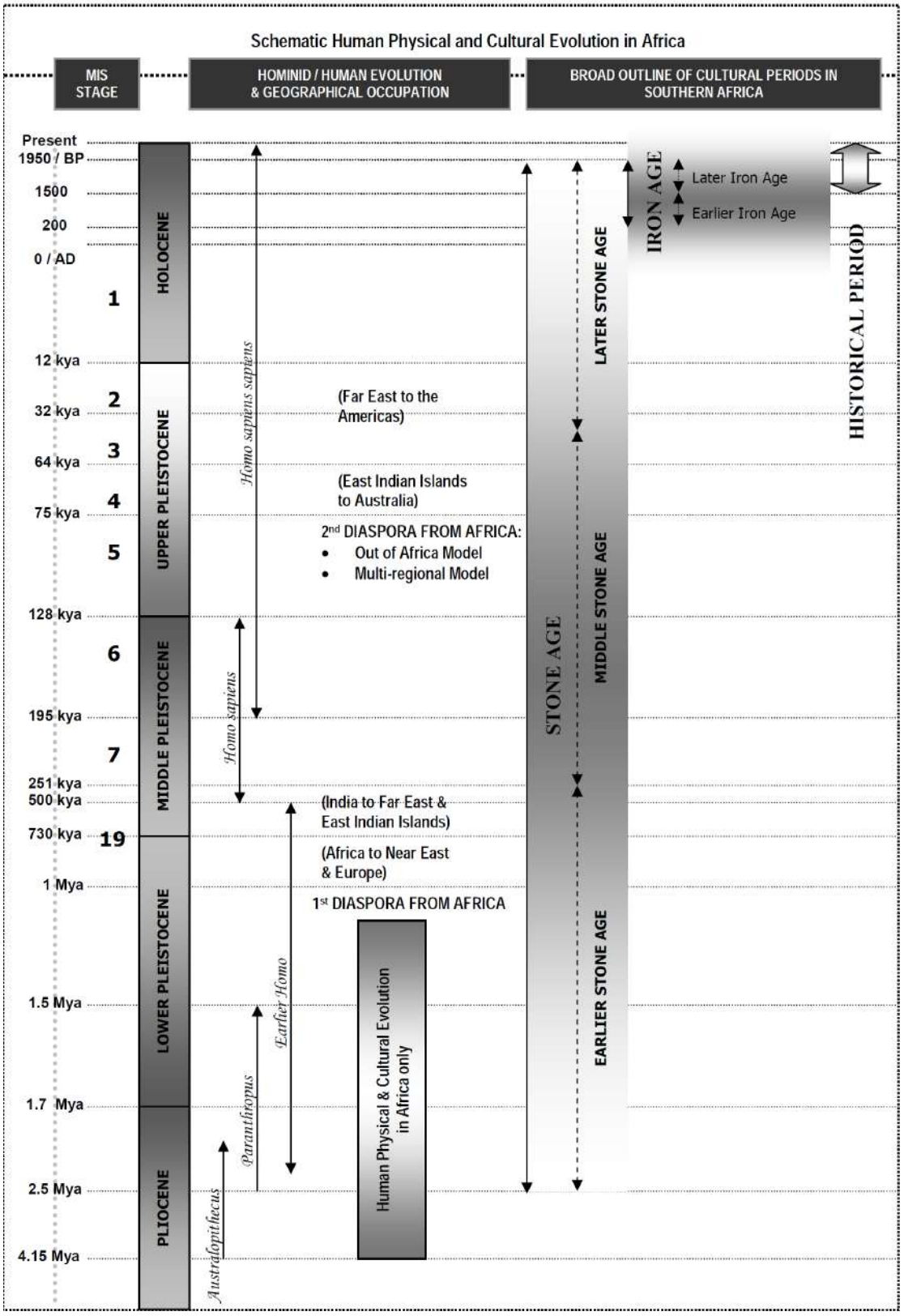


Figure 1 – Human and Cultural Timeline in Africa.

1 INTRODUCTION

PGS Heritage (Pty) Ltd was appointed by Kongiwe Environmental (Pty) Ltd (Kongiwe Environmental) to undertake a Desktop Heritage Impact Assessment (HIA) that forms part of the proposed Jelani Joint Venture (JV) Area Underground Mining Operation on Portions of the Farms Graspan 40, Diamant 37, Swartpan 436 and Welvaart 63 within the Mathjabeng Local Municipality, Lejeweleputswa District Municipality, Free State Province.

A further standalone Paleontological Desktop Assessment (PDA) was completed by PGS Heritage (Pty Ltd) by Elize Butler (Butler 2025).

1.1 Scope of the Study

The aim of the study is to identify heritage sites and finds that may occur in the proposed project area. The HIA aims to inform the Environmental Impact Assessment (EIA) to assist the developer in managing the discovered heritage resources in a responsible manner, to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (25 of 1999) as amended (NHRA).

1.2 Specialist Qualifications

This HIA report was compiled by PGS.

The staff at PGS has a combined experience of over 100 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Alexander Andreou, Heritage Advisory Unit Manager, wields over a decade of transdisciplinary experience within the heritage resources management sector. He specialises in spatial biographies and urban archaeology. He holds an MPhil in Conservation of the Built Environment from the University of Cape Town, and a PhD in Development Studies, in the sub-field of Critical Architecture and Urbanism from the University of Pretoria. He is a registered member of the Association of Professional Heritage Practitioners (APHP), Association of Southern African Professional Archaeologists (APHP), The Historical Association of South Africa (HASA), and the International Association for Impact Assessment (IAIAsa).

Elize Butler, Associate Palaeontologist, has conducted approximately 900 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Western, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (cum laude) in Zoology (specialising in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than thirty years. She has experience in locating, collecting, and curating fossils, including

exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

1.3 Assumptions and Limitations

1.3.1 Assumptions

1.3.1.1 *Unchanged Site Conditions:* It is assumed that the physical condition of the site has not materially changed since both Google and ESRI satellite imagery were captured.

1.3.1.2 *Historical Map Accuracy:* It is assumed that the initial historical mapping (and subsequent cartography) is accurate of all known and surveyed markers at that time.

1.3.2 Limitations

1.3.2.1 *No Physical Site Inspection:* No site visit was undertaken; therefore, the assessment could not confirm existing conditions, ground truthing, or to verify features on-site.

1.3.2.2 *No Archaeological Investigation:* Sub-surface or concealed heritage resources could not be evaluated due to the lack of intrusive testing or ground inspection.

1.3.2.3 *Environmental and Contextual Factors:* The surrounding landscape, setting, and potential visual or spatial relationships could not be fully assessed without a field survey.

1.3.2.4 *Temporal Limitations:* The statement reflects the physical condition of the site at which both Google and ESRI satellite imagery was captured.

Therefore, should any heritage features and/or objects be located or observed outside or within the identified heritage sensitive areas during construction activities, a heritage specialist must be contacted immediately. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time as the heritage specialist has been able to make an assessment of the significance of the site (or material) in question. This also applies to Burial Grounds and Graves (BGG). If any BGG are located or observed during the course of the development, the procedures and requirements pertaining to BGG will apply as set out below.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- Government Notice 320 (Government Gazette 43110, 20 March 2020) (GN 320) - general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified,
- EIA Regulations (Government Notice 982 (Government Gazette 38282, 4 December 2014)) Appendix 6 (GN 982) as amended by Government Notice 326 (Government Gazette 40772, 7 April 2017) (GN 326),
- NHRA.

1.4.1 Government Notice 320 (Government Gazette 43110, 20 March 2020)

Although minimum standards for Archaeological Impact Assessment (AIA) (2007) and Paleontological Impact Assessment (PIA) (2012) were published by the South African Heritage Resources Agency (SAHRA), Government Notice (GN) 320 requires sensitivity verification for a site, for which no specific assessment protocol related to any theme has been identified, on the national web based environmental screening tool. The requirements for GN 320 are listed in **Table 1** and the applicable section in this report noted.

Table 1: Reporting Requirements for GN 320.

GN 320	Relevant section in report	Where not applicable in this report
2.2 (a) a desktop analysis, using satellite imagery;	**section 4.1**	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	**N/A**	
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool;	**section 4.1**	
2.3(b) contains motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity;	**section 4.1**	

1.4.2 Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) Appendix 6 as amended by Government Notice 326 (Government Gazette 40772, 7 April 2017) requirements

This Desktop HIA report has been compiled considering the GN 326 Appendix 6 requirements for specialist reports.

1.4.3 Heritage screening - Department of Forestry, Fisheries and the Environment

A heritage screening was conducted by means of the Department of Forestry, Fisheries and the Environment (DFFE) National Web-based Environmental Screening Tool as required by GN 982**.**

DFFE issued guidelines in April 2025 concerning the application of the screening tool in relation to cultural heritage, archaeology, and palaeontological themes. The guidelines indicate that the "theme layer represents a limited number of known" heritage and palaeontological resources. These resources are widely distributed and may be present at any development site within South Africa. The guidelines state the following in terms of -

- HIA "*Therefore, a Heritage Impact Assessment (HIA) must be undertaken for all developments, irrespective of the sensitivity shown on the archaeological and cultural heritage theme layer*"
- PIA "*Therefore, a Palaeontological Impact Assessments (PIAs)* [sic] *must be undertaken for all developments as per the PalaeoSensitivity Map provided on* [South African Heritage Resources Information System] *SAHRIS, irrespective of the sensitivity shown on the palaeontology theme layer."*

The guidelines further stipulate the requirements for both an HIA and PIA must:

HIA	**PIA**
▪ meet the requirements of section 38(3) of the NHRA or section 41(1) of the KwaZulu-Natal Amafa and Research Institute Act, 2018 (Act No. 5 of 2018) (KNARIA), should the development be in KwaZulu-Natal (KZN); ▪ must be undertaken by a qualified heritage specialist; ▪ be undertaken in line with GN 326 Appendix 6; and ▪ for HIA submitted to SAHRA the report must also comply with the requirements of the "2007 Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports", accessible at https://sahris.sahra.org.za.	▪ meet the requirements of section 38(3) of the NHRA or section 41(1) of the KNARIA should the development be in KZN; ▪ must be undertaken by a qualified palaeontological specialist; ▪ be undertaken in line with GN 326 Appendix 6; and ▪ for PIA submitted to SAHRA, the report must comply with the requirements of the "2012 Minimum Standards: Palaeontological Components of Heritage Impact Assessments" [sic], accessible at https://sahris.sahra.org.za.

According to the heritage screening report, the project area has a Low Heritage Sensitivity (

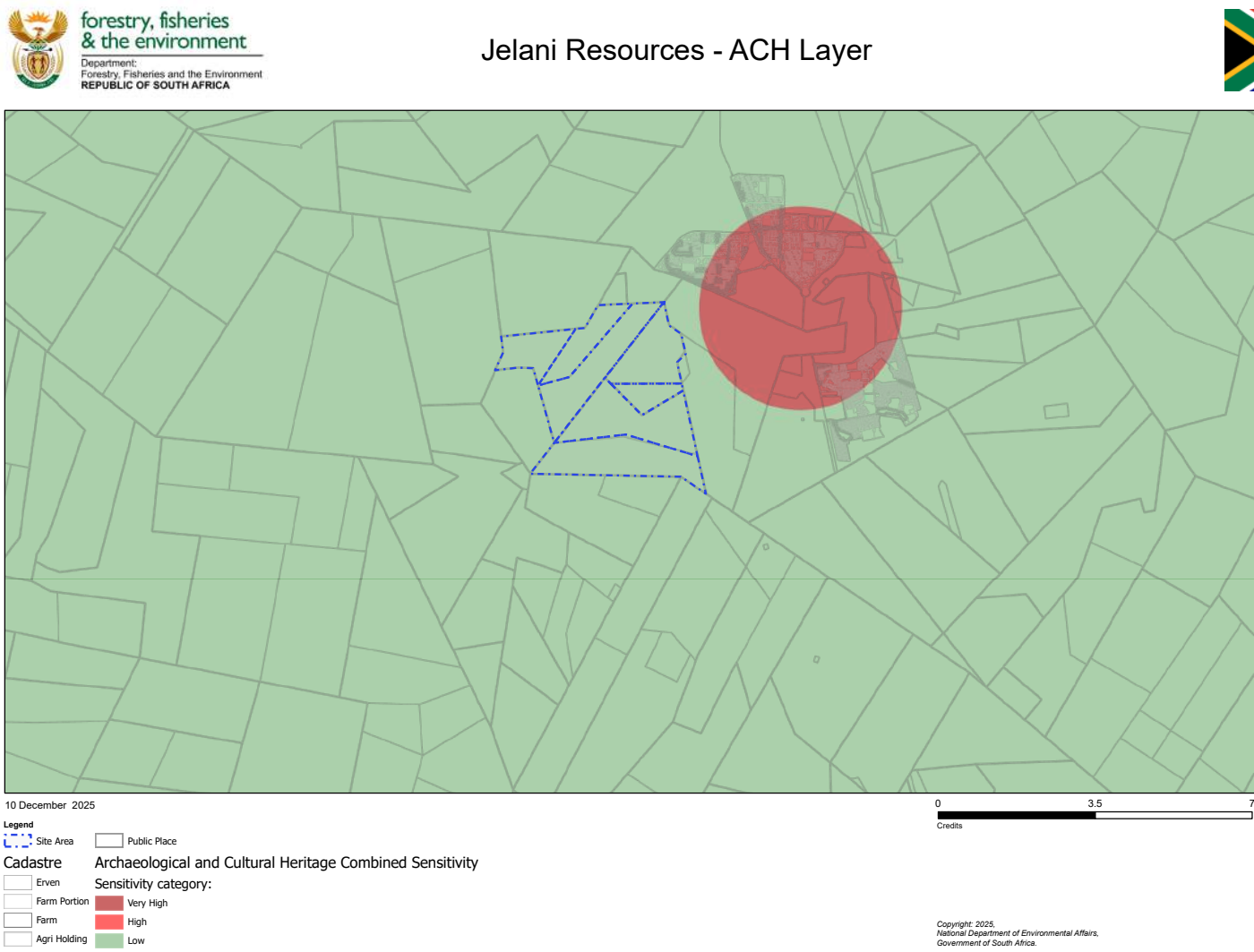


Figure 5 – DFFE Screening map indicating a low sensitivity rating for archaeology and heritage.). The desktop assessment is in agreement with the screening tool as no heritage resources were located within the study area.

1.4.4 National Heritage Resources Act (Act 25 of 1999) as amended

- Protection of Heritage Resources – sections 34 to 36; and
- Heritage Resources Management – section 38.

The NHRA is utilised as the basis for the identification, evaluation, and management of heritage resources and in the case of Cultural Resources Management (CRM) those resources specifically impacted on by development as stipulated in section 38 of the NHRA. This study falls under section 38(8) and requires comment from the relevant heritage resources authority.

Section 24(2) of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA) requires environmental authorisation from the environmental authority for certain activities that have been identified and must undergo an EIA or BA process. Similarly, section 38 of the NHRA lists specific development activities that require notice to the heritage resources authority to determine if an HIA process is necessary. Approval from the heritage authority is mandatory before proceeding with the development activities.

To avoid redundancy and facilitate co-ordination between NEMA and NHRA requirements, section 38(8) of the NHRA states that if the development activities listed in section 38(1) require an EIA under NEMA; a separate HIA and approval from the heritage resources authority are unnecessary. However, the environmental authority must ensure that the heritage resources authority's requirements for HIA are fulfilled and that its comments and recommendations are considered before granting environmental authorisation.

Therefore, if a NEMA EIA is required for the development activities listed under section 38 of the NHRA, separate HIA and EIA processes may not be followed, and different decisions may not be issued under NHRA and NEMA. The EIA process will be followed, and if the heritage resources authority requires a HIA, it must be conducted as one of the EIA specialist studies.

The environmental authority must ensure that the heritage resources authority's requirements for the assessment are met. A separate heritage approval may not be issued, but the environmental authority must consider the heritage resources authority's comments and recommendations before granting or refusing environmental authorisation.

It must, however, be noted that if no environmental process is required, but the proposed development still triggers the requirements for an HIA under section 38(1) of the NHRA, SAHRA or the relevant provincial heritage authority will be the authorising authority. This entity could then require a full HIA, taking into account the requirements for public participation and stakeholder engagement as stipulated by the regulations of the NHRA.

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Locality

The project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron,

in the Free State Province of South Africa (**Figure 2**). It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality.

2.1.1 Site Description

The project area is situated on Farms Welvaart 63, Swartpan 436, Diamant 37, and Graspan 4; with a development footprint of 80641ha and a NORM footprint of 9567ha (Error! Reference source not found.Error! Reference source not found.). Refer to Table 2 for the farm portions directly affected by the Proposed Project.

Table 2: Farm Portions Directly Affected by the Proposed Project

Farm Name	Farm ID	Farm Portion	SG Code
Welvaart No. 63	RD	0 (RE)	F02400000000006300000
Welvaart No. 63	RD	1	F02400000000006300001
Welvaart No. 63	RD	2	F02400000000006300002
Diamant No. 37	RD	0	F02400000000003700000
Graspan No. 40	RD	0 (RE)	F02400000000004000000
Graspan No. 40	RD	1	F02400000000004000001
Swartpan No. 436	RD	0 (RE)	F02400000000043600000


Jelani Resources
Underground Mining
Locality Map
Legend
957HIA Project Area
0
8
16 km
Data Sources: Kongiwe, Director General Surveys and Mapping, Mowbray, Cape Town, Google
PGS Heritage (Pty) Ltd
Heritage Management Unit
PGS

Figure 2 - Regional Locality of the study area.

2.2 Technical Project Description

2.2.1 Project description

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold. The JV was formed to conduct underground mining operations within the Exploration Joint Venture (EJV) area, situated adjacent to and west of Harmony Gold's existing Target Mine in the Free State Province of South Africa. Jelani initially secured a Prospecting Right (PR) for various minerals within the EJV area. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

The proposed project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.
Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional drill-and-blast breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

Ore will be transported to the shaft ore pass system using a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.
Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mine's life, be used for the movement of men, material and rock depending on which phase the mine is in.

2.2.2 Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within Harmony's existing Target Mine mining right area. No new operational mining infrastructure planned within the JV project area. Underground access infrastructure will comprise either refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.
The infrastructure requirements are intended to support the managerial, supervisory and operational functions associated with the respective underground mining operations/targets. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished.

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated Proposed Project will be relocated to this shaft.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project (and application) being undertaken by Harmony Gold.

Please note that the exact locations of the proposed monitoring stations and associated access roads have not yet been confirmed.

The surface infrastructure will be comprised of the below elements, corresponding to the labels in **Figure 3**.

- No 3 shaft
- Shaft facilities
- Lamp repair
- Proto room
- Lamp room
- Change house facilities
- Main laundry
- Main change house
- Compressor house
- Waste rock dump (not on Figure 3)
- Surface rock handling
- Main substation
- Parking area
- Offices
- Management, administration and technical services
- Mining
- Engineering
- Man winder
- Barlow winder
- Rock winder
- Fridge plant
- Store building
- Services/fitting workshops
- Dirty water dam & pump station
- Sewerage plant
- Evaporation plant
- Change house (not on Figure 3)
- No 4 shaft ventilation fans
- Security office
- Explosives store
- Conveyors
- Laydown area and salvage yard
- Walkway
- Marshalling yard
- Drop off area
- Ablution block
- Laundry
- Change houses
- Offices
- Lapa
- Parking (not on Figure 3)
- Parking
- Turnstiles
- Waiting area
- Lean to roof
- Underground store
- Pump house
- Service boiler shop (not on Figure 3)
- Services boiler store (not on Figure 3)
- Rail line
- Pipeline
- Security
- Timber yard
- Electrical workshop
- Flammable store
- Old oil store



Figure 3 - Infrastructure layout, as supplied by Kongiwe Environmental.

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

3 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

3.1 Methodology for Assessing Heritage Site significance

This Desktop HIA report was compiled by PGS for the proposed underground mining operations. The applicable maps, tables and figures are included, as stipulated in the NHRA and NEMA. The Desktop HIA process consists of Two steps:

Step I – Literature Review and initial site analysis: The background information to the field survey is informed by the Heritage Background Research which was undertaken through archival research and evaluation of satellite imagery and topographical maps of the study area.

Step II – Remote Sensing Verification: A remote sensing scope was conducted by examining comparative satellite imagery provided by ESRI (Environmental Systems Research Institute) and Google, of the proposed project area in order to locate and document sites falling within and adjacent to the proposed development footprint.

The significance of heritage sites is based on four main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
    - Low - <10/50 m^2
    - Medium - 10-50/50 m^2
    - High - >50/50 m^2
- Uniqueness and
- Potential to answer present research questions.

Impacts on these sites by the development will be evaluated as follows:

3.1.1 Site Significance

The applied site significance classification standards are based on the heritage classification of section 3 of the NHRA and developed for implementation according to the grading system approved by SAHRA for HIA. The updated classification and rating system as developed by Heritage Western Cape (HWC) (2021) was implemented in this report.

Site significance classification standards prescribed by the HWC Guideline (2016), were used for the purposes of this report (**Table 3** and **Table 4**).

Table 3: Rating system for archaeological resources.

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by a Provincial Heritage Authority (PHRA). Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the NHRA but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
Not Conservation Worthy (NCW)	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 4: Rating system for built environment resources.

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the NHRA but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section	No research potential or other cultural significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	to be retained as part of the National Estate.	34 of the NHRA can even be lifted by HWC for structures in this category if they are older than 60 years.	

3.2 Methodology used in determining the significance of environmental impacts

The methodology used to determine the environmental impact significance was provided PGS and is explained in **Appendix A**.

4 CURRENT STATUS QUO

4.1 Site Description

4.1.1 Biome Overview

The vicinity, falling in the vicinities of Allanridge, Odendaalsrus and Wesselbron is categorised as within the Grassland Biome, specifically the Central Free State Grassland vegetation unit as described by Mucina and Rutherford (2006). This vegetation type is typically dominated by perennial C_4 grasses, including species of *Themeda*, *Eragrostis* and *Aristida*, with a diverse forb component and very limited woody cover. Due to extensive historical and ongoing land transformation associated with gold mining, agriculture and urban development in the Matjhabeng area, the natural grassland has been largely modified, with remaining vegetation predominantly comprising secondary grassland, disturbed surfaces and ruderal plant communities associated with mining infrastructure, access roads and other anthropogenic features (Mucina & Rutherford, 2006).

4.1.2 Geological and Palaeontological Overview

The study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup). The project footprint is primarily underlain by the Volksrust Formation of the Ecca Group, part of the Karoo Supergroup. The Ecca Group is Early to Late Permian in age (~289–253 Ma) and comprises dark greenish-grey shale, siltstone, and fine-grained sandstone. These lithologies are typically deeply weathered and poorly exposed, with outcrops scarce and restricted to thinly bedded shale showing well-defined bedding planes. Sedimentological evidence indicates that the Volksrust Formation accumulated as deep-water offshore marine deposits (Botha & Botha, 2002).

Trace fossils and abundant plant fossils are known from the Ecca Group, particularly in sandstone-rich units in the northern Karoo Basin. Notably, the upper Volksrust Formation has yielded the first African occurrence

of the bivalve *Megadesmus*, preserved with articulated valves in interbedded shale–siltstone deposits indicative of deltaic deposition near the Ecca–Beaufort Group boundary (Cairncross et al., 2005).

Overlying dolerite and hillslopes are partially calcretised older alluvium deposits, while gravelly colluvial and eluvial deposits dominated by hornfels, sandstone, and dolerite rubble mantle most hillslopes and plateau surfaces. These deposits represent sediment remobilisation and slope processes and contribute to the low-relief topography characteristic of the study area.

The youngest geological units are the Quaternary superficial deposits (Qs), formed during the last ~2.6 million years. These deposits are largely unconsolidated to weakly consolidated, comprising clay, silt, sand, gravel, and calcrete, occurring as relatively thin, discontinuous veneers. They include channel, floodplain, pan, spring, and stream-related sediments and preserve evidence of palaeoclimatic fluctuations, with alternating wetter and drier phases influencing river flow regimes, sedimentation patterns, and vegetation dynamics (Hunter et al., 2006; Tooth et al., 2004; Maud, 2012). Climatic fluctuations during the Quaternary, particularly over the last ~1.8 million years, were among the most pronounced of the Cenozoic Era and strongly shaped the modern geomorphology of the region (Barnosky, 2005).

Fossil assemblages within Qs deposits are generally of low diversity, but may be locally abundant, particularly in fluvial, spring, and pan environments. Fossils typically include diatoms, freshwater gastropods and bivalves, ostracods, trace fossils, mammalian bones and teeth, coprolites, freshwater molluscs, plant microfossils, and tortoise remains. Late Pleistocene deposits along the Modder River have preserved fossilised hyena burrows and lairs, as well as evidence of prehistoric human activity in association with Middle and Later Stone Age artefacts (Broom, 1909a, b; Cooke, 1955; Churchill et al., 2000; Rossouw, 2006; Scott & Brink, 1991; Horowitz et al., 1978; Butzer, 1984). Important fossil localities in the broader region include Florisbad, Baden-Baden, Liebenbergspan, Deelpan, and Erfkroon, with Florisbad designated as a Provincial Heritage Site (Brink, 1987, 1988; Scott & Rossouw, 2005).

4.1.3 Historical Overview

Odendaalsrus was established in 1912, eventually developing into a formal town as agriculture and early trade networks consolidated in the region. Gold was later discovered in April 1946 on the Farm Geduld near the settlement, a discovery that catalysed rapid regional growth and contributed to the expansion of the Free State goldfields. Allanridge, established shortly thereafter in 1947, became the operational centre of the Loraine Gold Mining Company. Its landscape was soon dominated by distinctive mining headgear and extensive reduction works, reflecting the industrial boom that reshaped the region's economy. Allanridge achieved municipal status in 1956, marking its transition from a mining camp to a permanent urban settlement.

While these 20th-century developments define the modern identity of the region, the broader Free State landscape possesses a far deeper history. The province contains an archaeological record extending back millions of years, encompassing Later Stone Age (LSA) rock art traditions, Iron Age stone-walled enclosures, and significant historical battlefields. The area served as a dynamic frontier zone where San hunter-gatherers, Nguni and Sotho-Tswana farming communities, Dutch Voortrekkers, and later British colonial forces interacted; sometimes peacefully, but often in conflict. This landscape also witnessed the large-scale environmental and social transformations catalysed by 19th-century settler expansion, culminating in major regional conflicts such as the South African War (1899–1902) and the Boer Rebellion (1914–1915), both of which left enduring marks on settlement patterns, land use, and mobility.

Archaeologically, the Free State interior is known for Middle Stone Age (MSA) and LSA assemblages often associated with water sources, river terraces, and pan systems. Van der Walt (2013) notes that although MSA artefacts may be found around pans, the study area lacks such features, contributing to the absence of material culture within the development footprint. This absence is further explained by the scarcity of suitable raw materials for stone tool manufacture in the immediate landscape. As a result, no Early, Middle, or Later Iron Age sites are expected within the footprint, although isolated ceramics belonging to the Moloko branch of the Urewe tradition have been recorded further north (Maggs 1976; Mason 1986).

Rossouw's (2012) assessment highlights that in the broader Allanridge/Virginia/Theunissen corridor, Stone Age material is typically found near river drainages, with a notable but poorly contextualised MSA assemblage uncovered in 1953 at the Allanridge railway siding. Additional MSA/LSA finds occur in erosional gullies along major rivers, sometimes in association with faunal remains. However, Rossouw reports no in situ Stone Age or Iron Age remains within or directly adjacent to the proposed development footprint, nor any historic structures older than 60 years or evidence of rock engravings.

4.1.4 Archival and Historical Maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and for determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were assessed by overlaying the study area on the images or map sheets to observe the development of the area and to identify and locate historical structures, possible BGG and/or archaeological sites protected under sections 34 and 36 of the NHRA, present in, or immediately adjacent to, the area.

Historical topographic maps (1:50 000) for various years (**1952, 1954, 1975, 1997** and **2009**) were available for utilisation in the background study (**Figure 4**).

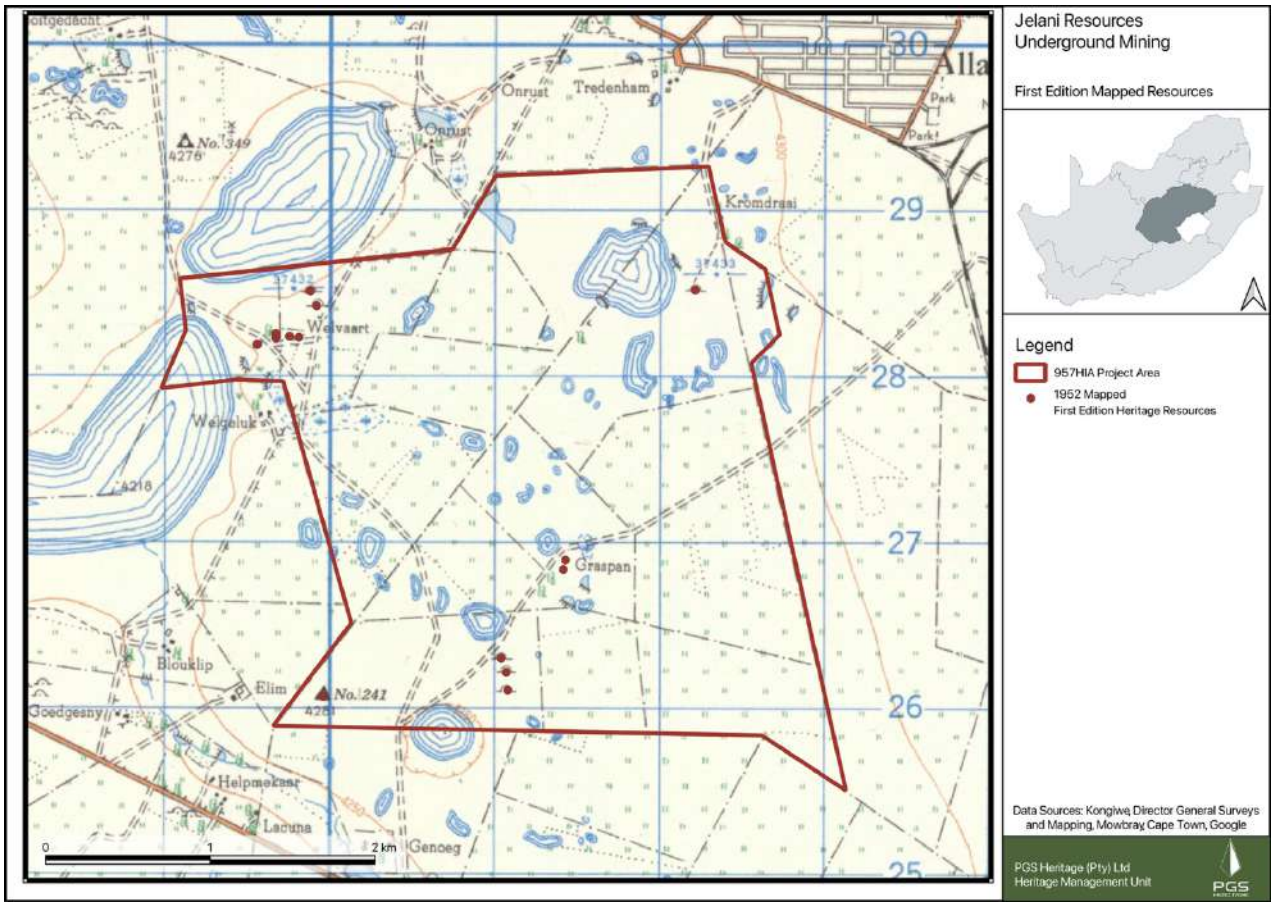


Figure 4 - First edition 1:50000 topographic map with sensitive areas marked in red (1962).

4.1.5 Previous Heritage Impact Assessment Reports from the study area and surroundings

A search of the SAHRIS database revealed that **six** previous archaeological, heritage and palaeontological impact assessments had been undertaken within the surroundings of the study area. These previous studies are listed below in ascending chronological order:

Russouw, L. 2012. Phase 1 Heritage Impact Assessment of a Proposed New Solar Facility at Grootspruit 252 near Allanridge, Free State Province.

van der Walt, J. 2013. Archaeological Scoping Report for the Proposed Grootkop Solar Energy Facility.

van der Walt, J. 2013. Archaeological Impact Assessment for the proposed Grootkop Solar Energy Facility, Free State Province.

Lavin, J., & Presnyakova, D. 2022. The development of various PV Facilities and their associated grid

connections associated with Harmony Gold Mining activities throughout the Free State Province and in the North West Province.

Lavin, J. 2023. Proposed development of the 30MW Harmony Target Solar PV, Allanridge, Free State Province.

Millsteed, B. (*nd*). Desktop Palaeontology Heritage Impact Assessment Report for the Grootkop Solar Energy Facility.

4.1.6 Heritage Screening

A heritage screening was conducted by means of the DFFE National Web-based Environmental Screening Tool as required GN 982**.** According to the heritage screening report, the project area has a **Low Heritage** Sensitivity (**Figure 5**). The remote sensing has shown that scant archaeological and heritage resources were present in the study area and thus is in agreement with the original screening rating.

4.1.7 Heritage Sensitivity

Analysis of topographical maps and satellite imagery enabled the identification of possible heritage sensitive areas. By superimposition and analysis, it was possible to rate these structures according to age and thus their level of protection under the NHRA. **Table 5** lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

Table 5: Tangible heritage site in the study area.

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA sections 3 and 35
Structures	Possibly older than 60 years	NHRA sections 3 and 34
Burial grounds	Graves	NHRA sections 3 and 36

Additionally, evaluation of satellite imagery has indicated the following areas that may be sensitive from a heritage perspective. The analysis of the studies conducted in the area assisted in the development of the following landform type to heritage find matrix (**Table 6**).

Table 6: Landform type to heritage find matrix.

LANDFORM TYPE	HERITAGE TYPE
Crest and foot hill	LSA and MSA scatters, Late Iron Age (LIA) settlements
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Water holes/pans/rivers	MSA and LSA sites, LIA settlements

Farmsteads	Historical archaeological material
Ridges and drainage lines	LSA sites, LIA settlements

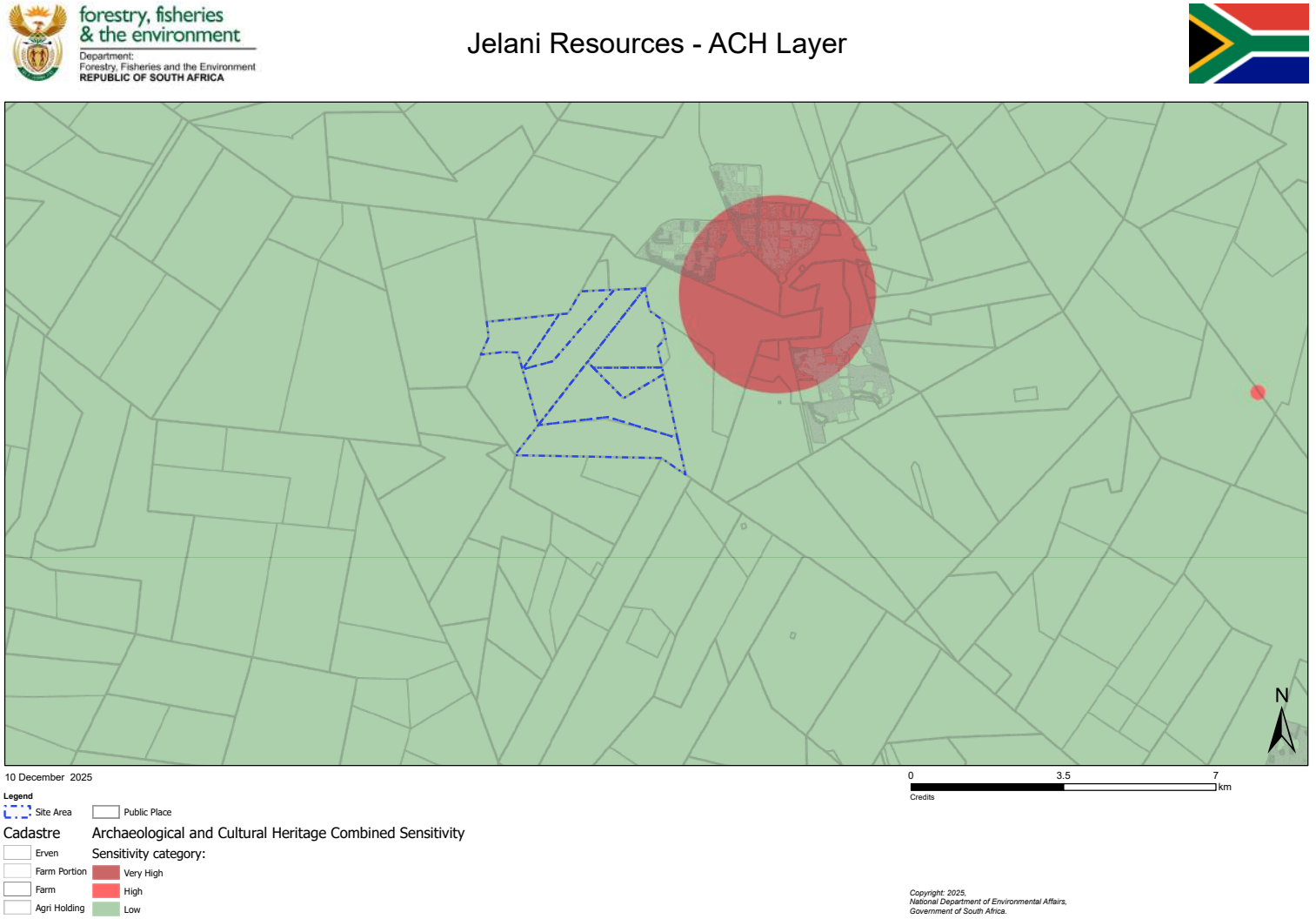


Figure 5 – DFFE Screening map indicating a low sensitivity rating for archaeology and heritage.

4.2 Remote Sensing findings

No physical fieldwork was conducted, and the archival map and remote sensing findings are tabulated below:

Table 7: Potential Heritage Resources identified on archival maps and remote sensing.

Site ID	Resource Type	Resource Trigger	Verified	GPS Coordinates
JR_01	Kraal	Section 34 and 36	No	2959885, -3220354
JR_02	Structure	Section 34	No	2960014, -3220314
JR_03	Structure	Section 34	No	2960017, -3220283
JR_04	**Structure**	**Section 34**	**Yes**	**2960100, -3220291**
JR_05	**Structure**	**Section 34**	**Yes**	**2960174, -3220309**
JR_06	Structure	Section 34	No	2960299, -3220093
JR_07	'Hut' Structure	Section 34 and 36	No	2960270, -3220010
JR_11	**Trig Beacon**	**Section 34**	**Yes**	**2960346, -3222775**
JR_12	'Hut' Structure	Section 34 and 36	No	2961568, -3222506
JR_13	'Hut' Structure	Section 34 and 36	No	2961599, -3222611
JR_14	'Hut' Structure	Section 34 and 36	No	2961608, -3222729
JR_15	Structure	Section 34	No	2961986, -3221899
JR_16	Structure	Section 34	No	2962001, - 3221836
JR_17	'Hut' Structure	Section 34 and 36	No	2962891, -3219986

The historical and current maps for Odendaalsrus 2726DC (1:50 000) for the years **1952**, **1954**, **1975**, **1997** and **2009** allowed for the plotting of **14** resources (**Figure 6**). **Seven** rectilinear structures (**JR_02**, **JR_03**, **JR_04**, **JR_05**, **JR_06**, **JR_15**, and **JR_16**); **five** 'hut' structures (**JR_07**, **JR_12**, **JR_13**, **JR_14**, and **JR_17**); **one** kraal (**JR_01**) and **one** trigonometrical survey beacon (**JR_11**).

With the use of ESRI and Google satellite imagery, **three** (**JR_04**, **JR_05**, and **JR_11**) of the **14** resources were able to be verified (**Figure 7**). These resources trigger section 34 of the NHRA, pertaining to historical structures. Due to there not being fieldwork that was conducted, it is not possible to ascertain full site extents or any status of these or other resources within the project area. As such, **JR_04**, **JR_05** and **JR_11** are graded by *sine aspectu* inference as **NCW** with **low local heritage significance**.

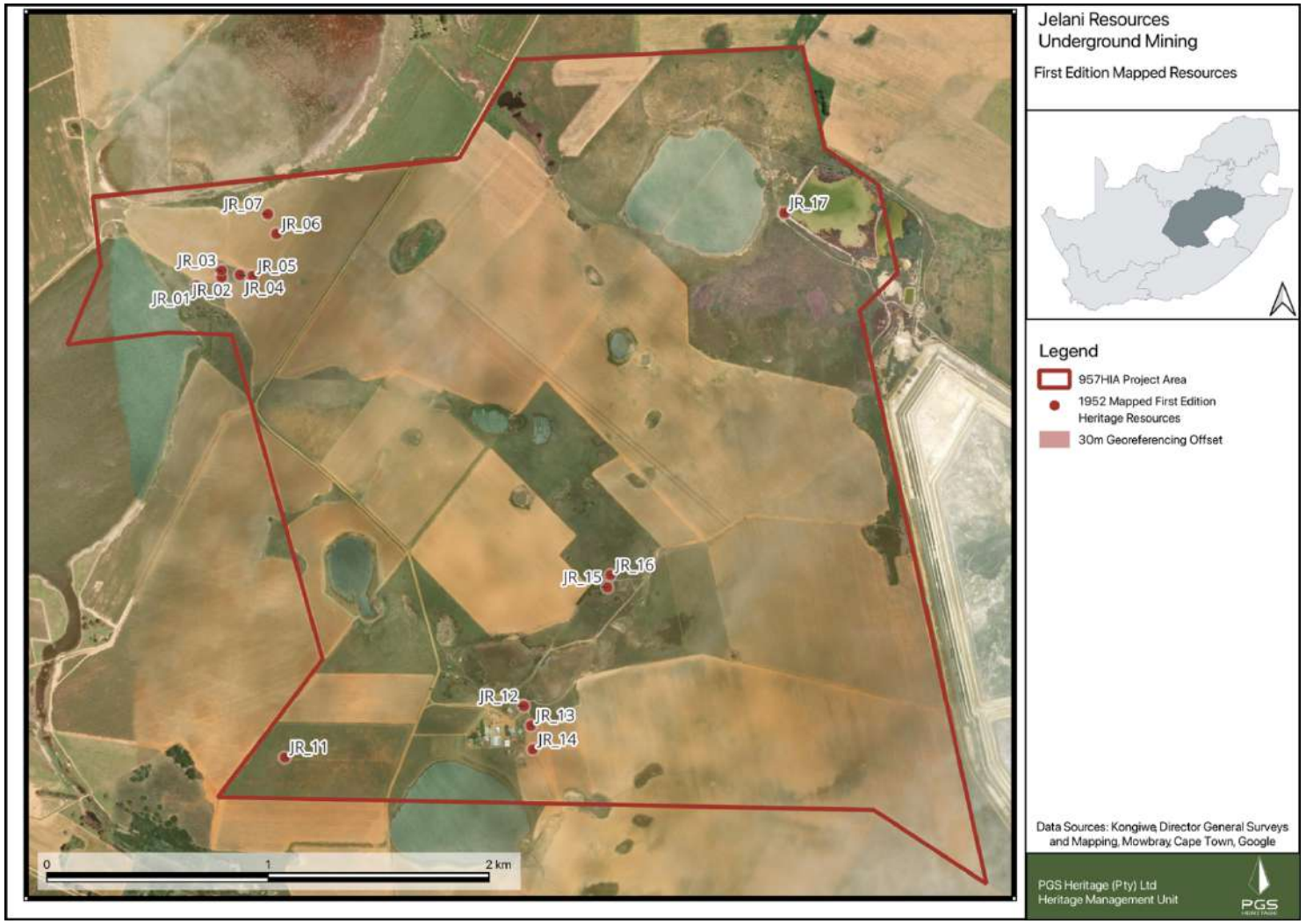


Figure 6 - Identified heritage resources, as recorded on historical maps, within proximity of the proposed Jelani Resources mining operations.

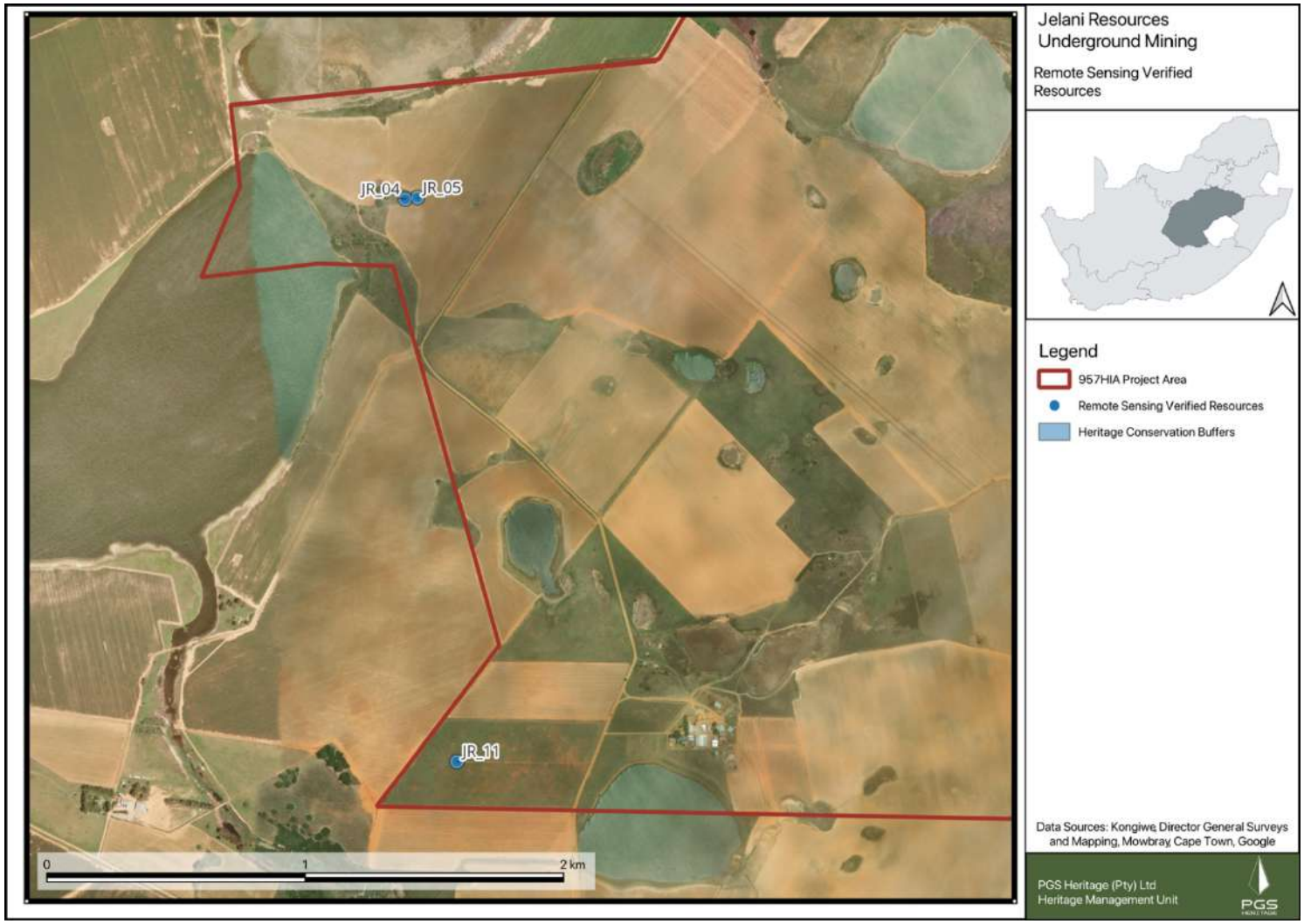


Figure 7 – Remote sensing verified heritage sites with applicable buffer.

4.3 Palaeontology

The Proposed Project is shown on the 1:250 000 Kroonstad (2726) Geological Map (Council for Geoscience, Pretoria; **Figure 8**). The study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup). According to the SAHRIS PalaeoMap, the Volksrust Formation is classified as having High Palaeontological Sensitivity (orange), while the overlying Qs deposits are assigned a Moderate palaeontological sensitivity, both intersecting the proposed development footprint (**Figure 9, Table 3**) (Almond & Pether, 2008; SAHRIS website). The site is also classified as having High Palaeontology Theme Sensitivity (red) in the DFFE National Environmental Screening Tool (**Figure 10**).

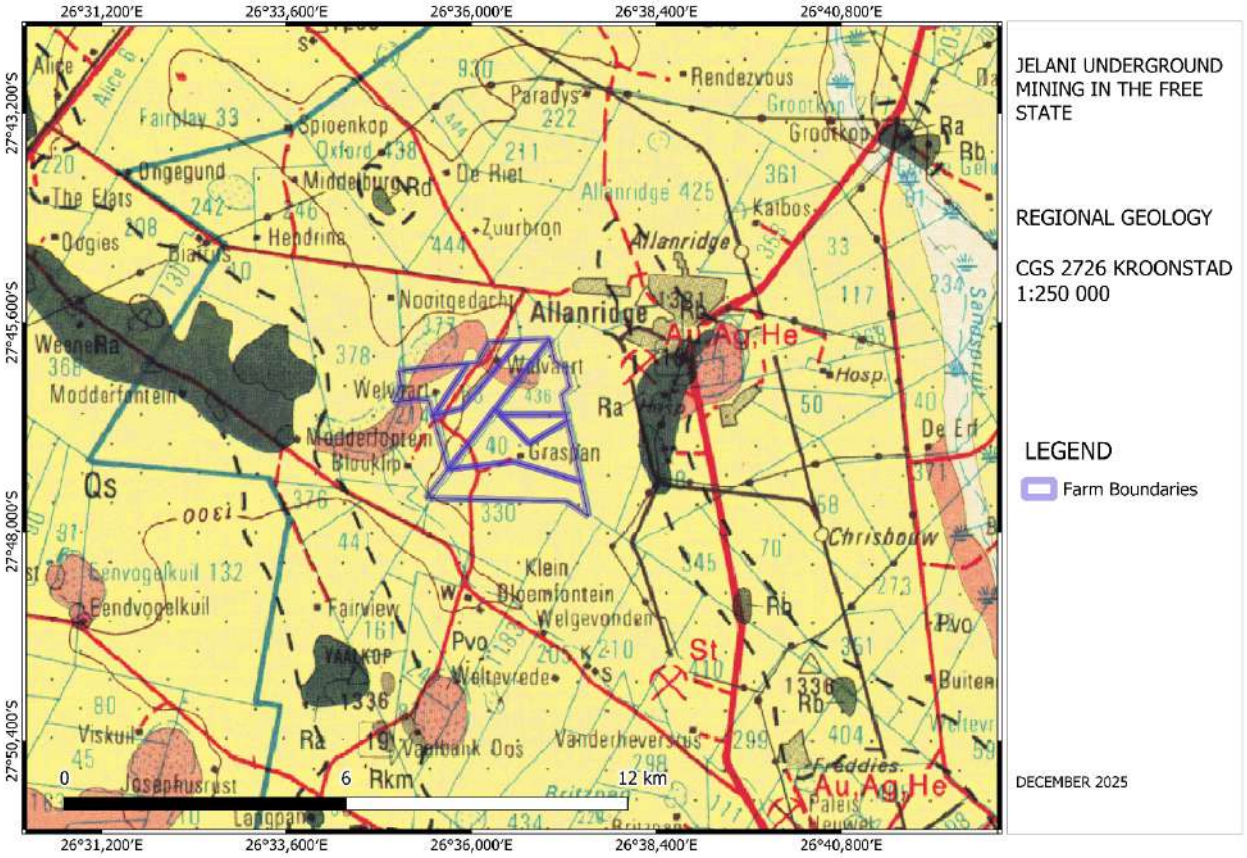


Figure 8 - Extract of the 1:250 000 000 Kroonstad 2726 Geological Map (Council for Geosciences, Pretoria) indicates that the study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup (Butler 2025).

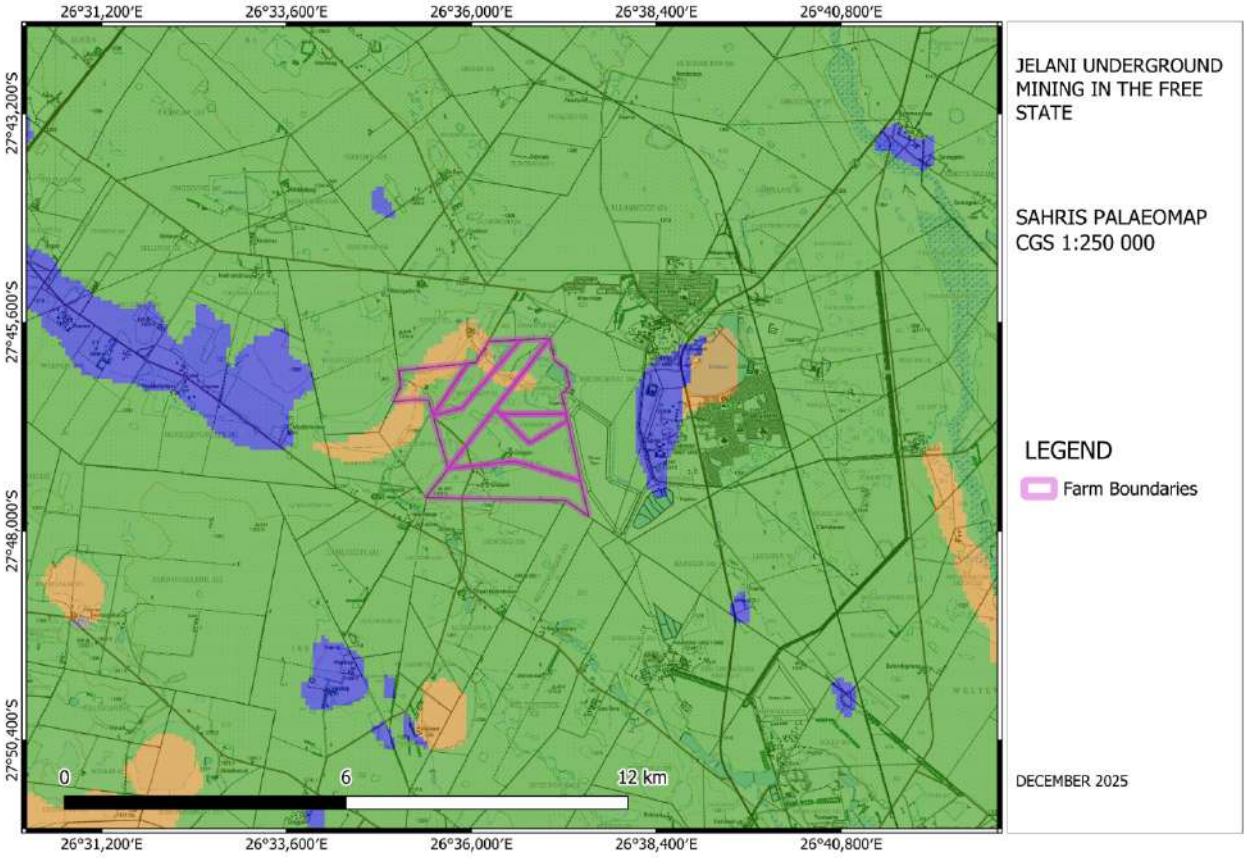


Figure 9 - Extract of the SAHRIS PalaeoMap (Council for Geosciences) indicates that the study area is underlain by sediments with a High (orange) and a Moderate (green) Palaeontological Sensitivity (Butler 2025)

Table 8: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).

Colour	Sensitivity	Required Action
Red	Very high	Field assessment and protocol for finds is required
Orange/yellow	High	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
Green	Moderate	Desktop study is required
Blue	Low	No palaeontological studies are required however a protocol for finds is required
Grey	Insignificant/zero	No palaeontological studies are required
White/clear	Unknown	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

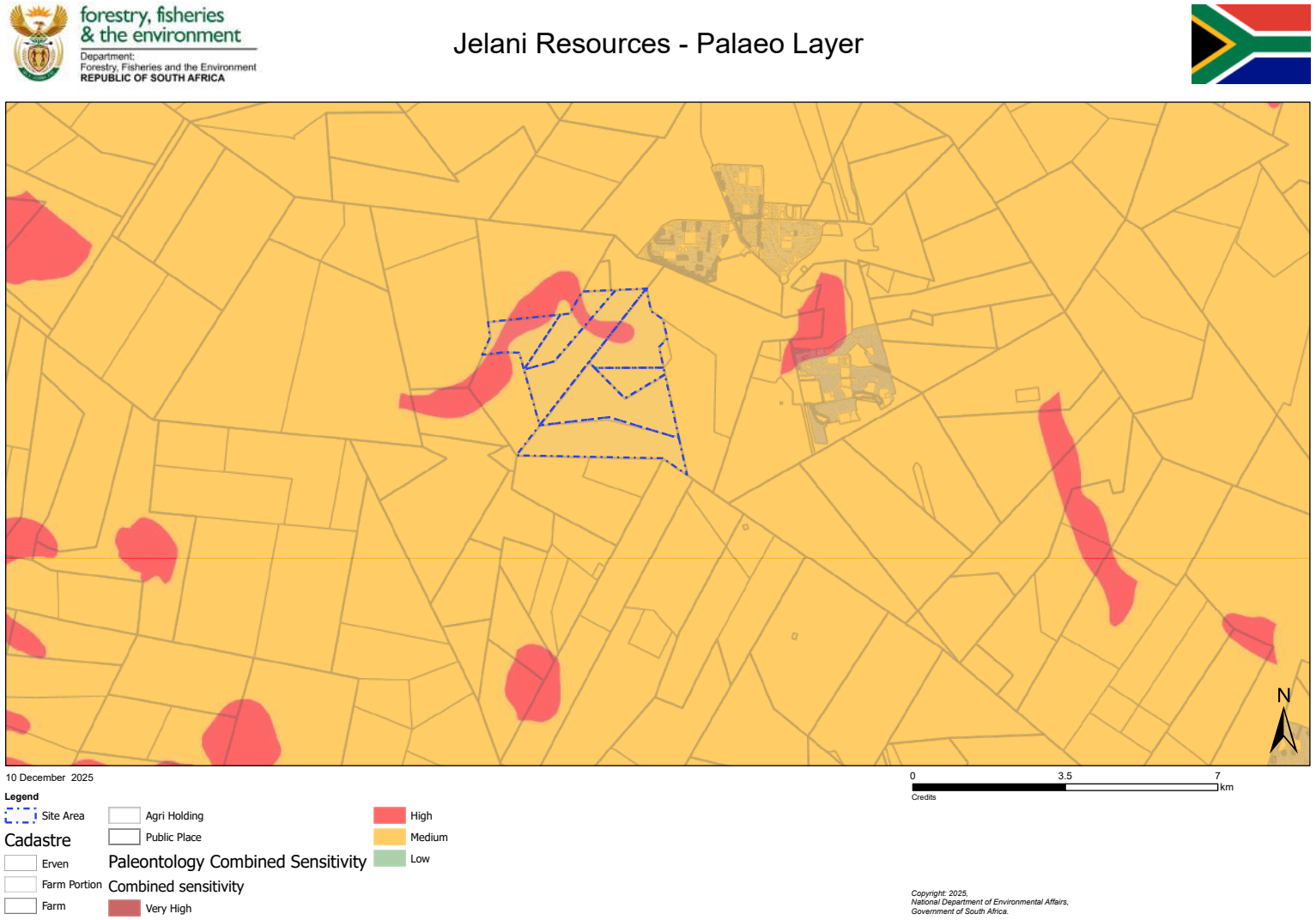


Figure 10 - DFFE Screening map indicating a high-medium sensitivity rating for palaeontology.

Despite this High Sensitivity, no field-based palaeontological investigation was conducted at the site, and therefore the site's Palaeontological Sensitivity could not be irrefutably verified. However, desktop-based research indicates that the palaeontological sensitivity of the area is Low.

Please note that even if the proposed development does not require an Environmental Impact Assessment (EIA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, it may still trigger the requirement for a Heritage Impact Assessment (HIA) in terms of Section 38(1) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). SAHRA may therefore request a full HIA in accordance with Section 38(4) of the NHRA, particularly where public participation and stakeholder engagement requirements, as outlined in the NHRA regulations, are applicable.

5 IMPACT ASSESSMENT

The impact assessment rating is based on the rating scale as contained in **Appendix A**.

The following section provides an analysis of the impact of the Proposed Project area on heritage resources identified within the Jelani Joint Venture (JV) Area Underground Mining Operations:

5.1 Details of all alternatives considered

This section describes alternative means of carrying out the operation and the consequences of not proceeding with the proposed project.

The "no-go" alternative refers to the option of not going ahead with the proposed project. This will entail maintaining the current status quo with no impact from the project.

5.1.1 Damage to unknown finds (Chance Finds Procedure)

A **low significance** has been allocated to chance finds before mitigation, and **very low significance** post-mitigation.

5.1.2 Palaeontology

A high palaeontological significance has been allocated for the construction phase of the development and access roads pre-mitigation and **low post-mitigation.**

5.2 Impact assessment summary table

Implementing the PGS impact assessment methodology provides a quantitative assessment of the impacts of the Proposed Project.

Table 9: Impact Table – Chance Finds – Pre mitigation

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
Damage/ destruction to unknown archaeological heritage (Chance Finds Procedures)	Negative	LOW	Isolated Sites / proposed site	Permanent	Could happen	Low
	-	2	1	5	3	1.60

Table 10: Impact Table – Chance Finds – Post mitigation

IMPACT	IMPACT DIRECTION	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
Damage/ destruction to unknown archaeological heritage (Chance Finds Procedures)	Negative	VERY LOW	Isolated Sites / proposed site	Permanent	Unlikely	Very Low
	-	1	1	5	2	0.93

Table 11: Impact Table – Palaeontology

PALAEONTOLOGICAL								
NATURE	LOSS OF FOSSIL HERITAGE BY DESTRUCTION, MOVEMENT OR SEALING IN OF FOSSIL HERITAGE IN OR BELOW THE EARTH'S SURFACE SITE(S):							
DEVELOPMENT PHASE	DEVELOPMENT IMPACT			IMPACT RATING		RECOMMENDED MITIGATION	IS IMPACT ACCEPTABLE?	
	CRITERIA	*BM	**AM	BEFORE MITIGATION	AFTER MITIGATION		*BM	**AM
PLANNING PHASE	Extent	1	1			NONE	YES	YES

	Probability	1	1	Positive low impact	Positive low impact			
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					
CONSTRUCTION PHASE	Extent	1	1	Negative Medium impact	Negative low impact	NONE	NO	YES
	Probability	1	1					
	Reversibility	4	4					
	Irreplaceability	4	4					
	Duration	4	4					
	Cumulative Effect	1	1					
	Magnitude	2	1					
	Impact Significance	34	16					
OPERATIONAL PHASE	Extent	1	1	Positive low impact	Positive low impact	NONE	YES	YES
	Probability	1	1					
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					
DECOMMISSIONING PHASE	Extent	1	1			NONE	YES	YES

	Probability	1	1	Positive low impact	Positive low impact			
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					

6 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

The following section must be read in conjunction with **Table 13**: Heritage Management Plan for EMPr implementation.

6.1 Construction and operational phases

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camp areas and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind that delays can be costly during construction, and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance; however, foundation holes do offer a window into the past, and it may thus be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project, and these must be catered for. Temporary infrastructure developments, such as construction camps and laydown areas, are often changed or added to the project as required. In general, these are low-impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognise any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following Chance Finds Procedure (CFP) be implemented:

6.2 Chance Finds Procedure

- A heritage practitioner/archaeologist should be appointed to develop a heritage induction program and conduct training for the Environmental Control Officer (ECO) as well as team leaders in the identification of heritage resources and artefacts **during the implementation of the Environmental Management Program (EMPr)**.
- An appropriately qualified heritage practitioner/archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted.
- The qualified heritage practitioner/archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.

- The contractor therefore should have a contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner/archaeologist.

6.3 Possible finds during construction

The study area occurs within a greater historical and archaeological context as identified during the desktop assessment. Soil clearance for infrastructure as well as the proposed reclamation activities, could uncover the following:

- Historical structures and foundations.
- Unmarked BGG.
- Archaeological sites or resources.
- Palaeontological sites or resources.

As aforementioned, fieldwork and ground-truthing were not conducted for this site. As such, the Heritage Management Plan (HMP) laid out in **Table 13**, is written inclusive of the resources as identified on the First Edition 1965 Historical Map (**Figure 4** and **Figure 6**), as hypotheticals. This does not absolve Jelani Resources (Pty) Ltd involved on this site from the due process as per **6.2 Chance Finds Procedure**.

6.4 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for the collection or excavation of heritage resources, and lead times must be worked into the construction time frames. **Table 12** gives guidelines for lead times on permitting.

Table 12: Lead times for permitting and mobilisation.

Action	Responsibility	Timeframe
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – BGG/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of BGG affected by the development	Service provider – Archaeologist, SAHRA, Local and Provincial Government	6 months

6.5 Heritage Management Plan for Environmental Management Programme

Table 13: Heritage Management Plan for EMPr implementation.

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement a chance to find procedures in case where possible heritage finds are uncovered.	Construction	During construction	Applicant ECO Heritage Specialist	ECO (monthly/as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Burial grounds and graves	Demarcate a **30 m** buffer during construction and treat as no-go zones. Should a fence be erected, access to the BGG for interested and affected parties and next-of-kin must be allowed, and suitable measures for public access control must be put in place. An access protocol to manage visits by the next of kin must be included in the EMPr. - If direct impact is unavoidable and relocation is required, a grave relocation process (NHRA section 36) must be undertaken.	Construction	During Construction	Applicant ECO) Heritage specialist	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under section 36 and 38 of NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	This involves social consultation, public participation, and permits from SAHRA under the NHRA and the National Health Act (Act 61 of 2003) (NHA), as amended.						
Historical Homesteads/Structures	Demarcate a **30 m** buffer during construction and treat as no-go zones for sites graded as **IIIC or higher.** If conservation is not possible, mitigation must be undertaken under a NHRA section 34 permit from SAHRA, as well as a section 36 permit in the case of homesteads which hold the chance of containing graves (**JR_01**, **JR_07**, **JR_12**, **JR_013**, **JR_14**, and **JR_17**)[1]. For mitigation of the sites **JR_04**, **JR_05** and **JR_11** (and additionally of **JR_02**, **JR_03**, **JR_06**, **JR_15**, **JR_16**)[2], site documentation by an architectural historian, which consists of drawing and photographing the structure and the layout, as well as recording any special characteristics						

[1] In the event of ground-truthing chance finds revealing any of these sites to exist *in mundo reali*.

[2] In the event of ground-truthing chance finds revealing any of these sites to exist *in mundo reali*.

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	identified during the recording, after which a destruction permit can be applied for, as discussed in the bullet point below. - This includes detailed documentation of the site layout and infrastructural characteristics, and archaeological geophysics and test excavations to investigate the possibility of infant burials for the homesteads which are assessed to hold the potential for graves, which will require a NHRA section 35 permit from SAHRA. - Destruction may proceed only on condition of the issuing of an appropriate permit from the relevant PHRA/SAHRA, which is supported by the mitigation report, or if the cultural heritage resource is to be retained in situ and not altered; an HMP in compliance with section 47(3) of the NHRA must be compiled by a heritage specialist/archaeologist and implemented.						

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
Archaeological sites	Demarcate a **30 m** buffer during construction and treat as no-go zones for sites graded as **IIIC or higher.** As the 30 m buffer is a guideline, it may be reduced only if the site is clearly demarcated, strictly avoided, and such a reduction is approved by SAHRA. If conservation is not possible, mitigation must be undertaken under a NHRA section 35 permit from SAHRA. - This includes a sample surface collection for all types of archaeological material in the impacted areas.	Construction	Construction	Applicant Archaeologist SAHRA Relevant PHRA	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 of the NHRA	Report after construction
Palaeontological resources	If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the ECO in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that	Construction	During Construction	Applicant ECO	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under section 36 and 38 of the NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	mitigation can be carried out by a palaeontologist						

7 CONCLUSIONS AND RECOMMENDATIONS

PGS Heritage (Pty) Ltd was appointed by Kongiwe Environmental to undertake a Desktop Heritage Impact Assessment that forms part of the proposed Jelani Joint Venture (JV) Area Underground Mining Operations on Portions of the Farms Graspan 40, Diamant 37, Swartpan 436 and Welvaart 63 within the Mathjabeng Local Municipality, Lejeweleputswa District Municipality, Free State Province.

A further standalone Paleontological Desktop Assessment was completed by PGS Heritage (Pty Ltd) by Elize Butler (Butler 2025).

No fieldwork or ground-truthing was conducted for either the heritage or palaeontological components of this study. Therefore it is of utmost importance that should any such resources be discovered during forthcoming investigation, construction or operational phases that the **Chance Finds Procedure** as laid out in **Section 6.2** be actioned immediately.

In terms of heritage resources, the following was ascertained:

7.1 Historical Structures – homesteads, farmsteads, kraals and trig beacons

With the use of historical and archival maps, the following resources were identified**. Seven** rectilinear structures (**JR_02**, **JR_03**, **JR_04**, **JR_05**, **JR_06**, **JR_15**, and **JR_16**); **five** 'hut' structures (**JR_07**, **JR_12**, **JR_13**, **JR_14**, and **JR_17**); **one** kraal (**JR_01**) and **one** trigonometrical survey beacon (**JR_11**). With the use of ESRI and Google satellite imagery, **three** (**JR_04**, **JR_05**, and **JR_11**) of the **14** resources were able to be verified (**Figure 7**).

Due to there not being fieldwork that was conducted, it is not possible to ascertain full site extents or any status of these or other resources within the project area. As such, **JR_04**, **JR_05** and **JR_11** are graded by *sine aspectu* inference as **NCW** with **low local heritage significance**.

7.2 Burial grounds and graves

No Burial grounds or graves were identified on the historical or archival maps, nor in the remote sensing process. This does not exclude their presence, however.

7.3 Palaeontology

Desktop research has found that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A High Palaeontological Significance has been allocated for the mining /operational phase of the development pre-mitigation and a low significance post mitigation**.

These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Proposed Project, as well as included as conditions for Environmental Authorisation.

Mitigation measures

As aforementioned, fieldwork and ground-truthing were not conducted for this site. As such, the Heritage Management Plan (HMP) laid out in **Table 13**, is written inclusive of the resources as identified on the First Edition 1965 Historical Map (**Figure 4** and **Figure 6**), as hypotheticals. This does not absolve Jelani Resources (Pty) Ltd, involved on this site from the due process as per **6.2 Chance Finds Procedure**.

Conclusion

It is the combined considered opinion of the heritage specialists that the Proposed Project will have no direct impact on any known cultural heritage resources, should they remain as those verified (**JR_04**, **JR_05** and **JR_11**).

With the implementation of recommended mitigation measures in case of a chance find, the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project.

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APPENDIX A

ENVIRONMENTAL IMPACT METHODOLOGY

PGS: IMPACT ASSESSMENT METHODOLOGY

Impact Assessment Methodology

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

Significance;
Spatial scale;
Temporal scale;
Probability; and
Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in **Table 14**.

Table 14: Quantitative rating and equivalent descriptors for the impact assessment criteria

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	Proposed site	Incidental
2	LOW	Study area	Short-term
3	MODERATE	Local	Medium/High-term
4	HIGH	Regional / Provincial	Long-term
5	VERY HIGH	Global / National	Permanent

A more detailed description of each of the assessment criteria is given in the following sections.

Significance Assessment

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1 000 km^2) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in Table 15 below.

Table 15: Description of the significance rating scale

RATING		DESCRIPTION
5	Very high	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	High	Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	Moderate	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	Very low	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity are needed, and any minor steps which might be needed are easy, cheap, and

		simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	No impact	There is no impact at all - not even a very low impact on a party or system.

Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in ***Table 16*****.**

Table 16: Description of the significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a regional scale (District Municipality to Provincial Level).
3	Local	The impact will affect an area up to 10 km from the proposed site.
2	Study Site	The impact will affect an area not exceeding the property.
1	Proposed site	The impact will affect an area no bigger than the site.

Duration Scale

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in **Table 17**.

Table 17: Description of the temporal rating scale

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium/High term	The environmental impact identified will operate for the duration of life of facility.
4	Long term	The environmental impact identified will operate beyond the life of operation.
5	Permanent	The environmental impact will be permanent.

Degree of Probability

Probability or likelihood of an impact occurring will be described as shown in **Table 18** below.

Table 18: Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very Likely

5	It's going to happen / has occurred

Degree of Certainty

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used as discussed in **Table 19**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 19: Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.
Don't know	The consultant cannot, or is unwilling, to make an assessment given available information.

Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

Impact Risk = (SIGNIFICANCE **+** *Spatial* **+** Temporal) X Probability

3 **5**

An example of how this rating scale is applied is shown in **Table 20**.

Table 20: Example of Rating Scale

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating

	LOW	Local	Medium/High-term	Could Happen	
Impact to air	2	3	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criteria rating of 2,67. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes, as described in the **Table** *21* below.

Table 21: Impact Risk Classes

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	**Very Low**
1.1 – 2.0	2	**Low**
2.1 – 3.0	3	**Moderate**
3.1 – 4.0	4	**High**
4.1 – 5.0	5	**Very High**

Therefore, with reference to the example used for air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

APPENDIX B

PGS SPECIALIST CVs



ALEXANDER ANDREOU

Heritage Practitioner & Built Environment Specialist

PROFILE

My professional career includes research, curation, conservation, risk mitigation, critical urbanism, and legislative compliance. I hold two advanced postgraduate degrees; with my MPhil research focusing on (re)interpretation in the archaeological praxis, and my PhD research on the role of heritage built environment and what I coined as 'archived buildings' in the creation and recording of public and social histories.

My work at PGS Heritage is centered on leading the Built Environment Unit, which focuses on the safeguarding and activation of South Africa's historic fabric.

CONTACT

PHONE NUMBER:
+27 63 777 3270

WEBSITE:
www.pgsheritage.com

EMAIL ADDRESS:
alex@pgsheritage.com

PGS HERITAGE

EDUCATION

University of Pretoria
2011 - 2013
BA Archaeology & Ancient Cultures

University of Pretoria
2015
Post-Graduate Diploma Museum and Heritage Studies

University of Cape Town
2019 - 2021
MPhil Conservation of the Built Environment

University of Pretoria
2023 - 2025
PhD Development Studies (Research Chair for Critical Architecture and Urbanism)

WORK EXPERIENCE

PGS Heritage Group of Companies
(South Africa, Lesotho, Mozambique, and Portugal)
Senior Heritage Specialist
2025 - present
I support the advancement of PGS Heritage's presence within the built heritage sector, providing specialist input on conservation management strategies, interpretive frameworks, and practical application of national heritage legislation within development and planning contexts. My role includes authorship, editorial, and technical review support for HIAs and related reports, as well as archival and historical research.

Nedbank Group Ltd
Heritage & Arts Manager *(i.a.)*
2016 – 2025
Led a series of dynamic and multidisciplinary roles that blended cultural stewardship with practical management. It ensured that Nedbank's heritage and art assets were safe guarded in alignment with best practice and national legislation. The role wove together archival expertise with strategic initiatives, ensuring the preservation, accessibility, and visibility of the institution's historical legacy.

University of Pretoria Museums
Cultural Officer *(i.a.)*
2014 – 2016
Championed public engagement, documentation, and preservation across UP's museological collections, specifically the Mapungubwe gold, bone, ivory, and ceramics. I contributed to key research, access, and conservation initiatives through collaborative, community-focused projects and international partnerships.

PROFESSIONAL AFFILIATION

Accredited Heritage Practitioner
Association of Professional Heritage Practitioners

Accredited Archaeologist
Association of Southern African Professional Archaeologists

ELIZE BUTLER

Associate

Palaeontologist

PROFILE

Elize has conducted approximately 900 Paleontological Impact Assessments for developments in the Free State, KwaZulu-Natal, Eastern, Northern and Western Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (cum laude) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa. She has experience in locating, collecting, and curating fossils. She has been a member of the Paleontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

CONTACT

PHONE NUMBER:
+27 (84) 447-8759

WEBSITE:
www.pgsheritage.com

EMAIL ADDRESS:
elize@pgsheritage.com

EDUCATION

University of the Orange Free State
1988
B.Sc. Botany and Zoology

University of the Orange Free State
1991
B. Sc (Hons) Zoology

University of the Orange Free State
2009
M. Sc. Cum laude (Zoology)
Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont Galesaurus planiceps: implications for biology and lifestyle.

WORK EXPERIENCE

PGS Heritage Group of Companies

Associate – Palaeontologist
2025 - present
Appointed as Associate - Palaeontologist responsible for palaeontological impact studies

Banzai Environmental - Palaeontologist
2016 - present
Palaeontologist and Director responsible for palaeontological impact studies

National Museum, Bloemfontein - Principal Research Assistant and Collection Manager
1998 - 2022

National Museum, Bloemfontein - Research Assistant
1993-1997

PROFESSIONAL AFFILIATION

Professional Palaeontologist
Paleontological Society of South Africa (PSSA) – since 2006

JELANI JOINT VENTURE AREA UNDERGROUND MINING PROJECT

Palaeontological Desktop Assessment

Document Number	Revision	Date
PGS-957HIA-002-RPT_02	1.0	07 September 2026

PGS HERITAGE

+ 27 (0) 12 332 5305 | +27 (0) 86 675 8077 | contact@pgsheritage.com | Block D, The Village, 307 Glenwood Drive, Fearie Glen, 0043

Offices in South Africa, Kingdom of Lesotho, Mozambique and Portugal

Head Office:
Block D
The Village
307 Glenwood Road
Faerie Glen Pretoria,
South Africa

Directors: HS Steyn, PD Birkholtz, W Fourie

REVISION HISTORY

Version	Issue Date	Description of Changes
01	17 December 2025	First draft
2.0	09 September 2026	Client updates

Specialist Declaration for assessments undertaken for application for authorisation in terms of the National Environmental Management Act (Act 107 of 1998) as amended and the Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) as amended

I, Elize Butler declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (Act 107 of 1998) as amended, when applying for environmental authorisation which were promulgated in Government Notice 320 (Government Gazette 43110, 20 March 2020) and in Government Notice 1150 (Government Gazette 43855, 30 October 2020).
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
- any decision to be taken with respect to the application by the competent authority; and;
- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of the Environmental Impact Assessment Regulations (Government Notice R982, Government Gazette 38282, 4 December 2014) as amended and is punishable in terms of section 24F of the National Environmental Management Act (Act 107 of 1998).
- I will take into account, to the extent possible, the matters listed in section 38 of the National Heritage Resources Act (Act 25 of 1999) when preparing the application and any report relating to the application.

HERITAGE CONSULTANT: PGS Heritage (Pty) Ltd

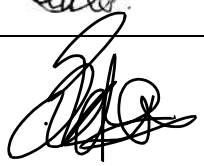
CONTACT PERSON: Elize Butler – Palaeontologist

Tel: +27 (0) 12 332 5305

Email:

SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title			
Control	**Name**	**Signature**	**Designation**
Author	Elize Butler		**PGS Heritage** – Associate Palaeontologist
Reviewed	Alexander Andreou		**PGS Heritage** - Heritage Advisory Unit Manager and Senior Heritage Specialist

CLIENT: **Kongiwe Environmental (Pty) Ltd**

CONTACT PERSON: **Umeshree Naicker**
Principal Environmental Consultant
unaicker@kongiwe.com

SIGNATURE: _____

This Palaeontological Impact Assessment report (as part of the Heritage Impact Assessment) has been compiled considering the Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) Appendix 6 as amended by Government Notice 326 (Government Gazette 40772, 7 April 2017) requirements for specialist reports as indicated in the table below:

Requirements Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) Appendix 6 as amended	The relevant section in the report
1. (1) (a) (i) Details of the specialist who prepared the report	Page iii and Section 1.2 of the Report – Contact details and company, and Appendix B
(ii) The expertise of that person to compile a specialist report, including a curriculum vitae	Section 1.2 – refer to Appendix B
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page iii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 3 – Approach and Methodology
(cA) An indication of the quality and age of the base data used for the specialist report	Section 4.1 – Geological and Palaeontological History of the Baseline Environment
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development, and levels of acceptable change;	Section 5
(d) The duration, date, and season of the site investigation and the relevance of the season to the outcome of the assessment	Executive Summary and Section 7
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process, inclusive of equipment and modelling used	Section 3 – Assessment Methodology
(f) Details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 4
(g) An identification of any areas to be avoided, including buffers	Executive Summary and Sections 7
(h) A map superimposing the activity, including the associated structures and infrastructure, on the environmental sensitivities of the site, including areas to be avoided, including buffers;	Section 4 – Geological and Palaeontological History
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3 – Assumptions and Limitations
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Executive Summary and 7
(k) Any mitigation measures for inclusion in the EMPr	Executive Summary and Sections 7
(l) Any conditions for inclusion in the environmental authorisation	Executive Summary and Sections 7
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Executive Summary and Sections 7
(n)(i) A reasoned opinion as to whether the proposed activity, activities, or portions thereof should be authorised and	Executive Summary and Sections 7
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities, or portions thereof should be authorised, any avoidance, management, and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Executive Summary and Sections 7
(o) A description of any consultation process that was undertaken during the carrying out of the study	Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) process.

Requirements Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) Appendix 6 as amended	The relevant section in the report
(p) A summary and copies of any comments that were received during any consultation process	Not applicable. To date, no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	N/A
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 1.4: Compliance with SAHRA guidelines

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd was appointed to conduct the Heritage Impact Assessment (HIA) (archaeology and palaeontology) for the proposed **Jelan**i **Underground Mining Operations** in the Free State Province. This study is the Palaeontological Desktop Assessment (PDA) for the Proposed Project. In compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the National Heritage Resources Act (Act No. 25 of 1999, Section 38) (NHRA), this PDA aims to determine the potential presence of fossil material within the proposed development area, assess the likely impact of the project on palaeontological heritage, and recommend appropriate mitigation measures to protect any fossil resources that may be affected.

The proposed Jelani Underground Mining Operations Project is underlain by the Quaternary Superficial sediments as well as the Volksrust Formation (Ecca Group, Karoo Supergroup). According to the SAHRIS PalaeoMap, the Volksrust Formation is classified as having High Palaeontological Sensitivity, while the overlying deposits are assigned a Moderate Palaeontological Sensitivity, both intersecting the proposed development footprint (Almond & Pether, 2008; SAHRIS website). The site is also classified as having High Palaeontology Theme Sensitivity (red) in the DFFE (Department of Forestry Fisheries and the Environment) National Environmental Screening Tool.

Due to the Sensitivities no site investigation was conducted for this project. However, Desktop research has found that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A High Palaeontological Significance has been allocated for the mining /operational phase of the development pre-mitigation and a low significance post mitigation**. The **mining /operational** will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Decommissioning phase**. The No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development are considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that **no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils**.

If significant fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Jelani **Underground Mining Operations** in the Free State Province**, as well as included as conditions for Environmental Authorisation.**

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ABBREVIATIONS AND TERMINOLOGY

Abbreviations	Description
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
CA	National Competent Authority
CV	Curriculum Vitae
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
HIA	Heritage Impact Assessment
JV	Joint Venture
LoM	Life of Mine
Ma	Millions of years ago
MR	Mining Right
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PDA	Palaeontological Desktop Assessment
PIA	Palaeontological Impact Assessment
PSSA	Palaeontological Society of South Africa
PR	Prospecting Right
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
S&EIA	Scoping & Environmental Impact Assessment
ToR	Terms of Reference

Fossil

A fossil is the preserved remains or traces of an organism that lived in the distant past, typically millions of years ago. These remains may include shells, mineralised bones, and other hard parts of ancient animals and plants, as well as impressions, moulds, and casts left in sedimentary rocks where organic material has decayed. Fossils offer important insights into the history of life on Earth, enabling scientists to study the evolution, diversity, and distribution of past organisms and ecosystems.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act (Act 25 of 1999) as amended.

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under section 3 of the National Heritage Resources Act (Act 25 of 1999) as amended,

- places, buildings, structures and equipment of cultural significance,
- places to which oral traditions are attached, or which are associated with living heritage,
- historical settlements and townscapes,

- landscapes and natural features of cultural significance,
- geological sites of scientific or cultural importance,
- archaeological and palaeontological sites,
- graves and burial grounds and
- sites of significance relating to the history of slavery in South Africa.

Palaeontology

Palaeontology is the scientific study of ancient life through time and entails the examination of fossils—remains, traces, or impressions of organisms preserved in rocks. It seeks to understand the evolution, diversity, and interactions of past life forms, as well as the environmental conditions in which they lived. By integrating geology and biology, palaeontology provides crucial insights into the history of life on Earth over geological time.

The term palaeontology derives from the Latin palaeontologia, which in turn originates from the Greek words palaios (παλαιός), meaning “ancient,” and ontos (ὄντος), meaning “being” or “creature,” combined with the suffix -logia, meaning “study of.” The literal translation is therefore “the study of ancient beings.” In English usage, the classical Latin, British and South African spelling is palaeontology, while the American spelling omits the a after the p, rendering paleontology. In this report the Latin, English and South African spelling of Palaeontology will be used.

1 INTRODUCTION

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold. The JV was formed to conduct underground mining operations within the Exploration Joint Venture (EJV) area, situated adjacent to and west of Harmony Gold's existing Target Mine in the Free State Province of South Africa. Jelani initially secured a Prospecting Right (PR) for various minerals within the EJV area. Following the exploration and licensing phases, Jelani intends to initiate **underground mining operations** within the same area (hereafter the **Proposed Project**).

Kongiwe Environmental has been appointed by Jelani Resources as the independent Environmental Assessment Practitioner (EAP) to manage and facilitate the Environmental Authorisation process for Jelani underground mining operations. The application process will be undertaken in accordance with the requirements of the EIA Regulations, 2014 (as amended), promulgated under the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended),

Kongiwe has appointed PGS Heritage (Pty) Ltd to undertake the Heritage Impact Assessment (HIA), inclusive of archaeological and palaeontological components, for the Proposed Project. This report constitutes the Palaeontological Desktop Assessment (PDA) for the project.

1.1 Scope of the Study

The aim of the study is to identify palaeontological sites/sensitivity that may occur in the Proposed Project area. The PDA aims to inform the Environmental Impact Assessment (EIA) to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) as amended (NHRA).

1.2 Specialist Qualifications

This study has been conducted by Mrs Elize Butler, palaeontologist of Banzai Environmental (Pty) Ltd. She has conducted approximately 900 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Western, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (cum laude) in Zoology (specialising in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than thirty years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

A short CV is attached in **Appendix B**, while a detailed CV could be provided on request.

1.3 Assumptions and Limitations

Geological maps primarily focus on the lithology and structural geology of an area, and their accompanying sheet explanations were not intended to emphasise palaeontological heritage. Many remote regions of South Africa remain unexplored by palaeontologists, with available data often derived solely from aerial imagery. Furthermore, fossil locality and geological data stored in museum and university collections are frequently outdated or were historically recorded with limited accuracy.

To supplement these gaps, comparable Assemblage Zones and geological formations from better-studied regions are often referenced to infer the potential for fossil presence in previously undocumented areas. In desktop studies, it is typically assumed that fossil heritage may be present where similar stratigraphy is exposed. However, a field-based assessment is essential to validate and refine these assumptions, thereby enhancing the accuracy of the palaeontological sensitivity rating.

1.3.1 Additional Information Consulted

In compiling this report, the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)
- 1: 50,000 scale topographic maps.
- Palaeosensitivity map on SAHRIS (South African Heritage Resources Information System) website.
- DFFE Screening Tool of the study area
- A Google Earth KMZ files and background information on the proposed development was supplied by Kongiwe as received from the developer.
- 1:250 000 Kroonstad 2726 Geological Map (Council for Geosciences, Pretoria).
- Palaeontological Impact Assessments in the same area are studied
- Due to the Sensitivities No site-specific investigation has been conducted for the project as only a desktop assessment is required.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- Government Notice 320 (Government Gazette 43110, 20 March 2020) (GN 320) - general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified,
- EIA Regulations (Government Notice 982 (Government Gazette 38282, 4 December 2014)) Appendix 6 (GN 982) as amended by Government Notice 326 (Government Gazette 40772, 7 April 2017) (GN 326),
- National Heritage Resources Act (Act 25 of 1999) as amended.

1.4.1 Government Notice 320 (Government Gazette 43110, 20 March 2020)

Although minimum standards for Archaeological Impact Assessment (AIA) (2007) and Paleontological Impact Assessment (PIA) (2012) were published by the South African Heritage Resources Agency (SAHRA), GN 320 requires sensitivity verification for a site, for which no specific assessment protocol related to any theme has been identified, on the national web based environmental screening tool. The requirements for GN 320 are listed in **Table 1** and the applicable section in this report noted.

Table 1: Reporting requirements for GN 320.

GN 320	Relevant section in report	Where not applicable in this report
2.2 (a) a desktop analysis, using satellite imagery;	section 4.1	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	Executive Summary and Section 7	
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool;	Section 1.4	
2.3(b) contains motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity;	Section 1.4	

1.4.2 Environmental Impact Assessment Regulations (Government Notice 982, Government Gazette 38282, 4 December 2014) Appendix 6 as amended by Government Notice 326 (Government Gazette 40772, 7 April 2017) requirements

This PDA report has been compiled considering the GN 326 Appendix 6 requirements for specialist reports.

1.4.3 Heritage screening - Department of Forestry, Fisheries and the Environment

A heritage screening was conducted by means of the Department of Forestry, Fisheries and the Environment (DFFE) National Web-based Environmental Screening Tool as required by GN 982.

DFFE issued guidelines in April 2025 concerning the application of the screening tool in relation to cultural heritage, archaeology, and palaeontological themes. The guidelines indicate that the "theme layer represents a limited number of known" heritage and palaeontological resources. These resources are widely distributed and may be present at any development site within South Africa. The guidelines state the following in terms of -

- HIA "*Therefore, a Heritage Impact Assessment (HIA) must be undertaken for all developments, irrespective of the sensitivity shown on the archaeological and cultural heritage theme layer*"
- PIA "*Therefore, a Palaeontological Impact Assessments (PIAs)* [sic] *must be undertaken for all developments as per the PalaeoSensitivity Map provided on* [South African Heritage Resources Information System] *SAHRIS, irrespective of the sensitivity shown on the palaeontology theme layer."*

The guidelines further stipulate the requirements for both an HIA and PIA must:

HIA	**PIA**
▪ meet the requirements of section 38(3) of the NHRA or section 41(1) of the KwaZulu-Natal Amafa and Research Institute Act, 2018 (Act No. 5 of 2018) (KNARIA), should the development be in KwaZulu-Natal (KZN); ▪ must be undertaken by a qualified heritage specialist; ▪ be undertaken in line with GN 326 Appendix 6; and ▪ for HIA submitted to SAHRA the report must also comply with the requirements of the "2007 Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports", accessible at https://sahris.sahra.org.za.	▪ meet the requirements of section 38(3) of the NHRA or section 41(1) of the KNARIA should the development be in KZN; ▪ must be undertaken by a qualified palaeontological specialist; ▪ be undertaken in line with GN 326 Appendix 6; and ▪ for PIA submitted to SAHRA, the report must comply with the requirements of the "2012 Minimum Standards: Palaeontological Components of Heritage Impact Assessments" [sic], accessible at https://sahris.sahra.org.za.

According to the heritage screening report, the palaeontological sensitivity of the development area is Very High (dark red). This Very High sensitivity classification signifies that a detailed palaeontological investigation is required. It is therefore recommended that such an investigation be conducted following site clearance, particularly when excavations reach depths of 1 to 1.5 meters.

1.4.4 National Heritage Resources Act (Act 25 of 1999) as amended

- Protection of Heritage Resources – sections 34 to 36; and
- Heritage Resources Management – section 38.

The NHRA is utilised as the basis for the identification, evaluation, and management of heritage resources and in the case of Cultural Resources Management (CRM) those resources specifically impacted on by development as stipulated in section 38 of the NHRA. This study falls under section 38(8) and requires comment from the relevant heritage resources authority.

Section 24(2) of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA) requires environmental authorisation from the environmental authority for certain activities that have been identified and must undergo an EIA or BA process. Similarly, section 38 of the NHRA lists specific development activities that require notice to the heritage resources authority to determine if an HIA process is necessary. Approval from the heritage authority is mandatory before proceeding with the development activities.

To avoid redundancy and facilitate co-ordination between NEMA and NHRA requirements, section 38(8) of the NHRA states that if the development activities listed in section 38(1) require an EIA under NEMA; a separate HIA and approval from the heritage resources authority are unnecessary. However, the environmental authority must ensure that the heritage resources authority's requirements for HIA are fulfilled and that its comments and recommendations are considered before granting environmental authorisation.

Therefore, if a NEMA EIA is required for the development activities listed under section 38 of the NHRA, separate HIA and EIA processes may not be followed, and different decisions may not be issued under NHRA and NEMA. The EIA process will be followed, and if the heritage resources authority requires a HIA, it must be conducted as one of the EIA specialist studies.

The environmental authority must ensure that the heritage resources authority's requirements for the assessment are met. A separate heritage approval may not be issued, but the environmental authority must consider the heritage resources authority's comments and recommendations before granting or refusing environmental authorisation.

It must however be noted that if no environmental process is required, but the proposed development still triggers the requirements for and HIA under section 38(1) of the NHRA, SAHRA or the relevant provincial heritage authority will be the authorising authority. This entity could then require a full HIA taking into account the requirements for public participation and stakeholder engagement as stipulated by the regulations of the NHRA.

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Locality

The **Jelani Underground Mining Operations** project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 2,5km west of Allanridge, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality (**Figure 1-2).**

The total surface area assessed is 956,76 hectares (ha). (**Figure 1-2**).

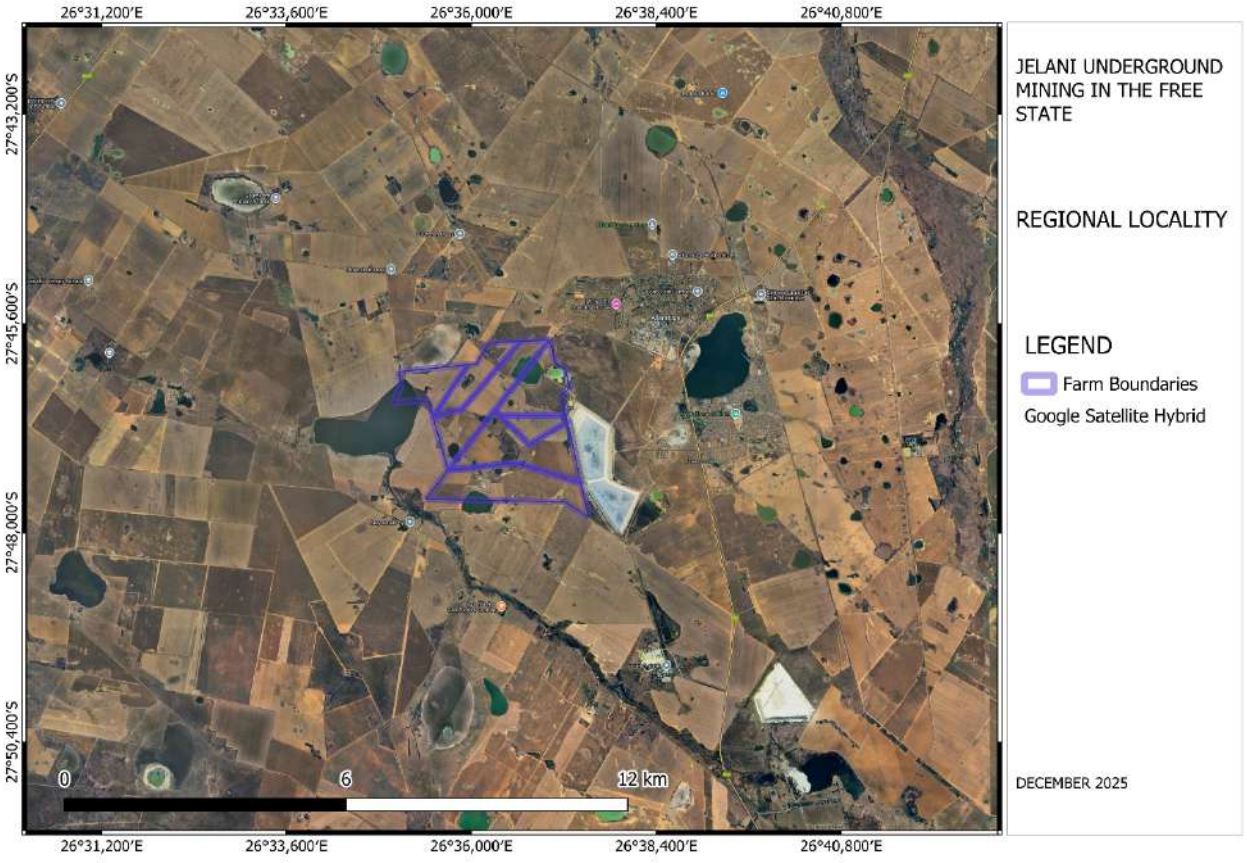


Figure 1 - Regional Locality map of the proposed Jelani Underground Mining Project in the Free State.

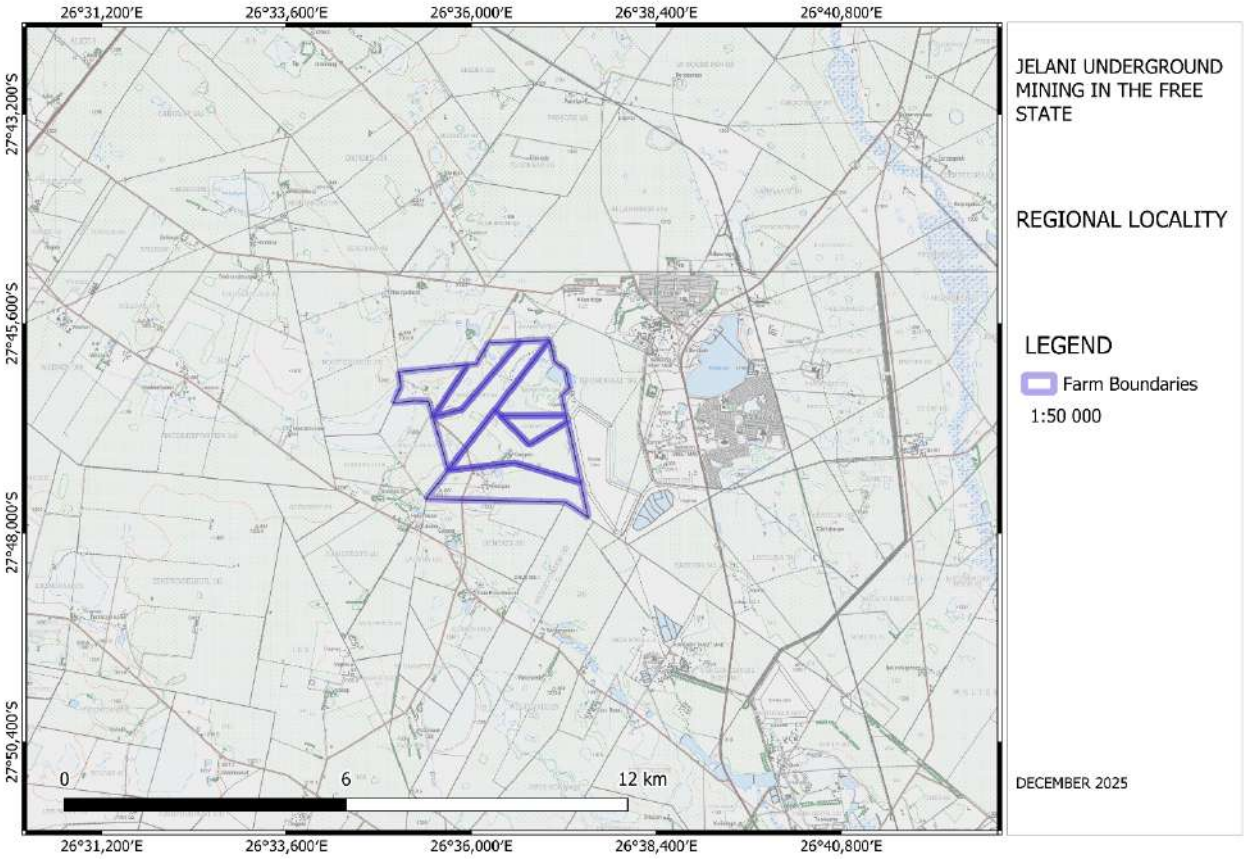


Figure 2 – Site locality

2.2 Technical Project Description

2.2.1 Project description

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration and Harmony Gold. The JV was formed to conduct underground mining operations within the Exploration Joint Venture (EJV) area, situated adjacent to and west of Harmony Gold's existing Target Mine in the Free State Province of South Africa. Jelani initially secured a Prospecting Right (PR) for various minerals within the EJV area. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area (hereafter the Proposed Project).

The Proposed Project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,

- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site (approximately 1,200 mbs). As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage).

Conventional Breast Mining

Where the orebody dips below 55°, conventional breast mining will be used. Footwall drives will be developed in the strike direction, between 40 to 48m below the mining horizon. Crosscuts will subsequently be developed perpendicularly to the footwall drives, towards the reef horizon. Access to the reef horizon will be by travelling way, developed from the crosscut. Ore passes will be developed between the reef horizon and the crosscut for the removal of blasted ore from the stope. On the stope horizon, a raise or centre gully will be developed between levels up the centre of the mining block. Breast mining panels will be established off the centre gully. The panels will be mined approximately in the strike direction away from the centre gully to the stope block limit. An advanced strike gully (ASG) will be carried on the down dip side of each mining panel for access to the stope face and for clearing of blasted ore from the face. Typically, two stope ore passes will be situated in the centre gully which will connect the stoping areas to the footwall infrastructure. All ore produced in the stopes will be scraped into the ore passes for loading in the crosscut. **Error! Reference source not found.** shows a plan of a typical stope block.

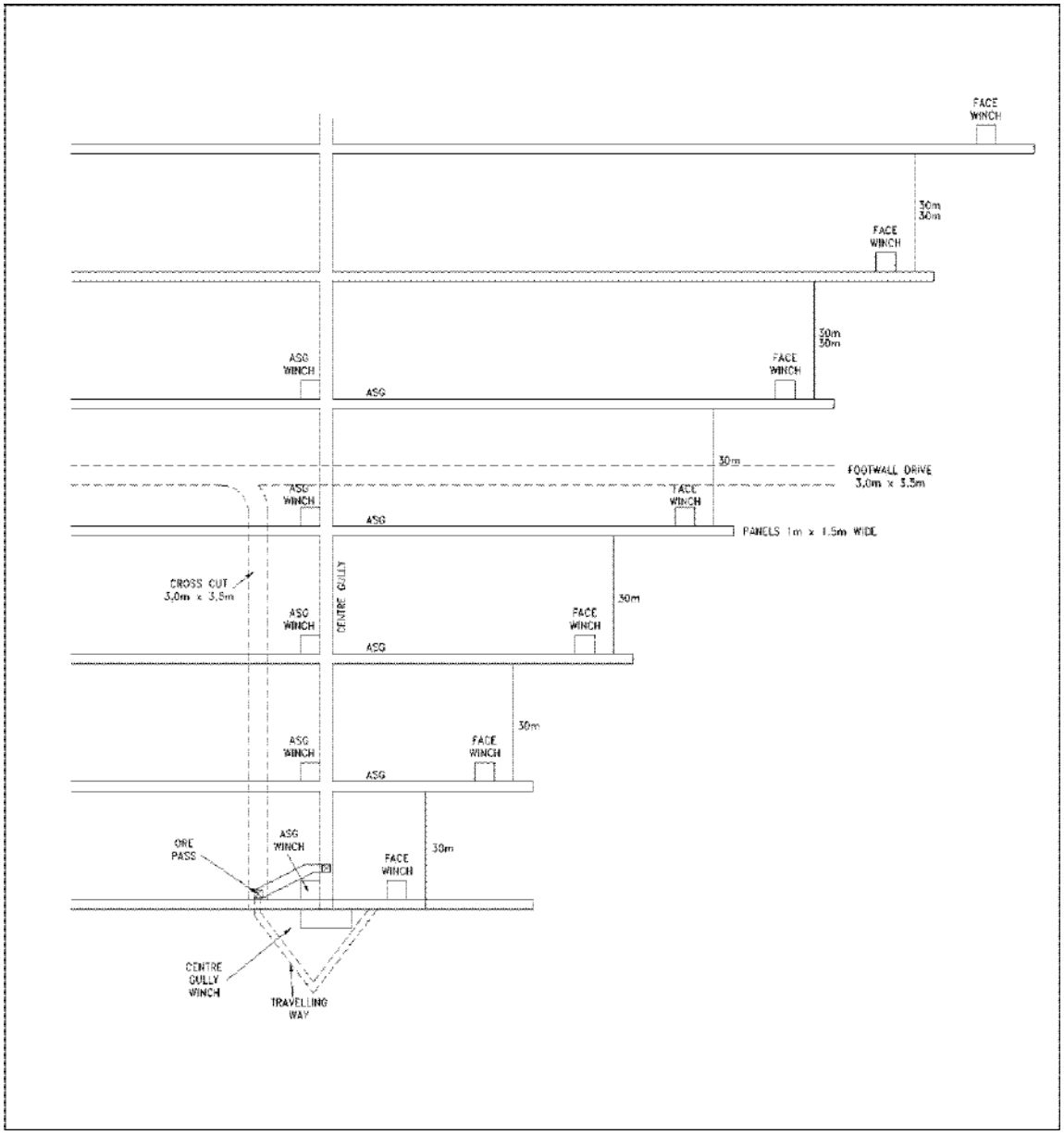


Figure 3 – Schematic plan view of a conventional stope block

The breast faces will be drilled using hand-held, hydro-powered rock drills and airlegs. Blast holes will be charged with packaged emulsion explosives. Scraper cleaning will be used in the stope horizon, ore on the face will be scraped into the ASG, then into a centre gully and to the centre gully tip. Ore will be scraped from the face, into the ASG and then into the centre gully. From the centre gully the rock is scraped over a stope grizzly into the ore pass. The bottom of the ore pass is equipped with a boxfront with a hydraulically operated gate.

Where multiple reefs occur, and both are payable and are planned to be mined, the order of mining will be to extract the uppermost reef first, working downwards.

Shrinkage Stope

Shrinkage stoping is an overhand mining method that relies on broken material being left in the stope to be used as the “working floor” and to support the walls. The shrinkage stope is accessed via a travelling way. The stope is established and accessed by the development of two raises, one on each end of the stope panel.

Two drives, separated by a sill pillar, are established at the bottom of the stope. Draw points are developed between the two drives will be equipped with box fronts for loading ore directly into hoppers. Once the stope preparation development and equipping have been completed stoping commences by advancing the stope face up-dip from the sill drive. After each blast sufficient ore is drawn out to allow access between the new stope face and the top of the muckpile. Once the stope face reaches the upper limit, which is normally defined by a crown pillar, all men are withdrawn from the stope. Ore is drawn out of the stope by operating the scraper winch in the reef drive. This clears rock from the draw points and allows the ore to continue to flow.

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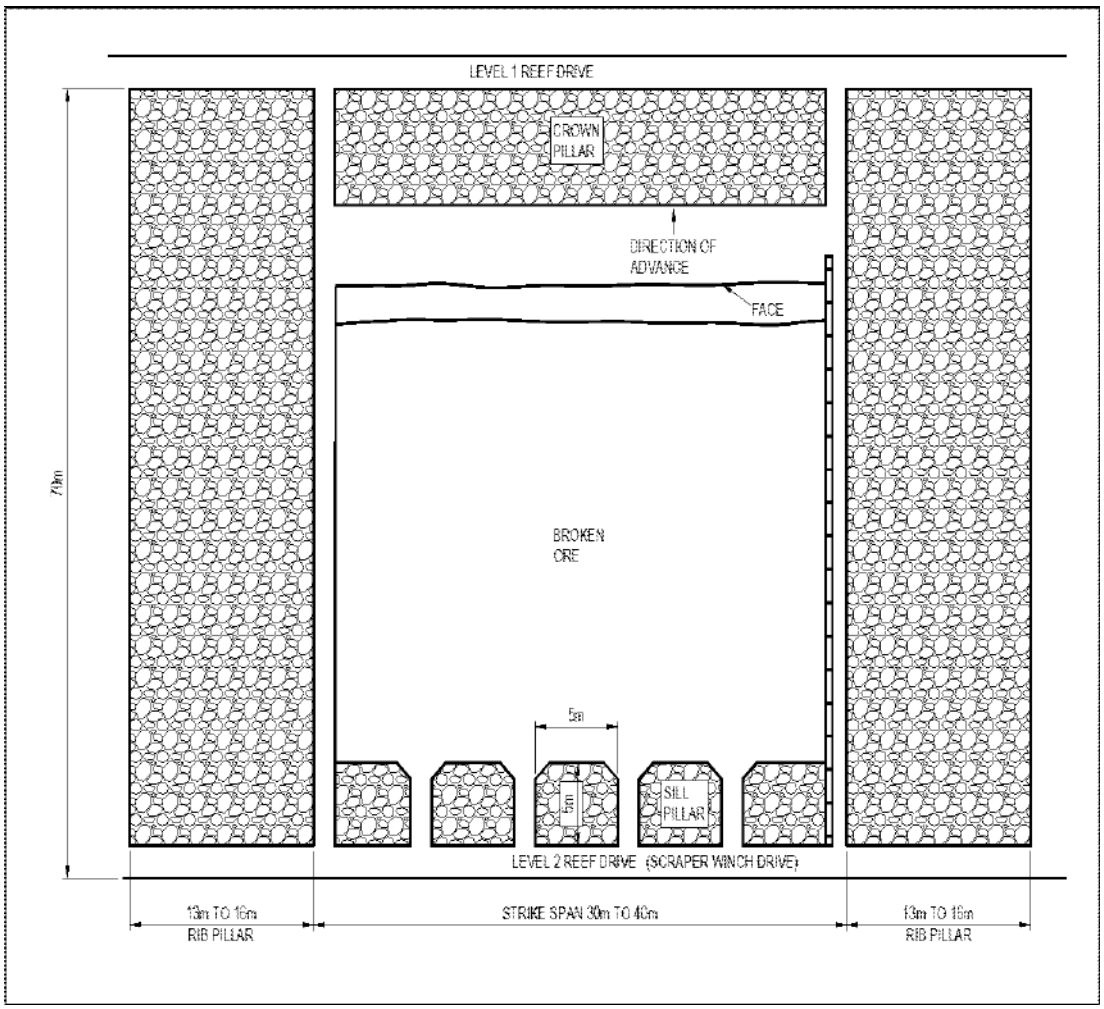


Figure 4 – Schematic long section illustrating a typical shrinkage stope.

Ore will be transported to the shaft ore pass system using a conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mines life, be used for the movement of men, material and rock depending on which phase the mine is in.

Infrastructure Requirements

All infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new infrastructure is planned within the project area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4, and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations/targets. A layout of the proposed Target 3 shaft surface infrastructure which either needs to be refurbished or constructed in presented in **Error! Reference source not found.**. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished.



Figure 5 – Target No 3-shaft surface infrastructure layout.

The No 3 shaft surface infrastructure will compromise of the following (as numbered):

1. No 3 shaft
2. Shaft facilities
   (a) Lamp repair
   (b) Proto room
   (c) Lamp room
3. Change house facilities
   (a) Main laundry
   (b) Main change house

4. Compressor house
5. Waste rock dump (not on Figure 3)
6. Surface rock handling
7. Main substation
8. Parking area
9. Offices
   (a) Management, administration and technical services
   (b) Mining
   (c) Engineering
10. Man winder
11. Barlow winder
12. Rock winder
13. Fridge plant
14. Store building
15. Services/fitting workshops
16. Dirty water dam & pump station
17. Sewerage plant
18. Evaporation plant
19. Change house (not on Figure 3)
20. No 4 shaft ventilation fans
21. Security office
22. Explosives store
23. Conveyors
24. Laydown area and salvage yard
25. Walkway
26. Marshalling yard
27. Drop off area
28. Ablution block
29. Laundry
30. Change houses
31. Offices
32. Lapa
33. Parking (not on Figure 3)
34. Parking
35. Turnstiles
36. Waiting area
37. Lean to roof
38. Underground store
39. Pump house
40. Service boiler shop (not on Figure 3)
41. Services boiler store (not on Figure 3)
42. Rail line
43. Pipeline
44. Security
45. Timber yard
46. Electrical workshop
47. Flammable store

48. Old oil store

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated Proposed Project will be relocated to this shaft.

A layout of the current Target No 2 Shaft surface infrastructure as well as the proposed new infrastructure which is required to be constructed is presented in **Error! Reference source not found.** and **Error! Reference source not found.**.

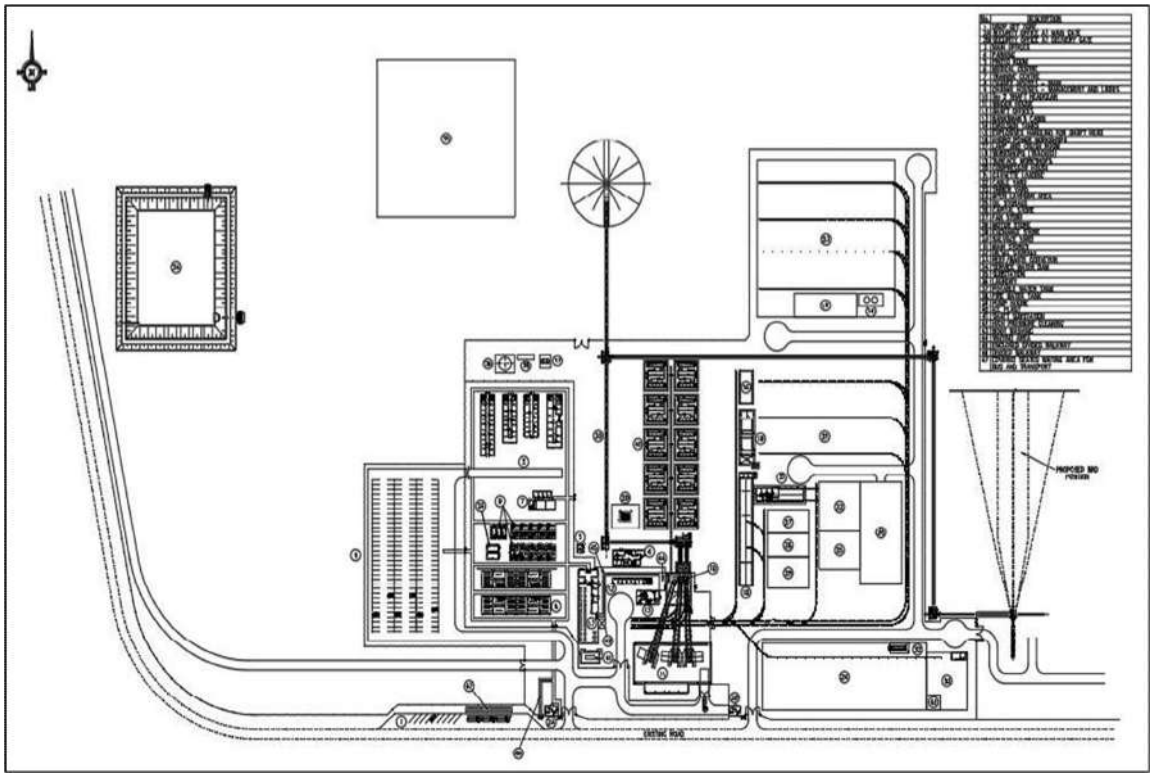


Figure 6 – Target No 2-shaft surface infrastructure layout

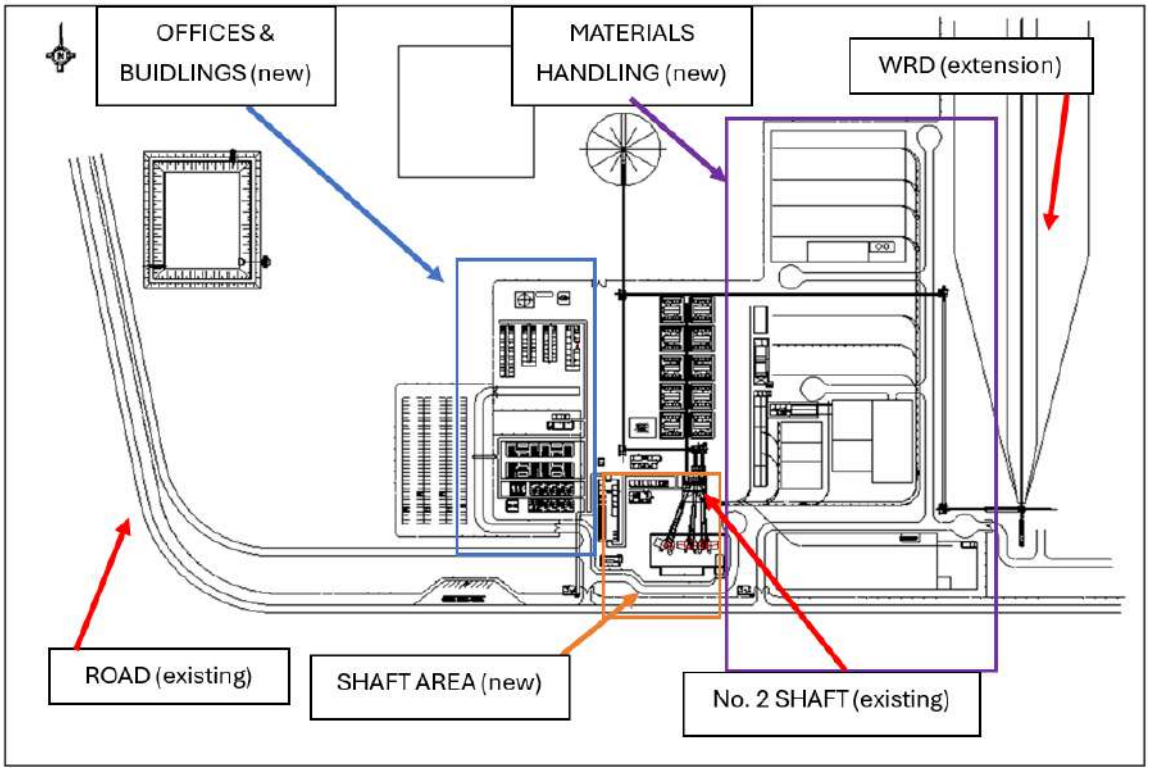


Figure 7 – Target No 2 Shaft new and existing infrastructure

To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Extent of area required for mining

The total surface area assessed is 956,76 hectares (ha).

Depth of Mineral below Surface

The orebodies extend to at least 2 000m below surface.

Proposed beneficiation Process

All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

Project Schedule

Prior to the initiation of mine implementation and construction activities, various stages of design work will be required to be undertaken. It is expected that these activities will take approximately four years before implementation can be initiated. Active mining can commence during year 7. . The key timelines are listed in **Table 2** below:

Table 2: Project Timelines

Period	Description
Year 1- 3	Site data gathering and feasibility studies
Year 4	Detailed engineering design
Year 5 - 8	Implementation and construction activities
Year 7	Hiring of employees
Year 7	**Initiation of mining activities underground**

The production build-up is planned to occur in two phases:

In Phase 1, which is planned to last for four years starting in Year 5, with construction and refurbishment with mining starting in Year 7. The first two years are required for level access and refurbishment, after which Target No 3 shaft will be used for hoisting of men, material and rock.

Phase 2 commences in Year 9, whereby access to the underground workings is via Target No 2 shaft, with Target No 3 shaft been reserved as a second outlet.

As mine development progresses over the first four years, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tons of ore per month, which is achieved Year 10.

10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years.

3 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

3.1 Methodology for Assessing Heritage Site significance

This study forms part of the Heritage Impact Assessment Report. According to the “SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports” the purpose of the PIA is:

- to identify the palaeontological importance of the rock formations in the footprint;
- to evaluate the palaeontological magnitude of the formations;
- to clarify the **impact** on fossil heritage; and
- to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated, as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development, and c) the quantity of bedrock removed.

All possible information is consulted to compile a scoping report, and this includes the following: SAHRIS Palaeosensitivity map, Provisional DFFE Screening Tool, all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical and geological maps as well as scientific articles of specimens from the development area and Assemblage Zones.

A field-based assessment is necessary when the development footprint has a Very High to High paleontological sensitivity. The desktop and the field survey of the exposed rock determine the impact significance of the planned development, and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase, while the excavations will change the current topography and destroy or permanently seal in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

During a site investigation, the palaeontologist surveys the development and tries to determine the density and diversity of fossils in the development area. Rock exposures that are investigated usually contain a large portion of the stratigraphic unit, can be accessed easily and comprise of unweathered (fresh) exposed rock. These exposures may be natural (rocky outcrops in streams or riverbanks, cliffs, dongas) but could also be artificial (quarries, open building excavations, and even railway and road cuttings). It is common practice for palaeontologists to log well-preserved fossils (GPS, and stratigraphic data) during field assessment studies.

Mitigation usually precedes construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. Preceding excavation of any fossils, a permit from SAHRA must be obtained, and the material will have to be housed in a SAHRA approved fossil repository. When mitigation is applied correctly, a positive impact is possible as knowledge of local palaeontological heritage may be increased.

When a Site investigation is conducted, the fossil potential of the site will be determined by cross-crossing the development footprint and physically investigating bedrock outcrops to determine the lithology and fossil content of the outcrops. Fossils occurring at the surface are very unpredictable, and a **representative sample size** of the area has been investigated. However, it is important to note that the absence of fossils in a development footprint does not necessarily mean that palaeontological significant material is not present on site (on or beneath ground surface).

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports following Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation, and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study.
- Description and location of the proposed development, and provide geological and topographical maps
- Provide the palaeontological and geological history of the affected area.
- Identification of sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases, and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect, and cumulative:
    a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and place as the activity.
    b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
    c. Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities.
- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses, etc).

3.2 Methodology used in determining the significance of environmental impacts

The methodology used to determine the environmental impact significance was provided by Kongiwe and is explained in **Appendix A**.

4 CURRENT STATUS QUO

4.1 Baseline Description of the Receiving Environment

The **Jelani Underground Mining Project** located near Odendaalsrus in the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality in the Free State., is situated on the generally

flat to gently undulating interior plateau of the central Free State. The regional topography is characterised by broad, low-relief plains with shallow, poorly incised drainage lines and limited local relief, typical of the Highveld geomorphology of the Lejweleputswa District. Vegetation in the project area occurs within the Grassland Biome, specifically the Central Free State Grassland vegetation unit as described by Mucina and Rutherford (2006). This vegetation type is typically dominated by perennial C_4 grasses, including species of *Themeda*, *Eragrostis* and *Aristida*, with a diverse forb component and very limited woody cover. Due to extensive historical and ongoing land transformation associated with gold mining, agriculture and urban development in the Matjhabeng area, the natural grassland has been largely modified, with remaining vegetation predominantly comprising secondary grassland, disturbed surfaces and ruderal plant communities associated with mining infrastructure, access roads and other anthropogenic features (Mucina & Rutherford, 2006).

4.1.1 Geological and Palaeontological History

The proposed **Jelani Underground Mining Project** is located near Odendaalsrus in the Matjhabeng Local Municipality and is shown on the 1:250 000 Kroonstad (2726) Geological Map (Council for Geoscience, Pretoria; **Figure 8**). The study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup). According to the SAHRIS PalaeoMap, the Volksrust Formation is classified as having High Palaeontological Sensitivity (orange), while the overlying Qs deposits are assigned a Moderate palaeontological sensitivity, both intersecting the proposed development footprint (**Figure 9, Table 3**) (Almond & Pether, 2008; SAHRIS website). The site is also classified as having High Palaeontology Theme Sensitivity (red) in the DFFE National Environmental Screening Tool (**Figure 10**).

The project footprint is primarily underlain by the Volksrust Formation of the Ecca Group, part of the Karoo Supergroup (Pvo; Figure 8). The Ecca Group is Early to Late Permian in age (~289–253 Ma) and comprises dark greenish-grey shale, siltstone, and fine-grained sandstone. These lithologies are typically deeply weathered and poorly exposed, with outcrops scarce and restricted to thinly bedded shale showing well-defined bedding planes. Sedimentological evidence indicates that the Volksrust Formation accumulated as deep-water offshore marine **deposits** (Botha & Botha, 2002).

Trace fossils and abundant plant fossils are known from the Ecca Group, particularly in sandstone-rich units in the northern Karoo Basin. Notably, the upper Volksrust Formation has yielded the first African occurrence of the bivalve *Megadesmus*, preserved with articulated valves in interbedded shale–siltstone deposits indicative of deltaic deposition near the Ecca–Beaufort Group boundary (Cairncross et al., 2005).

Overlying dolerite and hillslopes are partially calcretised older alluvium deposits, while gravelly colluvial and eluvial deposits dominated by hornfels, sandstone, and dolerite rubble mantle most hillslopes and plateau

surfaces. These deposits represent sediment remobilisation and slope processes and contribute to the low-relief topography characteristic of the study area.

The youngest geological units are the Quaternary superficial deposits (Qs), formed during the last ~2.6 million years. These deposits are largely unconsolidated to weakly consolidated, comprising clay, silt, sand, gravel, and calcrete, occurring as relatively thin, discontinuous veneers. They include channel, floodplain, pan, spring, and stream-related sediments and preserve evidence of palaeoclimatic fluctuations, with alternating wetter and drier phases influencing river flow regimes, sedimentation patterns, and vegetation dynamics (Hunter et al., 2006; Tooth et al., 2004; Maud, 2012). Climatic fluctuations during the Quaternary, particularly over the last ~1.8 million years, were among the most pronounced of the Cenozoic Era and strongly shaped the modern geomorphology of the region (Barnosky, 2005).

Fossil assemblages within Qs deposits are generally of low diversity, but may be locally abundant, particularly in fluvial, spring, and pan environments. Fossils typically include diatoms, freshwater gastropods and bivalves, ostracods, trace fossils, mammalian bones and teeth, coprolites, freshwater molluscs, plant microfossils, and tortoise remains. Late Pleistocene deposits along the Modder River have preserved fossilised hyena burrows and lairs, as well as evidence of prehistoric human activity in association with Middle and Later Stone Age artefacts (Broom, 1909a, b; Cooke, 1955; Churchill et al., 2000; Rossouw, 2006; Scott & Brink, 1991; Horowitz et al., 1978; Butzer, 1984). Important fossil localities in the broader region include Florisbad, Baden-Baden, Liebenbergspan, Deelpan, and Erfkroon, with Florisbad designated as a Provincial Heritage Site (Brink, 1987, 1988; Scott & Rossouw, 2005).

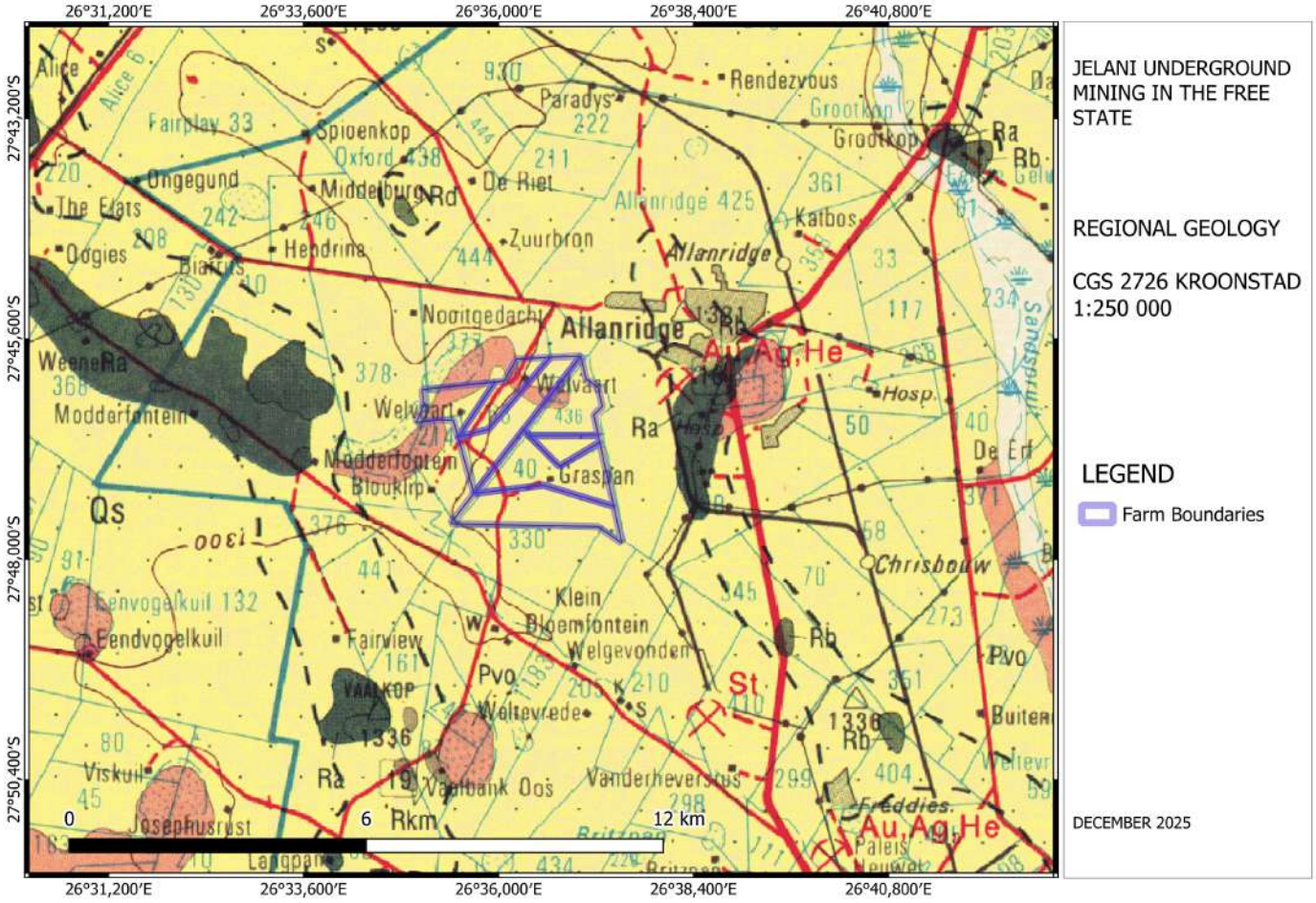


Figure 8 – Extract of the 1:250 000 000 Kroonstad 2726 Geological Map (Council for Geosciences, Pretoria) indicates that the study area is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Pvo, Ecca Group, Karoo Supergroup).

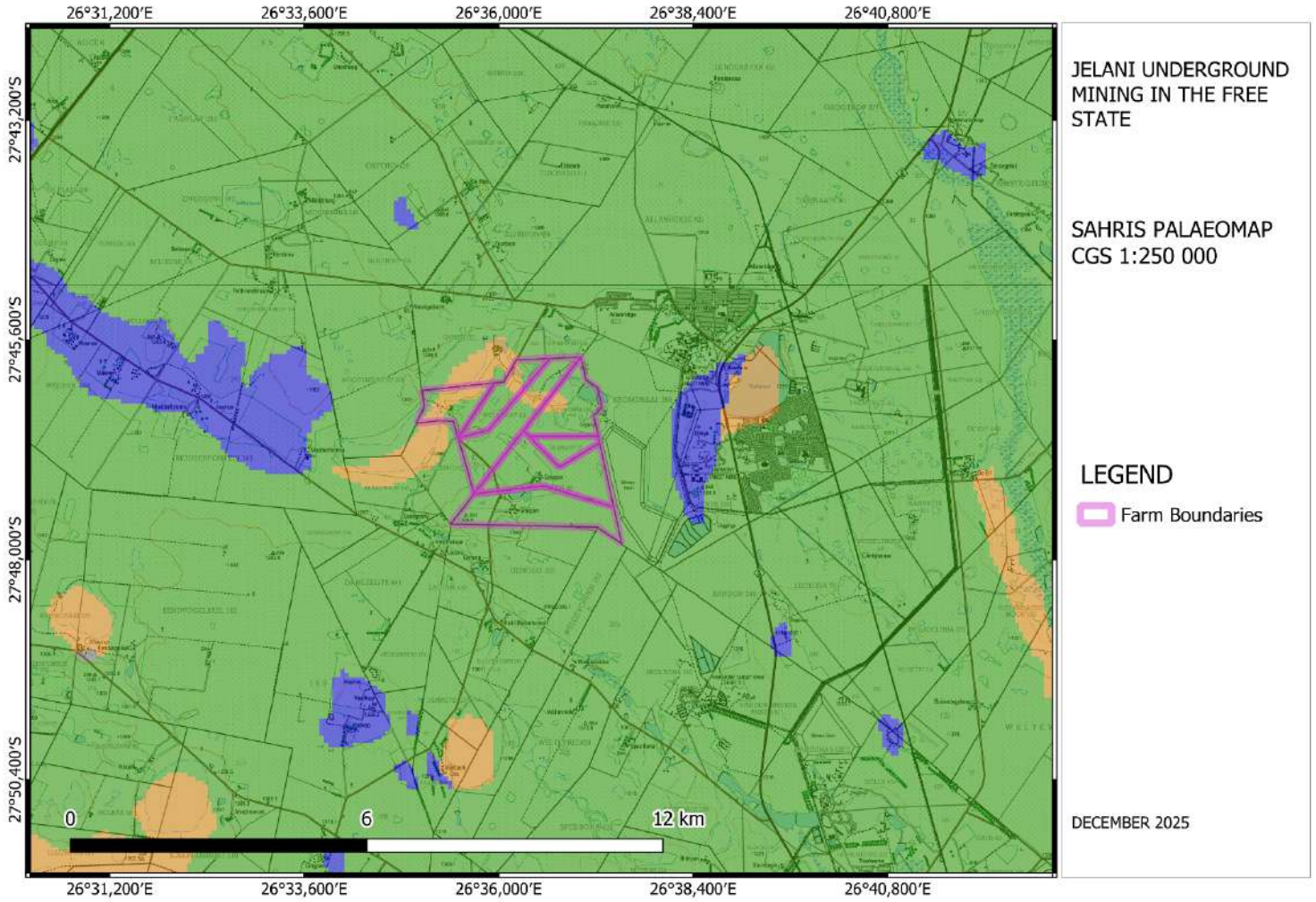


Figure 9 – Extract of the SAHRIS PalaeoMap (Council for Geosciences) indicates that the study area is underlain by sediments with a High (orange) and a Moderate (green) Palaeontological Sensitivity

4.1.2 SAHRIS Palaeomap and the National Web-based Screening Tool

Table 3: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website.

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds are required
ORANGE/YELLOW	HIGH	A desktop study is required, and based on the outcome of the desktop study, a field assessment is likely.
GREEN	MODERATE	A desktop study is required
BLUE	LOW	No palaeontological studies are required; however, a protocol for finds is required.
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The overall palaeontological sensitivity of the area is classified as **High**, as indicated by the SAHRIS Palaeomap (**Figure 9; Table 3**).

The SAHRIS PalaeoMap (**Figure 9**) and the National Environmental Web-based Screening Tool (**Figure 10**) both classify the development area as having High Palaeontological Sensitivity. Despite this High Sensitivity, no field-based palaeontological investigation was conducted at the site, and therefore the site's Palaeontological Sensitivity could not be verified on site. However, desktop-based research indicates that the palaeontological sensitivity of the area is Low**.**

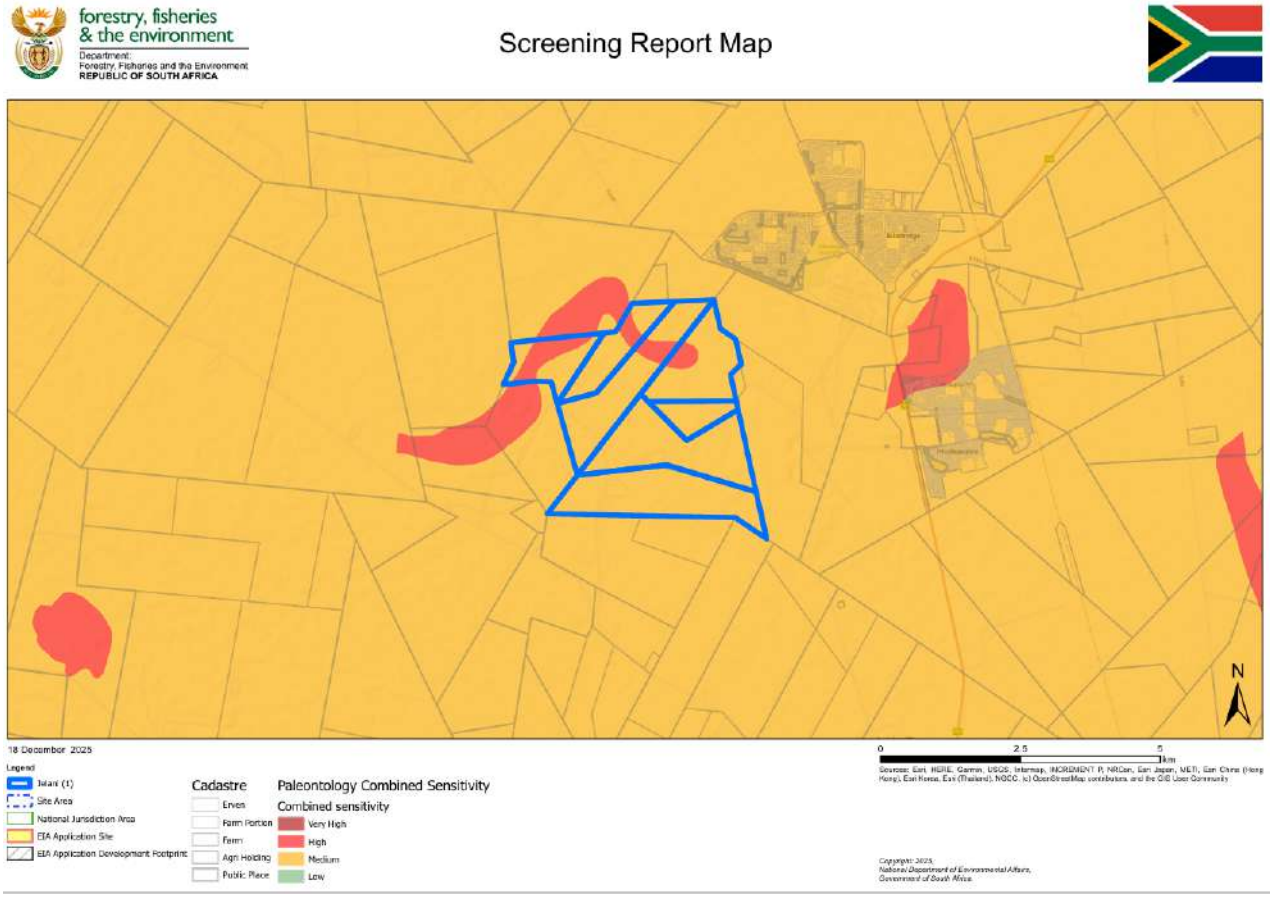


Figure 10 - Palaeontological Sensitivity of the study area by the National Environmental Web-based Screening Tool indicates a High (red)Sensitivity while areas with a Medium (orange) is also crossed.

4.2 Findings

The proposed Jelani Underground Mining Project is underlain by the Quaternary Superficial sediments (Qs) as well as the Volksrust Formation (Ecca Group, Karoo Supergroup). According to the SAHRIS PalaeoMap, the Volksrust Formation is classified as having High Palaeontological Sensitivity (orange), while the overlying superficial deposits are assigned a Moderate Palaeontological Sensitivity, both intersecting the proposed development footprint (Almond & Pether, 2008; SAHRIS website). The site is also classified as having High Palaeontology Theme Sensitivity in the DFFE National Environmental Screening Tool. Despite this High Sensitivity, no field-based palaeontological investigation was conducted at the site, and therefore the site's Palaeontological Sensitivity could not be verified on site. However, desktop-based research indicates that the palaeontological sensitivity of the area is Low.

The Kongiwe Impact Assessment methodology is attached in Appendix 1.

Nature of the impact: The excavations and clearing of vegetation during the construction phase of the infrastructure areas will consist of digging into the superficial sediment cover as well as underlying deeper bedrock. These excavations will change the existing topography and may possibly destroy or even permanently close-in fossils at or below the ground surface. These fossils will then be lost for research.

Table 4: The rating system

NATURE OF THE IMPACT: ***Impact on palaeontological resources***		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long Term	Long Term
Magnitude *(Major, Moderate, Minor)*	Major	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	*Unlikely*
Calculated Significance Rating *(Low, Medium, High)*	**High**	**Low**
Reversibility: *(Reversible or Irreversible)*	Irreversible	
Irreplaceable loss of resources: *(Yes or No)*	Yes	
Can impacts be enhanced: *(Yes or No)*	Yes	
Residual impacts ❖ Loss of fossil Heritage: *T*he excavations and clearing of vegetation during the construction phase of the infrastructure areas will consist of digging into the superficial sediment cover as well as underlying deeper bedrock. These excavations will change the existing topography and may possibly destroy or even permanently close-in fossils at or below the ground surface. These fossils will then be lost for research.		
Mitigation measures ❖ **Chance finds Protocol**		

Table 5: The Impact Summary

BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
Major -	*Long Term > 5 years*	*Site or Local*	High	*Possible*	High	Yes	Chance Finds Protocol	*Minor -*	*Long Term > 5 years*	*Site or Local*	Medium	*Unlikely*	Low

Table 6: The cumulative rating system

NATURE OF THE CUMULATIVE IMPACT: *Cumulative impact on palaeontological resources*		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: *(positive or negative)*	**Negative**	**Negative**
Extent *(Local, Regional, International)*	*Regional*	*Regional*
Duration *(Short term, Medium term, Long term)*	*Long Term*	*Long Term*
Magnitude *(Major, Moderate, Minor)*	*Minor*	Minor
Probability *(Definite, Possible, Unlikely)*	*Unlikely*	*Unlikely*
Calculated Significance Rating *(Low, Medium, High)*	**Medium**	**Low**
Reversibility: *(Reversible or Irreversible)*	Irreversible	
Irreplaceable loss of resources: *(Yes or No)*	Yes	

NATURE OF THE CUMULATIVE IMPACT: ***Cumulative impact on palaeontological resources***	
Can impacts be enhanced: *(Yes or No)*	Yes
Residual impacts: Loss of fossil Heritage: *T*he excavations and clearing of vegetation during the construction phase of the infrastructure areas will consist of digging into the superficial sediment cover as well as underlying deeper bedrock. These excavations will change the existing topography and may possibly destroy or even permanently close-in fossils at or below the ground surface. These fossils will then be lost for research.	
Mitigation measures ❖ **Chance finds Protocol**	

Table 7: Cumulative Impacts

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
Construction																
All construction in a 30 km radius	Surface clearance and digging into superficial sediments as well as bedrock	Loss of fossil Heritage by destruction, movement or sealing in of fossil heritage in or below earth surface	*Minor -*	*Long Term > 5 years*	*Regional*	Medium	*Possible*	Medium	Yes	Chance Finds Protocol	*Minor -*	*Long Term > 5 years*	*Site or Local*	Medium	*Unlikely*	Low

5 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

The following section must be read in conjunction with **Table 8** of this report.

5.1 Construction and operational phases

The initial construction phase of the Jelani Underground Mining Project will include activities such as site clearance, establishment of construction camps, and development of supporting infrastructure required for the box-cut and subsequent dragline operations. During these activities, cultural material may be exposed and could be recoverable.

While construction delays can be costly, mitigation measures should aim to minimise disruptions while ensuring compliance with heritage requirements. Excavations for foundations, haul roads, and other ground disturbances, although primarily for mining infrastructure, may provide opportunities to document and rescue heritage material. Temporary infrastructure such as construction camps and laydown areas may be added or modified as the project progresses through its phases. These installations generally have a low impact on the landscape as they are superficial, but they still require consideration within the heritage management framework.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following Chance Finds Procedure (CFP) should be implemented:

5.2 Chance Finds Protocol

The procedure outlined below is only triggered if fossil material is exposed during excavation activities.

Cultural Heritage in South Africa (includes all heritage resources) is protected by the National Heritage Resources Act (Act No 25 of 1999) (NHRA). According to Section 3 of the Act, all Heritage resources include “all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens”.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

A fossil is the naturally preserved remains (or traces thereof) of plants or animals embedded in rock. These organisms lived millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.
It is the responsibility of the Environmental Control Officer (ECO), Environmental Site Officer (ESO) or site manager (whatever the case may be) of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ECO / ESO / Site Manager, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

5.2.1 Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO / ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ECO / ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.

- If the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO / ESO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

5.3 Heritage Management Plan for Environmental Management Plan

Table 8: Heritage Management Plan for EMPr implementation.

Area and site no.	**Mitigation measures**	**Phase**	**Timeframe**	**The responsible party for implementation**	**Monitoring Party (frequency)**	**Target**	**Performance indicators (monitoring tool)**
Palaeontological resources	Chance Finds	Mining	During Mining	Applicant ECO /Palaeontologist			

6 CONCLUSIONS AND RECOMMENDATIONS

The proposed Jelani Underground Mining Project is underlain by the Quaternary Superficial sediments as well as the Volksrust Formation (Ecca Group, Karoo Supergroup). According to the SAHRIS PalaeoMap, the Volksrust Formation is classified as having High Palaeontological Sensitivity, while the overlying deposits are assigned a Moderate Palaeontological Sensitivity, both intersecting the proposed development footprint (Almond & Pether, 2008; SAHRIS website). The site is also classified as having High Palaeontology Theme Sensitivity (red) in the DFFE (Department of Forestry Fisheries and the Environment) National Environmental Screening Tool.

Due to the Sensitivities no site investigation was conducted for this project. However, Desktop research has found that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A High Palaeontological Significance has been allocated for the mining /operational phase of the development pre-mitigation and a low significance post mitigation**. The **mining /operational** will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Decommissioning phase**. The No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development are considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that **no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils**.

If significant fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

These recommendations should be incorporated into the Environmental Management Programme (EMPr) for the Jelani Underground Mining Operations in the Free State Province**, as well as included as conditions for Environmental Authorisation.**

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APPENDIX A

ENVIRONMENTAL IMPACT METHODOLOGY

KONGIWE: IMPACT ASSESSMENT METHODOLOGY

Impacts associated with the proposed project.

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.

The impact significance rating system is presented in **Error! Reference source not found.**, Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration.

, and

Part C: Determining Significance Rating

Rate significance based on consequence and probability.

and involves three parts:

Part A: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration;

Part B: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A; and

Part C: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequence in Part B.

Consequence Rating Methodology

mpact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or dentified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration.

Consequence Rating Methodology

	Spatial Scale/ Population

			Site or Local	Regional	National/ international
Magnitude					
Minor	**DURATION**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**DURATION**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**DURATION**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability.

Significance Rating Methodology

Probability (of Exposure to Impacts)	Consequence Negative			Consequence Positive		
	Low	Medium	High	Low	Medium	High
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

Impact Tables

Please use the table below to rank impacts and propose mitigation measures.

Typical tables used to identify and classify the significance of identified impacts

NATURE OF THE IMPACT: *DESCRIBE THE IMPACT IN RESPECT TO THE ACTIVITY TO BE UNDERTAKEN*		
	mpact Rating Without Mitigation	**mpact Rating With Mitigation**
mpact Status: *(positive or negative)*		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		
Calculated Significance Rating *(Low, Medium, High)*		
Reversibility: *(Reversible or Irreversible)*		
rreplaceable loss of resources: *(Yes or No)*		
Can impacts be enhanced: *(Yes or No)*		
Residual impacts (List these below)		
Mitigation measures (List these below)		

Cumulative Impact

Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Typical table used to identify and classify the significance of identified cumulative impacts

NATURE OF THE CUMULATIVE IMPACT: ***DESCRIBE THE IMPACT IN RESPECT TO THE ACTIVITY TO BE UNDERTAKEN***		
	Impact Rating Without Mitigation	**Impact Rating With Mitigation**
Impact Status: *(positive or negative)*		
Extent *(Local, Regional, International)*		
Duration *(Short term, Medium term, Long term)*		
Magnitude *(Major, Moderate, Minor)*		
Probability *(Definite, Possible, Unlikely)*		
Calculated Significance Rating *(Low, Medium, High)*		
Reversibility: *(Reversible or Irreversible)*		
Irreplaceable loss of resources: *(Yes or No)*		
Can impacts be enhanced: *(Yes or No)*		
Residual impacts (List these below)		
Mitigation measures (List these below)		

APPENDIX B

PGS TEAM CVs

ELIZE BUTLER

Associate

Palaeontologist

PROFILE

Elize has conducted approximately 900 Paleontological Impact Assessments for developments in the Free State, KwaZulu-Natal, Eastern, Northern and Western Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (cum laude) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa. She has experience in locating, collecting, and curating fossils. She has been a member of the Paleontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

CONTACT

PHONE NUMBER:
+27 (84) 447-8759

WEBSITE:
www.pgsheritage.com

EMAIL ADDRESS:
elize@pgsheritage.com

EDUCATION

University of the Orange Free State
1988
B.Sc. Botany and Zoology

University of the Orange Free State
1991
B. Sc (Hons) Zoology

University of the Orange Free State
2009
M. Sc. Cum laude (Zoology)
Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont Galesaurus planiceps: implications for biology and lifestyle.

WORK EXPERIENCE

PGS Heritage Group of Companies

Associate – Palaeontologist
2025 - present
Appointed as Associate - Palaeontologist responsible for palaeontological impact studies

Banzai Environmental - Palaeontologist
2016 - present
Palaeontologist and Director responsible for palaeontological impact studies

National Museum, Bloemfontein - Principal Research Assistant and Collection Manager
1998 - 2022

National Museum, Bloemfontein - Research Assistant
1993-1997

PROFESSIONAL AFFILIATION

Professional Palaeontologist
Paleontological Society of South Africa (PSSA) – since 2006

Appendix D9 – Closure Risk Assessment

JELANI MINE CLOSURE RISK ASSESSMENT

AUGUST 2026

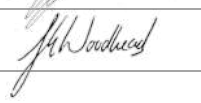
Rev	Name	Designation	Signature	Date
03	Jared Murray	Technician		15 September 2026
	Geoff Woodhead	Director		15 September 2026

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SECTION 1: INTRODUCTION

1. Planned Closure and Unplanned / Premature Closure

Class 5 Surface Disturbance Only (Seismographic monitoring stations, access tracks, fencing and associated rehabilitation)

Prepared to accompany the Mining Work Programme, Environmental Management Programme and Financial Provisioning submissions under the Mineral and Petroleum Resources Development Act, 2002 and the Financial Provisioning Regulations, 2015.

1.1. Purpose and Application of this Chapter

This document presents a structured risk assessment of the planned closure and unplanned (premature) closure of the surface works that are costed in the Jelani Class 5 Rehabilitation Cost Estimate (Rev 00, 20 March 2026). It is written for inclusion in the Environmental Risk Report and Final Rehabilitation, Decommissioning and Mine Closure Plan required under the Financial Provisioning Regulations, and to support the Mining Work Programme submitted with the mining-right application.

The assessment is written from a risk-management perspective. It identifies the sources of harm that can arise when the Class 5 surface works are decommissioned, the pathways by which those sources can reach environmental and social receptors, the likelihood and consequence of those events, and the controls required to reduce residual risk to a level that is acceptable to the Competent Authorities and to adjacent land users.

This assessment is deliberately confined to the Class 5 estimate. It does not assess underground mining, Harmony-owned Target shaft infrastructure, the Target metallurgical plant, any new tailings storage facility on the Loraine/Target mining right, or socio-economic impacts of the mining operation itself. Those elements sit outside the battery limits of the Class 5 quantum and of this chapter.

1.1.1. Objectives

i. Identify and rank environmental, social, health, safety, financial and reputational risks associated with planned end-of-life removal of the four seismographic stations and associated tracks, fencing and small disturbed pads.
ii. Identify and rank the additional risks that arise if the project ceases earlier than planned (unplanned or premature closure) while the stations and tracks are still in place.
iii. Distinguish operational-phase risks that persist into closure from risks generated by the closure activities themselves.
iv. Define residual and latent risks that must be carried in the Environmental Risk Report and in the quantum of financial provision.
v. Confirm that the Class 5 quantum (R 1 480 314.57 excluding VAT; R 1 702 361.76 including VAT) is proportionate to the residual closure risk of these works.

1.1.2. Limitations

This assessment is a screening-level (qualitative to semi-quantitative) risk assessment commensurate with the current Class 5 level of project definition. Detailed engineering drawings, contamination surveys, radiological characterisation of the residual footprint, and as-built pipeline profiles were not available at the time of writing. Ratings will be refined once specialist studies commissioned for the EIA phase are complete. The assessment does not replace those specialist studies.

SECTION 2: PROJECT CLOSURE CONTEXT

2.1. Nature of the operation

Jelani Resources (Pty) Ltd is the joint-venture vehicle of White Rivers Exploration and Harmony Gold. The mining-right application covers 956.76 ha of farm portions (Graspan 40, Welvaart 63, Diamant 37 and a portion of Swartpan 436) immediately west of Harmony's Target Mine, approximately 11 km north-west of Odendaalsrus and 2.5 km west of Allanridge, in Ward 36 of the Matjhabeng Local Municipality, Free State.

Underground gold (and associated) mineralisation will be accessed exclusively through refurbished Target No. 2 and Target No. 3 shafts located on Harmony's existing, fully permitted Loraine/Target mining right. No new shafts, declines, plants, tailings facilities, waste-rock dumps or bulk surface infrastructure will be constructed on the Jelani mining-right area. Ore will be hoisted and processed on Harmony ground.

The only new surface works proposed on the Jelani right, and the only works costed in the Class 5 rehabilitation estimate, are four seismographic monitoring stations installed along the shared boundary with Harmony Target. Their purpose is to monitor mining-induced seismicity and boundary interaction. Each station comprises:

i. a small sensor pad / housing of approximately 5–10 m^2;
ii. basic power and communications equipment;
iii. approximately 6 m of perimeter fencing per station (24 m in total); and
iv. short gravel access tracks totalling approximately 1 km at 4 m wide, costed in the estimate at 8 748 m^2 to allow for turning heads, drainage and localised widening.

General surface rehabilitation is costed at 0.04 ha (the combined pad footprints). Aftercare maintenance and monitoring is costed against 8 ha, which is a conservative envelope around the tracks and stations rather than a contiguous disturbed block.

2.2. Closure vision

The closure vision for the Class 5 works is to remove all project-specific surface equipment from the Jelani mining-right area, rip and rehabilitate the gravel tracks, revegetate the four pads, and return the footprints to the pre-existing agricultural / grazing land capability of the host farms, with no residual infrastructure, no residual contamination requiring institutional control, and no ongoing access restriction beyond ordinary farm management.

2.3. Battery limits of this assessment

The following are inside the battery limits:

i. The four seismographic stations (pads, housings, sensors, power/comms equipment and local fencing).
ii. The associated gravel access tracks (8 748 m^2) and any short stormwater mitres constructed with those tracks.
iii. The 0.04 ha of pad disturbance and the 8 ha aftercare envelope used in the Class 5 estimate.
iv. Decommissioning, demolition, transport off-site, ripping, topsoiling, seeding and three-year aftercare of the above.

The following are outside the battery limits, except where an interface risk exists:

i. Target No. 2, 3, 4 and 5 shaft complexes and all Harmony surface infrastructure;
ii. the Target metallurgical plant and any new or existing tailings storage facility on the Loraine/Target right;
iii. underground workings, ore passes, development and stoping;
iv. seismicity generated by mining (the stations measure it; they do not cause it); and
v. social and labour plan, community development and workforce transition associated with the mine as a whole.

2.4. Planned versus unplanned closure

Planned closure

Underground mining reaches its planned end of life (or the monitoring obligation is discharged). The four stations are decommissioned in an orderly sequence: equipment recovered, pads broken out, tracks ripped and revegetated, fencing removed, and aftercare completed. Financial provision of R 1.48 million (excl. VAT) is adequate for this scope.

Unplanned or premature closure

The project is suspended or abandoned before, during or shortly after the stations are installed (installation is planned in the months leading to underground drill-and-blast, around Year 7). Causes may include loss of economic viability, regulatory suspension, failure to execute the mining right, insolvency, or force majeure. In this case the stations, fencing and tracks may be left in place without an operating owner on the ground. Because the physical footprint is small, the environmental consequence remains limited; the principal amplified risks are orphaned equipment, incomplete rehabilitation of the tracks, and a short-term security / theft exposure.

Unplanned closure is treated as a credible case. The Financial Provisioning Regulations require residual and latent risks, and the cost of unexpected premature closure, to be identified and provided for. For these works the planned-closure quantum already covers full removal; the incremental unplanned-closure cost is therefore small and is carried as a contingency within the existing Class 5 figure rather than as a separate line.

2.5. Class 5 quantum summarised

No.	Description (Class 5 estimate)	Quantity	Amount (ZAR)
3	Rehabilitation of access roads	8 748 m^2	R 616,354
10	General surface rehabilitation / grassing of denuded areas	0.04 ha	R 8,713
12	Fencing (removal)	0.40 ha eq.	R 99
14	Decommissioning of seismographic monitoring stations	4 No.	R 420,000
15	Maintenance and monitoring	8 ha	R 232,068
	Sub-total 1		R 1,277,234
	P&G (12%) + Contingency (10%) + weighting adjustment		R 203,080
	Sub-total 3 (financial provision excl. VAT)		R 1,480,315
	VAT at 15%		R 222,047
	Grand total incl. VAT		R 1,702,362

Table 1- Class 5 rehabilitation quantum that defines the battery limits of this risk assessment (rounded).

Items 1, 2A/2B, 4A/4B, 5, 6, 7, 8A–8C, 9, 11 and 13 of the standard DMRE master-rate schedule are zero. That is a project fact, not an omission: there is no plant, no building stock, no shaft collar, no waste deposit and no river diversion on the Jelani right.

SECTION 3: REGULATORY AND GOOD-PRACTICE FRAMEWORK

3.1. Regulatory and Good-Practice Framework

The risk assessment has been framed against the following instruments. These are the same instruments that govern the Scoping and EIA process and the financial provision for this project.

Instrument	Relevance to closure risk
NEMA, 1998 and EIA Regulations	Duty of care; identification of impacts and residual risks in the Scoping Report and EIA/EMPr; mitigation hierarchy.
National Environmental Management: Waste Act, 2008 (Act 59 of 2008), the applicable listed waste activities, and the National Norms and Standards for the Assessment of Waste for Landfill Disposal, where relevant	Waste activities associated with residue deposits; decommissioning of waste facilities; residual contamination.
NWA, 1998 and WUL regulations	Section 21 water uses; dirty-water containment; post-closure water quality; residual seepage.
MPRDA, 2002 and Mine Closure Guidelines	Closure objectives, land capability, and relinquishment criteria.
Financial Provisioning Regulations, 2015 (GN R.1147 of 20 November 2015), as amended	Final Rehabilitation, Decommissioning and Mine Closure Plan; Environmental Risk Report for residual and latent risks; annual review of quantum.

Table 2 - Schedule of Regulatory Framework References

SECTION 4: RISK ASSESSMENT METHODOLOGY

4.1. Approach

The assessment uses a source–pathway–receptor model combined with a consequence–probability significance matrix consistent with South African S&EIA practice. Each identified risk is scored before mitigation and after the application of proposed controls. Residual and latent risks are then isolated for financial provisioning.

4.2. Source–pathway–receptor model

In the context of a reclaimed gold-tailings footprint, the model is applied as follows.

i. Source: concrete or compacted pads; gravel wearing course; fencing wire and posts; batteries, solar panels or telemetry units; residual hydrocarbons from service vehicles; small volumes of packaging and cable off-cuts.

ii. Pathway: surface runoff and sediment from un-ripped tracks into local drainage lines on the host farms; wind-blown dust from bare pads (very small source term); direct contact by livestock or farm workers; theft or vandalism moving equipment off-site; vehicle traffic during decommissioning.
iii. Receptor: livestock grazing the farms; farm residents and workers; shallow soils and any local drainage lines; Harmony's adjacent seismic / boundary monitoring interest; future agricultural land users; the Competent Authorities as custodians of residual liability.

4.3. Rating criteria

Consequence and probability are scored on five-point scales. Significance is the product of the two scores and is translated into the classes used in contemporary gold-dump EIAs.

Score	Consequence	Probability
1	Slight – localised, reversible, no lasting harm	Rare – may occur only in exceptional circumstances
2	Minor – short-term, readily mitigated, limited receptors	Unlikely – conceivable but not expected during the assessment period
3	Moderate – medium-term, measurable environmental or social effect	Possible – could occur at some time during closure or post-closure
4	Major – long-term or off-site effect; difficult to reverse; community health or water resource affected	Likely – will probably occur during the assessment period
5	Severe – irreversible loss of resource, serious public health effect, or inability to relinquish the site	Almost certain – expected to occur in the absence of effective controls

Table 3 - Consequence and Probability Scales

Significance	Score range	Management implication
Very Low	1 – 4	Acceptable. Monitor only.
Low	5 – 8	Acceptable with standard operating controls and routine inspection.
Moderate	9 – 12	Requires documented mitigation, monitoring and management review. May be acceptable after mitigation.
High	13 – 16	Not acceptable without additional engineering or administrative controls. Elevate to project risk register.
Very High / Fatal flaw	17 – 25	Unacceptable. Redesign, additional financial provision, or alternative closure strategy required.

Table 4 - Risk significance classes

4.4. Principles particular to this Class 5 scope

i. Scale is the dominant control. Four pads of 5–10 m^2 and roughly one kilometre of farm track cannot generate the source term of a tailings facility, a shaft complex or a plant. Consequence scores are therefore capped by the physical inventory.
ii. The host land use is commercial farmland, not a dense urban receptor grid. Pathway length to communities (Allanridge, Odendaalsrus) is measured in kilometres, not hundreds of metres.
iii. The principal long-term risk is not contamination; it is incomplete removal (orphaned pads, wire, batteries) if decommissioning is not executed.

iv. Interface risk with Harmony is real but administrative: the stations exist because of the shared boundary. Closing them without notice could affect Target's seismic monitoring, which is a neighbour-and-regulator issue rather than an environmental release.
v. Latent risk after a three-year aftercare period is expected to be negligible provided pads are broken out and tracks are ripped. No radiological, acid-drainage or long-term water-treatment liability attaches to these works.

SECTION 5: PLANNED CLOSURE - IDENTIFIED RISKS

The risks in this section assume that the stations have served their monitoring purpose and that decommissioning is executed in an orderly sequence consistent with the Class 5 Basis of Estimate.

5.1. Physical and landform risks

C-01 Incomplete removal of station pads and foundations

If concrete plinths, compacted bases or buried earthing/cabling are left in place, they become obstacles to cultivation and grazing and a long-term visual and trip hazard. Consequence is minor (very small area; reversible by a single excavation crew). Probability without a close-out survey is possible. Pre-mitigation significance: Low (2 × 3 = 6). Controls: documented demolition method statement; break-out of all pads to 300 mm below finished ground; as-built close-out photographs and GPS. Residual significance: Very Low.

C-02 Erosion and sedimentation from unrehabilitated access tracks

8 748 m^2 of gravel track will concentrate runoff if not ripped, cross-drained and revegetated, particularly on any sloping ground toward local drainage lines. Consequence is minor to moderate at the local farm-drain scale, not at catchment scale. Probability without ripping is possible. Pre-mitigation significance: Moderate (3 × 3 = 9). Controls: rip on contour; install mitre drains before the first wet season after closure; seed with a locally appropriate grass mix; first-wet-season inspection and repair (already funded under item 15). Residual significance: Low.

C-03 Residual fencing, wire and posts

Approximately 24 m of fence plus any access gates can become a livestock entanglement hazard or a source of scrap-metal scavenging if not removed. Consequence is slight to minor. Probability without a snagging list is possible. Pre-mitigation significance: Low (2 × 3 = 6). Controls: complete removal and off-site disposal or recycling; walk-down of each station. Residual significance: Very Low.

C-04 Demolition and transport hazards

Lifting housings, handling batteries and travelling on farm tracks with a light truck create ordinary construction H&S exposure for a crew of a few people over a few days. Consequence is moderate if a serious injury occurs, but the activity duration is short. Probability with a method statement and MHSA-compliant contractor is unlikely. Pre-mitigation significance: Low (3 × 2 = 6). Residual with isolation of power, battery handling procedure and farm-access protocol: Very Low to Low.

5.2. Chemical and waste risks

C-05 Residual batteries, fuels and electrical waste

Stations will carry some form of power (likely solar plus battery, possibly a small standby generator during commissioning). Lead-acid or lithium batteries, residual diesel and copper cable are the only plausible hazardous-waste items. Volumes are household-to-small-commercial scale. If abandoned, batteries can leak acid or metals into a few square metres of soil. Pre-mitigation significance: Low to Moderate (3 × 3 = 9) only if power sources are left on site. Controls: inventory of all energy-storage items at installation; removal to a licensed recycler at closure; spill kit on the decommissioning vehicle. Residual significance: Very Low. This item is already covered by the R 100 000 per-station decommissioning rate.

C-06 Hydrocarbon staining of pads and tracks

Service vehicles and any generator will leave a thin film of oil on a few square metres. Consequence is slight. Probability is possible. Pre-mitigation significance: Very Low to Low (2 × 2 = 4). Controls: drip trays during servicing; lift and dispose of any visibly stained gravel with the pad break-out. Residual significance: Very Low.

5.3. Biodiversity, land capability and social risks

C-07 Failure of revegetation on pads and ripped tracks

Compacted gravel and small concrete footprints can resist grass establishment, especially if aftercare is skipped. The affected area is 0.04 ha of pads plus the track running surface. Consequence is minor (local bare patches, not a land-capability change at farm scale). Probability without aftercare is possible. Pre-mitigation significance: Low (2 × 3 = 6). Controls: ripping, light topsoil or ameliorant where available, seeding, and the three-year maintenance item already costed against 8 ha. Residual significance: Very Low.

C-08 Livestock injury or farm-access conflict during decommissioning

The host properties are working farms. Open excavations, cut wire and vehicle movements can injure stock or conflict with the landowner's operations. Consequence is minor. Probability without a landowner protocol is possible. Pre-mitigation significance: Low (2 × 3 = 6). Controls: seven-day notice to each landowner; temporary stock exclusion around each pad during break-out; reinstatement of any farm gates. Residual significance: Very Low.

C-09 Theft or vandalism of stations before or during decommissioning

Solar panels, batteries and copper are attractive to thieves. Loss of equipment is a financial issue; abandoned damaged housings become litter. Consequence is minor. Probability in a rural Free State setting is possible. Pre-mitigation significance: Low (2 × 3 = 6). Controls: keep fencing and locking in place until the removal crew arrives; schedule all four stations in a single campaign so that the site is not left half-stripped. Residual significance: Very Low.

5.4. Financial, legal and governance risks

C-10 Inadequate financial provision relative to actual scope

The Class 5 quantum carries an accuracy band of approximately −20 % to −50 % / +30 % to +100 %. Even at the upper bound the absolute amount remains small (order of R 2–3 million). There is no plausible specialist finding that would convert these four pads into a multi-million-rand liability. Pre-mitigation significance: Low (2 × 2 = 4). Residual with annual review of the quantum as the stations are built and as-built quantities confirmed: Very Low.

C-11 Interface failure with Harmony Target seismic monitoring

If Jelani decommissions the boundary stations without an agreed handover, Harmony may lose a data point it has come to rely on for boundary seismicity. This is not an environmental release but it is a neighbour and MHSA-adjacent risk. Consequence is moderate (regulatory or civil friction). Probability without a protocol is possible. Pre-mitigation significance: Moderate (3 × 3 = 9). Controls: written interface procedure with Harmony; 90-day notice before isolation; offer to transfer functioning equipment if Harmony wishes to keep the sites. Residual significance: Low.

C-12 Inability to relinquish the mining right because of leftover surface works

A mining right cannot be closed while project infrastructure remains. Four forgotten pads would be a bureaucratic, not an environmental, obstacle. Consequence is moderate (delay to relinquishment). Probability with a close-out survey is rare. Pre-mitigation significance: Low (3 × 1 = 3). Residual with GPS close-out and landowner sign-off: Very Low.

SECTION 6: UNPLANNED AND PREMATURE CLOSURE - IDENTIFIED RISKS

Unplanned closure is the case in which the project stops while the stations and tracks are still in the ground. Because the inventory is small, the amplification relative to planned closure is modest. The additional and amplified risks are set out below.

6.1. Triggers

i. Failure to execute the mining right, or a material delay that leaves the stations standing for years without an operating mine.
ii. Loss of economic viability or insolvency of the JV before or during production build-up.
iii. Regulatory suspension of the mining right or of adjacent Harmony operations that removes the purpose of the network.
iv. Prolonged access denial by a landowner or security conditions that prevent a removal crew from reaching the pads.
v. Force majeure damaging the stations (flood, fire, large seismic event) such that they are abandoned rather than repaired.

6.2. Additional and amplified risks

U-01 Orphaned stations and tracks

If cash flow stops, the cheapest immediate action is to walk away from four small sites. Pads, fences, batteries and gravel tracks then remain. Environmental consequence remains minor (same source term as C-01 to C-07). The amplification is duration: years instead of weeks. Pre-mitigation significance: Moderate (3 × 4 = 12) because probability of an incomplete project over a 14-year LOM is possible and the receptor is the landowner. Controls: financial provision held in a form that is accessible on premature closure (guarantee or trust) and calculated on full removal, which the current Class 5 figure already is. Residual significance: Low.

U-02 Leaking batteries and vandalised housings

An unattended station is more likely to be broken into. Batteries left on a pad for several wet seasons are the single plausible contamination source. Affected soil would still be measured in square metres. Pre-mitigation significance: Moderate (3 × 3 = 9). Controls: design-stage preference for sealed, lockable battery boxes; premature-closure protocol that treats battery recovery as a 30-day action; provision already included in the per-station rate. Residual significance: Low.

U-03 Unmaintained tracks becoming erosion gullies

A farm track that is used for a few years and then abandoned without ripping will start to gully on any grade. The 8 748 m^2 item is the correct quantum for repair; the risk is that the work is never called. Pre-mitigation significance: Moderate (3 × 3 = 9). Residual if the provision is accessible: Low.

U-04 Unfunded concurrent rehabilitation / inaccessible provision

If the financial instrument cannot be drawn on when the JV stops, the landowner or the State is left with a small but real clean-up. Pre-mitigation significance: Moderate (3 × 3 = 9). Residual only if the instrument is a guarantee or contribution to a trust that the Regulator can call. Residual: Low, provided the quantum remains ring-fenced for these works and is not absorbed into a larger Harmony closure account without a draw-down right.

U-05 Harmony interface and regulatory non-compliance

Premature closure does not extinguish the obligation to remove project infrastructure or to notify the neighbour. Directives for a few pads are possible but would be proportionate. Pre-mitigation significance: Low to Moderate (3 × 2 = 6). Residual with the premature-closure protocol written into the EMPr: Low.

U-06 Landowner compensation or relationship breakdown

The MWP states that no persons or communities require socio-economic compensation for the mining right as a whole. For these four sites the residual social risk is a landowner dispute over unrehabilitated tracks. Consequence is minor. Probability without a surface-use agreement that includes a removal trigger is possible. Pre-mitigation significance: Low (2 × 3 = 6). Residual with surface-use agreements that make removal a landowner-callable obligation: Very Low.

No unplanned-closure risk for these works reaches High or Very High. That is the material difference between this Class 5 scope and a hydraulic-reclamation or shaft-closure case. A half-removed seismic station is an inconvenience; a half-reclaimed tailings dam is not.

SECTION 7: CONSOLIDATED RISK REGISTER

Table 7-1 consolidates the risks assessed in Sections 5 and 6. Pre-mitigation and residual ratings use the scales in Section 4. Residual ratings assume that the controls listed in Section 8 are implemented and funded.

ID	Risk	Case	C	P	Pre	Res	Key control
C-01	Incomplete pad / foundation removal	Planned	2	3	Low	V.Low	Break-out + close-out survey
C-02	Track erosion / sedimentation	Planned	3	3	Mod	Low	Rip, drain, seed, first-wet inspection
C-03	Residual fencing / wire	Planned	2	3	Low	V.Low	Complete removal; walk-down
C-04	Demolition / transport H&S	Planned	3	2	Low	V.Low	Method statement; battery procedure
C-05	Batteries / electrical waste	Planned	3	3	Mod	V.Low	Inventory + licensed recycler
C-06	Hydrocarbon staining	Planned	2	2	V.Low	V.Low	Drip trays; lift stained gravel
C-07	Revegetation failure	Planned	2	3	Low	V.Low	Rip, seed, 3-year aftercare (item 15)
C-08	Livestock / farm-access conflict	Planned	2	3	Low	V.Low	Landowner notice; temporary exclusion
C-09	Theft / vandalism of equipment	Planned	2	3	Low	V.Low	Single-campaign removal; keep locked
C-10	Inadequate financial provision	Both	2	2	Low	V.Low	Annual quantity reconciliation
C-11	Harmony seismic-monitoring interface	Planned	3	3	Mod	Low	90-day notice; offer of transfer
C-12	Relinquishment blocked by leftovers	Planned	3	1	V.Low	V.Low	GPS close-out; landowner sign-off
U-01	Orphaned stations and tracks	Unplanned	3	4	Mod	Low	Callable financial provision
U-02	Leaking batteries / vandalised housings	Unplanned	3	3	Mod	Low	30-day battery recovery action
U-03	Abandoned tracks gully	Unplanned	3	3	Mod	Low	Item 3 quantum held as callable
U-04	Inaccessible financial provision	Unplanned	3	3	Mod	Low	Guarantee / trust, not operational cash

ID	Risk	Case	C	P	Pre	Res	Key control
U-05	Regulatory / Harmony non-compliance	Unplanned	3	2	Low	Low	Protocol written into EMPr
U-06	Landowner dispute over leftovers	Unplanned	2	3	Low	V.Low	Surface-use agreement removal trigger

Table 5 - Consolidated Risk Register

No planned-closure risk is rated High or Very High before mitigation. The highest planned-closure scores are Moderate (C-02 track erosion, C-05 batteries if abandoned, C-11 Harmony interface). All three fall to Low or Very Low after the controls that the Class 5 estimate already funds. No unplanned-closure risk is rated High or Very High. U-01 (orphaned stations) is the highest unplanned score at Moderate, and is controlled by making the existing quantum callable.

SECTION 8: MITIGATION, CONTROLS AND THE PREMATURE-CLOSURE PROTOCOL

8.1. Additional and amplified risks

Controls have been selected in the order required by NEMA: avoid, minimise, rehabilitate, offset. Offsets are not proposed and are not warranted at this scale. Avoidance is achieved by keeping the surface works to four point sites and existing or shortest-possible farm tracks. Minimisation is achieved by lockable housings, sealed batteries and concurrent housekeeping. Rehabilitation is the planned end-state funded by items 3, 10, 12, 14 and 15 of the Class 5 estimate. Residual risk that cannot be designed away (Harmony interface; landowner relationship) is managed by agreement..

8.2. Controls required for planned closure

i. As-built GPS and photographic record of each station, fence line and track centreline at commissioning, so that close-out can be demonstrated.
ii. Inventory of all batteries, panels, fuel containers and cables at commissioning, updated annually.
iii. Documented demolition method statement covering isolation of power, battery handling, pad break-out to 300 mm below ground, fence removal and track ripping on contour.
iv. Single-campaign decommissioning of all four stations to avoid a half-stripped network.
v. Landowner notice of at least seven days and temporary stock exclusion during break-out.
vi. 90-day written notice to Harmony Target before isolation of any boundary station, with an offer to transfer functioning equipment.
vii. Seeding of pads and ripped tracks in the first suitable season, followed by the aftercare already costed against 8 ha (item 15).
viii. Close-out pack: waste-disposal certificates, recycler receipts for batteries, landowner sign-off, and as-left photographs.
ix. Annual update of the quantum once as-built track length and pad specification are known (Class 5 to Class 4).

8.3. Premature-closure protocol

The protocol is the principal control for the unplanned-closure case. It must be a controlled document in the EMPr and must be executable without waiting for a new authorisation. Because the works are small, the protocol can be short.

i. Trigger definition and authority to activate: General Manager of Jelani (or the JV board if the company is no longer staffed), with notification to DMPR, the landowners and Harmony Target within five working days.

ii. Actions within 14 days: isolate and recover all batteries and portable electronics; lock or remove housings; notify landowners that tracks will be ripped.
iii. Actions within 60 days: break out pads, remove fencing, rip tracks, seed if season allows; submit waste certificates.
iv. Actions within 90 days: issue a close-out letter to DMPR and Harmony; update the Environmental Risk Report to record that the Class 5 works have been extinguished.
v. Standing commercial arrangements: a call-off with a local earthworks / electrical contractor, and confirmed access to the financial-provision instrument.

The incremental cost of executing this protocol on four pads is already inside the Class 5 figure (item 14 at R 100 000 per station plus item 3 for the tracks). No separate premature-closure add-on is required at this level of definition, provided the instrument is callable.

SECTION 9: MONITORING, REVIEW AND GOVERNANCE

9.1. Monitoring during operation, closure and aftercare

The following monitoring is required to confirm that residual risks remain within the ratings in Table 5. Intensities are proportionate to four point sites.

i. During operation: annual inspection of each station (fence integrity, battery condition, pad cracking, track erosion, evidence of theft). Record in the environmental file.
ii. At decommissioning: waste-disposal and recycler certificates; as-left photographs at each of the four coordinates.
iii. Aftercare (funded under item 15, costed against 8 ha): vegetation cover and erosion of ripped tracks, twice per wet season for three years or until 70 % canopy is achieved, whichever is later.
iv. No air-quality, groundwater, radiological or surface-water specialist network is justified for these works. If a local drainage line is crossed by a track, a single visual inspection after the first two storm events following ripping is sufficient.
v. Security / theft incidents until the last battery has left site.

9.2. Review

The risk register will be reviewed at: grant of the mining right; commissioning of the first station (confirm as-built quantities); each annual financial-provision update; any decision to add or relocate a station; activation of the premature-closure protocol; and application for closure certification of the mining right. Ownership of the register sits with Jelani's responsible person for environmental management, with technical input from the EAP and the closure-cost estimator.

9.3. Plan of Study implications

No additional specialist studies are required to close out the Class 5 surface-risk register at the current level of definition. The following modest confirmations should be captured in the next revision of the estimate and the EMPr:

i. final power specification for each station (so that the battery-waste stream is known);
ii. final track alignment and a measured length (to replace the 8 748 m^2 allowance with an as-designed quantity);
iii. confirmation that no station is sited inside a wetland or drainage line (avoidance); and
iv. the written Harmony interface procedure.

These are engineering and commercial confirmations, not EIA-grade specialist investigations. They do not change the conclusion that residual environmental risk of the Class 5 works is Low to Very Low.

SECTION 10: CONCLUSIONS

Planned closure of the Jelani Class 5 surface works is a small, conventional clean-up: four instrument pads, a short length of farm track and a few tens of metres of fence. No planned-closure risk is a fatal flaw. After the controls that the Class 5 estimate already funds, residual significance is Low or Very Low across the register.

Unplanned or premature closure does not change the source term. It only changes the duration for which pads, batteries and tracks might stand unattended. That case is controlled by holding the existing quantum in a callable instrument and by a short premature-closure protocol written into the EMPr. No High or Very High unplanned-closure risk has been identified for these works.

The Class 5 rehabilitation cost estimate of R 1,480,314.57 excluding VAT (R 1,702,361.76 including VAT) is proportionate to the risk. The estimate correctly sets every major DMRE master-rate item (plant, buildings, shafts, waste deposits, river diversions, water treatment) to zero, because those features do not exist on the Jelani mining-right area. This risk assessment does not identify any excluded activity that should now be added to that quantum.

Two interface matters sit outside the rand value but inside the management system: a written handover protocol with Harmony Target before any boundary station is isolated, and surface-use agreements that give each host landowner a callable right to require removal. Both should be captured in the EMPr.

Until as-built quantities are known, the residual significance of C-02 (track erosion) and U-01 (orphaned stations) should be treated as not lower than Low, and financial provision should not be reduced below the current Class 5 quantum. There is no basis, on the information in the project description, the Mining Work Programme and the Class 5 estimate, to increase it.

Appendix D10 - Climate Change



Jelani Resources (Pty) Ltd

Jelani Joint Venture (JV) Area Underground Mining Project

Climate Change Assessment

3 August 2026

JELA#001_CCA

Report Preparation By

Kongiwe Environmental (Pty) Ltd	
Registration Number	2016/135562/07
Telephone Number	+27 (10) 140 6508
Email	info@kongiwe.com
Registered Address	150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Website	www.kongiwe.com

Report Information

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Approval

Verification	Capacity	Name	Signature	Date
By Co-Author	Environmental Consultant	Benjamin Dunn		22 September 2026
By Co-Author	Geospatial Consultant	Chelsea Strooh		22 September 2026
Reviewed by	Climate Technical Lead	Robin Bolton		22 September 2026
Reviewed and approved by	COO	Grant Cornish-Bowden		25 September 2026

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Executive Summary

Kongiwe Environmental (Pty) Ltd was appointed to undertake a Climate Change Assessment for the proposed Jelani Joint Venture underground mining project, situated within the Matjhabeng Local Municipality in the Free State Province. Jelani Resources (Pty) Ltd is a joint venture between White Rivers Exploration (Pty) Ltd and Harmony Gold Mining Company Limited, established to develop a deep-level gold operation over an application area of 956.76 hectares. The Project will build to a full production rate of 60 000 tonnes of ore per month and will make use of the existing Target Mine shaft complex and metallurgical plant, with only seismograph stations and short access tracks proposed within the Jelani application area. This Assessment supports the environmental authorisation application. It quantifies the greenhouse gas emissions attributable to the Project and evaluates the Project's exposure and sensitivity to projected changes in the local climate.

The greenhouse gas inventory has been prepared on an operational control basis and quantifies only the incremental emissions attributable to the Jelani Project. Emissions associated with Harmony's existing operations, with ore processing at the Target No. 1 metallurgical plant under the toll treatment agreement, and with the construction and operation of the new tailings storage facility remain outside the inventory boundary. Construction-phase emissions are estimated at approximately 47 715 tCO_2e, of which 44 879 tCO_2e are Scope 1 and Scope 2 and 2 836 tCO_2e are Scope 3. Operational emissions are estimated at approximately 2 958 538 tCO_2e over the 15-year operational phase, comprising 2 940 077 tCO_2e of Scope 1 and Scope 2 emissions and 18 462 tCO_2e of Scope 3 emissions.

Purchased grid electricity dominates the footprint. Scope 2 emissions of approximately 2.89 million tCO_2e account for roughly 98 per cent of operational emissions, and the surface refrigeration plant alone accounts for approximately one quarter of life of mine Scope 2 emissions. The emissions profile of the Project is therefore governed principally by the volume of electricity consumed and by the carbon intensity of the national grid, rather than by direct fuel combustion. The Project's climate change impact during the operational phase has accordingly been assessed as a national and international scale impact of High significance. Mitigation reduces the magnitude of the impact from Major to Moderate. The significance nevertheless remains High after mitigation, because the impact is long term and national to international in extent.

The Project is exposed to a range of physical climate hazards. Average annual temperature is projected to rise by approximately 2.0 to 2.5 °C under RCP 4.5 and by 2.35 to 3.47 °C under RCP 8.5 by mid-century, with very hot days increasing from a present-day 2 to 9 days per year to approximately 13 days under RCP 4.5 and 20 days under RCP 8.5. Mean annual rainfall is projected to change modestly, but the frequency of extreme rainfall days at the Project location increases by approximately 1 to 3 days per year under RCP 4.5 and 2 to 4 days per year under RCP 8.5, and convection-permitting modelling indicates substantially higher short-duration rainfall intensity across southern Africa. Solar ultraviolet radiation is already an extreme ambient hazard at the site and is carried into the assessment as a present-day occupational exposure requiring active management rather than a hazard of increasing magnitude.

The highest residual risks arise from heat. Rising surface temperatures reduce the operating margin built into a ventilation and cooling system engineered around a fixed design summer condition, at a mine where conditions in the No. 5 Shaft return airway already exceed the heat-stroke threshold and where main fan redundancy is limited. These risks are rated High before mitigation and remain elevated afterwards. Extreme rainfall and flooding are rated High for construction areas, for the receiving tailings storage facility and for overlying landowners, noting that the site already floods under present-day conditions and that the stormwater designs carry no allowance for projected intensity increases. The Project is further exposed through infrastructure

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outside its operational control, most materially the receiving tailings storage facility, since a loss of deposition capacity would prevent processing and halt mining.

Transition risk is assessed as moderate to low, reflecting the Project's comparatively short operational life and its limited reliance on technologies vulnerable to transition. The principal exposure lies in carbon pricing, greenhouse gas reporting obligations and the progressive implementation of the Climate Change Act. With the mitigation and adaptation measures set out in this Assessment implemented, and subject to the refinement of the inventory as detailed design proceeds, the Project is considered acceptable from a climate change perspective.

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Abbreviations and Units

Abbreviation	Description
°C	Degrees Celsius
AMD	Acid and Metalliferous Drainage
AQA	National Environmental Management: Air Quality Act
BAC	Bulk Air Cooler
CCAM	Conformal-Cubic Atmospheric Model
CCRA	Climate Change Risk Assessment
CFWI	Canadian Fire Weather Index
CLO	Community Liaison Officer
CMIP5	Coupled Model Intercomparison Project Phase 5
CMIP6	Coupled Model Intercomparison Project Phase 6
CO_2e	Carbon Dioxide Equivalent
CORDEX	Coordinated Regional Climate Downscaling Experiment
CRV	Climate Risk and Vulnerability
CSIR	Council for Scientific and Industrial Research
DEFRA	UK Department for Environment, Food and Rural Affairs
DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
DMPR	Department of Mineral and Petroleum Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EM-DAT	Emergency Events Database
ENSO	El Niño–Southern Oscillation
EP4	Equator Principles (Fourth Edition)
g	Gravitational acceleration (peak ground acceleration)
GCM	Global Climate Model

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Abbreviation	Description
GHG	Greenhouse Gas
GISTM	Global Industry Standard on Tailings Management
GNR	Government Notice Regulation
ha	Hectare
HSE	Health, Safety and Environment
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
JV	Joint Venture
km	Kilometre
kW	Kilowatt
LoM	Life of Mine
m	Metre
m^3/s	Cubic metres per second
mamsl	Metres above mean sea level
MAP	Mean Annual Precipitation
MCS	Mesoscale Convective System
mm	Millimetre
MODIS	Moderate Resolution Imaging Spectroradiometer
MVA	Megavolt-ampere
MW(th)	Megawatt (thermal)
MWh	Megawatt hour
NCCAS	National Climate Change Adaptation Strategy
NDC	Nationally Determined Contribution
NEMA	National Environmental Management Act 107 of 1998
NERT	National Emissions Reduction Trajectory
PPE	Personal Protective Equipment
RCP	Representative Concentration Pathway
SABS	South African Bureau of Standards
SANS	South African National Standard
SETs	Sectoral Emission Targets

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Abbreviation	Description
SRES	Special Report on Emissions Scenarios
SSP	Shared Socio-economic Pathway
tCO_2e	Tonnes of Carbon Dioxide Equivalent
TCFD	Task Force on Climate-related Financial Disclosures
TSF	Tailings Storage Facility
TTT	Tropical-Temperate Trough
UV	Ultraviolet
W/m^2	Watts per square metre
WBGT	Wet Bulb Globe Temperature
WMA	Water Management Area
WMO	World Meteorological Organization
WUI	Wildland-Urban Interface

Glossary of Key Terms

Cascading Impacts	Cascading impacts from extreme weather/climate events occur when an extreme hazard generates a sequence of secondary events in natural and human systems that result in physical, natural, social or economic disruption, whereby the resulting impact is significantly larger than the initial impact. Cascading impacts are complex and multi-dimensional and are associated more with the magnitude of vulnerability than with that of the hazard **(IPCC, 2022, p. 2902)**.
Climate	In a narrow sense, climate is usually defined as the average weather -or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities- over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization (WMO). The relevant quantities are most often surface variables such as temperature, precipitation and wind. Climate in a wider sense is the state, including a statistical description, of the climate system (IPCC, 2022, p. 2902).
Climate Change	A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use. Note that the United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1 defines climate change as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods'. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes (IPCC, 2022, p. 2902).

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Climate Extreme (Extreme weather or Climate Event)	The occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classified as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., high temperature, drought or heavy rainfall over a season) (IPCC, 2022, p. 2902).
Climate Variability	Deviations of some climate variables from a given mean state (including the occurrence of extremes, etc.) at all spatial and temporal scales beyond that of individual weather events. Variability may be intrinsic, due to fluctuations of processes internal to the climate system (internal variability), or extrinsic, due to variations in natural or anthropogenic external forcing (forced variability) (IPCC, 2022, p. 2902).
Physical Climate Risks	Physical climate risks refer to the potential adverse effects on people, infrastructure, operations, communities, or ecosystems that arise directly from climate-related hazards. These risks include acute risks, which stem from sudden and intense extreme weather events such as floods, storms, hail, lightning, or wildfires, as well as chronic risks, which result from longer-term, gradual shifts in climate conditions such as rising average temperatures, changing rainfall patterns, increased frequency of heatwaves, or prolonged drought periods.
Transition Risks	Transition risks are those associated with the broader societal and economic shift toward a low-carbon economy. These risks typically arise from changes in government policy and regulations, the introduction of new legal requirements, advancements in low-carbon technologies, shifts in market preferences and expectations, or reputational pressures related to climate change. Examples include carbon pricing mechanisms, stricter emission standards, or evolving investor and lender requirements.
Hazard	A hazard is any climate-related event, condition, or trend that has the potential to cause harm or adverse impacts. Hazards can be acute, such as extreme rainfall events, heatwaves, or wildfires, or chronic, such as prolonged drought or gradual increases in average temperatures. Hazards form one of the core components in the assessment of climate-related risks.
Exposure	Exposure describes the presence of people, infrastructure, ecosystems, assets, or other receptors in locations where they could be adversely affected by climate-related hazards. The degree of exposure depends on the location and characteristics of these elements relative to areas where hazards may occur.
Vulnerability	Vulnerability refers to the propensity or predisposition of a system, community, asset, or population to be adversely affected by climate hazards. It is determined by a combination of the system's sensitivity to the hazard and its capacity to cope with, adapt to, or recover from the potential impacts. Vulnerability can be reduced through appropriate design improvements, operational controls, and adaptation measures.
Risk	Risk is defined as the potential for adverse consequences resulting from the interaction of three core components: a climate hazard, the exposure of receptors to that hazard, and the vulnerability of those receptors. In climate change risk assessments, risk is evaluated as the product of the probability or likelihood of a hazard occurring and the consequence or severity of its potential impacts. This produces an overall risk rating that guides the prioritisation of mitigation and adaptation measures. The relationship is expressed as: Risk = Probability × Consequence.

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Specialist Declaration

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations).

Report title: Climate Change Assessment: Jelani Underground Mining Project**.**

Specialist Information:

Title of Specialist Assessment	Climate Change Assessment: Jelani Underground Mining Project
Specialist Company Name	Kongiwe Environmental
Specialist Name	Benjamin Dunn
Specialist Identity Number	*Not available for public disclosure (POPIA ACT, Act No. 4 of 2013)*
Specialist Qualifications:	BA Geography & Sociology BA Honours Geography MSc Environmental Sciences
Professional Affiliation/Registration:	EAPASA Reg. 2024/8330
Physical address:	150 Bryanston Drive, Bryanston, Sandton, 2191. South Africa.
Postal address:	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Telephone	010 140 6508
E-mail	bdunn@kongiwe.com

Declaration by the Specialist

I, Benjamin Dunn, declare that:

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
- any decision to be taken with respect to the application by the competent authority; and;

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- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of Specialist

Kongiwe Environmental (Pty) Ltd
Name of Company

23 September 2026
Date

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Specialist Declaration

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations).

Report title: Climate Change Assessment: Jelani Underground Mining Project.

Specialist Information:

Title of Specialist Assessment	Climate Change Assessment: Jelani Underground Mining Project
Specialist Company Name	Kongiwe Environmental
Specialist Name	Chelsea Strooh
Specialist Identity Number	*Not available for public disclosure (POPIA ACT, Act No. 4 of 2013)*
Specialist Qualifications:	BSc Life and Environmental Science in Geography and Zoology BSc Honours Environmental Science
Professional Affiliation/Registration:	Geo-Information Society of South Africa (GISSA)
Physical address:	150 Bryanston Drive, Bryanston, Sandton, 2191. South Africa.
Postal address:	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Telephone	010 140 6508
E-mail	cstrooh@kongiwe.com

Declaration by the Specialist

I, Chelsea Strooh, declare that:

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –

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- any decision to be taken with respect to the application by the competent authority; and;
- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of Specialist

Kongiwe Environmental (Pty) Ltd

Name of Company

23 September 2026

Date

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Specialist Declaration

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations).

Report title: Climate Change Assessment: Jelani Underground Mining Project.

Specialist Information:

Title of Specialist Assessment	Climate Change Assessment: Jelani Underground Mining Project
Specialist Company Name	Kongiwe Environmental
Specialist Name	Robin Bolton
Specialist Identity Number	*Not available for public disclosure (POPIA ACT, Act No. 4 of 2013)*
Specialist Qualifications:	BSc: Microbiology & Biochemistry BSc Honours: Microbiology BSc Honours: Water Utilisation
Professional Affiliation/Registration:	• Principal Environmental Auditor, Institute of Environmental Management and Assessment, UK, 2016 • EMS Auditor, Institute of Environmental Management and Assessment, UK, 2015 • PrSciNat, 2006 (membership number: 400223/05) • Water Institute of South Africa (WISA) • Institute of Environmental Management and Assessment (IEMA) (membership number: 45134)
Physical address:	150 Bryanston Drive, Bryanston, Sandton, 2191. South Africa.
Postal address:	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Telephone	010 140 6508
E-mail	Robin@elementsstewardship.co.za

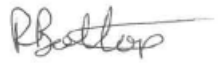
Declaration by the Specialist

I, Robin Bolton, declare that:

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;

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- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
- any decision to be taken with respect to the application by the competent authority; and;
- the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of Specialist

Kongiwe Environmental (Pty) Ltd
Name of Company

23 September 2026
Date

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Report Structure and Reference in Terms of GNR 982 EIA Regulations 4 December 2014, Appendix 6

Details to be included in the Report	Section in Report
Details of	
Specialist who prepared the report	Specialist declaration
Expertise of the specialist	Specialist declaration
Curriculum vitae of the specialist	See Appendix
Declaration that the Specialist is Independent in a form as may be specified by the Competent Authorities	Specialist declaration
An indication of the Scope of and the Purpose for which the report was prepared	Section 1.1
An indication of the Quality and Age of base data used for the specialist report	Section 4.1.3
A Description of existing impacts on the site, cumulative impacts of the proposed development, and levels of acceptable change	Section 6 & Section 8.5
The Duration, Date, and Season of the site investigation and the relevance of the season to the outcome of the assessment	Not relevant
A Description of the Methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 4
Details of an Assessment of the specific identified Sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	Not relevant
An identification of any areas to be avoided including buffers	Not Applicable
A Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided including buffers	Not relevant
A Description of any Assumptions made and any Uncertainties or Gaps in Knowledge	Section 9
A Description of the Findings and Potential implications of such findings on the Impact of the proposed activity, including identified Alternatives on the environment, or activities	Section 6
Any Mitigation Measures for inclusion in the EMPr	Section 6 and 8
Any Conditions for inclusion in the Environmental Authorisation	None
Any Monitoring Requirements for inclusion in the EMPr or Environmental Authorisation	Section 8.5
As to whether the proposed activity/ activities or portions thereof should be authorised	Section 10
Regarding the acceptability of the proposed activity or activities	Section 10
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management, and mitigation measures that should be included in the EMPr and where applicable the closure plan	Section 6 and Section 8.5
A Description of any Consultation Process that was undertaken during the course of preparing the specialist report	None
A Summary and copies of any comments received during any consultation process and where applicable all responses thereto	None
Any other information requested by the Competent Authority	None

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1. Introduction and Project Description

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture company established by White Rivers Exploration (Pty) Ltd (WRE) and Harmony Gold Mining Company Limited (Harmony) to develop an underground mining operation in the Free State Province of South Africa. The joint venture area combines two contributions: portions of Harmony's existing Target Mine mining right, and prospecting right areas held by WRE immediately to the west of that mine. The application area measures 956.76 hectares and comprises portions of the farms Graspan 40, Welvaart 63, Diamant 37 and Swartpan 436, situated approximately 11 km north-west of Odendaalsrus, 1.5 km west of Allanridge and 22 km east of Wesselsbron. It falls within Ward 36 of the Matjhabeng Local Municipality, in the Lejweleputswa District Municipality. The local setting of the proposed project is shown in Figure 1-1

The proposed project follows the completion of the prospecting phase, which confirmed the viability of an underground operation and identified mineral resources sufficient to support its development. Authorisation is sought for a schedule of sixteen commodities: gold, silver, uranium, sulphur, platinum group metals, rare earths, alluvial diamonds, copper, cobalt, manganese, molybdenum, nickel, lead, tungsten, zinc and iron. Gold is the primary target, and the mine plan, production schedule and revenue forecast are based on gold alone; silver and uranium are recovered only as minor constituents of the bullion. Initial underground access will be established at approximately 1 200 m below surface via the Target Shafts, from which mining will advance into the orebody, which extends from roughly 1 500 m to 2 600 m below surface and deepens over the life of mine. Two mining methods will be applied: conventional breast mining where the reef dips at less than 55°, which accounts for the large majority of stope tonnage, and shrinkage stoping on the steeper reef, accounting for approximately 3%. Broken ore will be loaded by 10-tonne load-haul-dump units, hauled by 30-tonne dump trucks to the shaft ore pass system, and hoisted to surface for delivery to the processing plant or the waste rock dump. Production will build to a full rate of 60 000 tonnes of ore per month, or 720 000 tonnes per annum, with a mining inventory of approximately 10.34 Mt over a fourteen-year full-production life.

Development of the project will take place over an extended lead time. Site data gathering and feasibility studies occupy the first three years and detailed engineering design the fourth, with implementation and construction running from Year 5 to Year 8. Underground mining commences in Year 7, following two years of level access work and shaft refurbishment, and full production is reached in Year 10. Access during Phase 1 is via Target No. 3 Shaft. In Phase 2, which begins in Year 9, the refurbished Target No. 2 Shaft becomes the main access to the underground workings and Target No. 3 Shaft is retained as a second outlet. On the current cash flow programme the operation produces from the early 2030s to the late 2040s, which places the mine's operating life across the 2050 climate projection horizon adopted in this assessment. The years referred to in this paragraph follow the overall project programme, which includes the study and design period. The greenhouse gas inventory in Sections 4 and 5 follows the mine schedule year numbering of the Bara Consulting Study Update (2026), in which Year 1 corresponds to Year 5 of the project programme.

All operational mining infrastructure will be located within Harmony's existing Target Mine mining right, and no new operational infrastructure is planned within the Jelani application area. Existing facilities at the Target No. 3, No. 4 and No. 5 Shaft sites will be refurbished and recommissioned; new surface infrastructure will be constructed at the Target No. 2 Shaft site. The energy-consuming infrastructure supporting the operation comprises the hoisting systems at both production shafts, the compressor stations, the surface refrigeration (ice) plant, the ventilation fans at the No. 4 and No. 5 Shafts together with underground ventilation, underground pumping, underground conveyors and chairlifts, a water treatment plant, as well as the associated surface buildings and workshops. Of these, the refrigeration plant is distinctive in that it operates at effectively continuous duty, its operating load equalling its connected load of 6 370 kW, so that its consumption varies little with production rate. The only surface works proposed within the Jelani application area are four seismographic monitoring stations, installed at intervals along the boundary shared with Harmony's operations to monitor

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mining-induced seismicity, each comprising a small sensor pad and housing of some 5 to 10 m², a basic power and communications installation, perimeter fencing, and short gravel access tracks totalling approximately 1 km.

Three elements of the wider operation fall outside Jelani's operational control and are treated accordingly in this assessment. Ore will be processed at Harmony's existing Target No. 1 metallurgical plant under a toll treatment agreement; the plant's energy, water and reagent consumption is therefore not attributable to Jelani. A new tailings storage facility of approximately 69 ha will be constructed west of the plant and north of the existing Target tailings facility. Harmony will obtain the required authorisations and operate the facility, and its construction and operational emissions are therefore excluded from the greenhouse gas inventory presented in this report. The facility is nevertheless included in the climate risk assessment because Jelani's operation is critically dependent on its availability. Climate-related disruption to tailings deposition could prevent ore processing and, consequently, mining activities. Closure and rehabilitation obligations associated with the Jelani mining right are correspondingly limited. No shafts, declines, processing facilities, tailings facilities, waste rock dumps or areas of widespread surface disturbance will be established within the application area. Rehabilitation will therefore be limited to the decommissioning and removal of the four seismographic stations, associated fencing and access tracks, revegetation of disturbed areas, and subsequent maintenance and monitoring.

Electricity will be supplied by Eskom to both production shafts. The Target No. 3 Shaft substation carries the operation during Phase 1 at a calculated peak demand of 12.5 MVA and thereafter supplies the No. 4 Shaft ventilation fans for the remainder of the life of mine. The Target No. 2 Shaft substation requires a complete upgrade to carry the Phase 2 load, with a calculated peak demand of 35 MVA for the project. Peak annual energy consumption is estimated at 217 000 MWh, reported for Year 11 of the mine schedule, which is corroborated by a project questionnaire estimate of 214 500 MWh for Year 12. Power costs have been based on Eskom's Megaflex tariff structure for 2025/26, averaging R2.18/kWh. An on-site generating plant with an estimated annual output of 3 000 MWh is also proposed.

This Climate Change Assessment has been prepared to support the environmental authorisation for the proposed project. It quantifies the greenhouse gas emissions attributable to the operation based on the information available and the scope of project development at the time of writing. The resulting figures constitute a high-level estimation, which is considered appropriate to the current stage of the project's development. The report further assesses the operation's exposure and sensitivity to projected changes in the local climate and identifies measures to reduce emissions and to manage climate-related risk over the life of mine.

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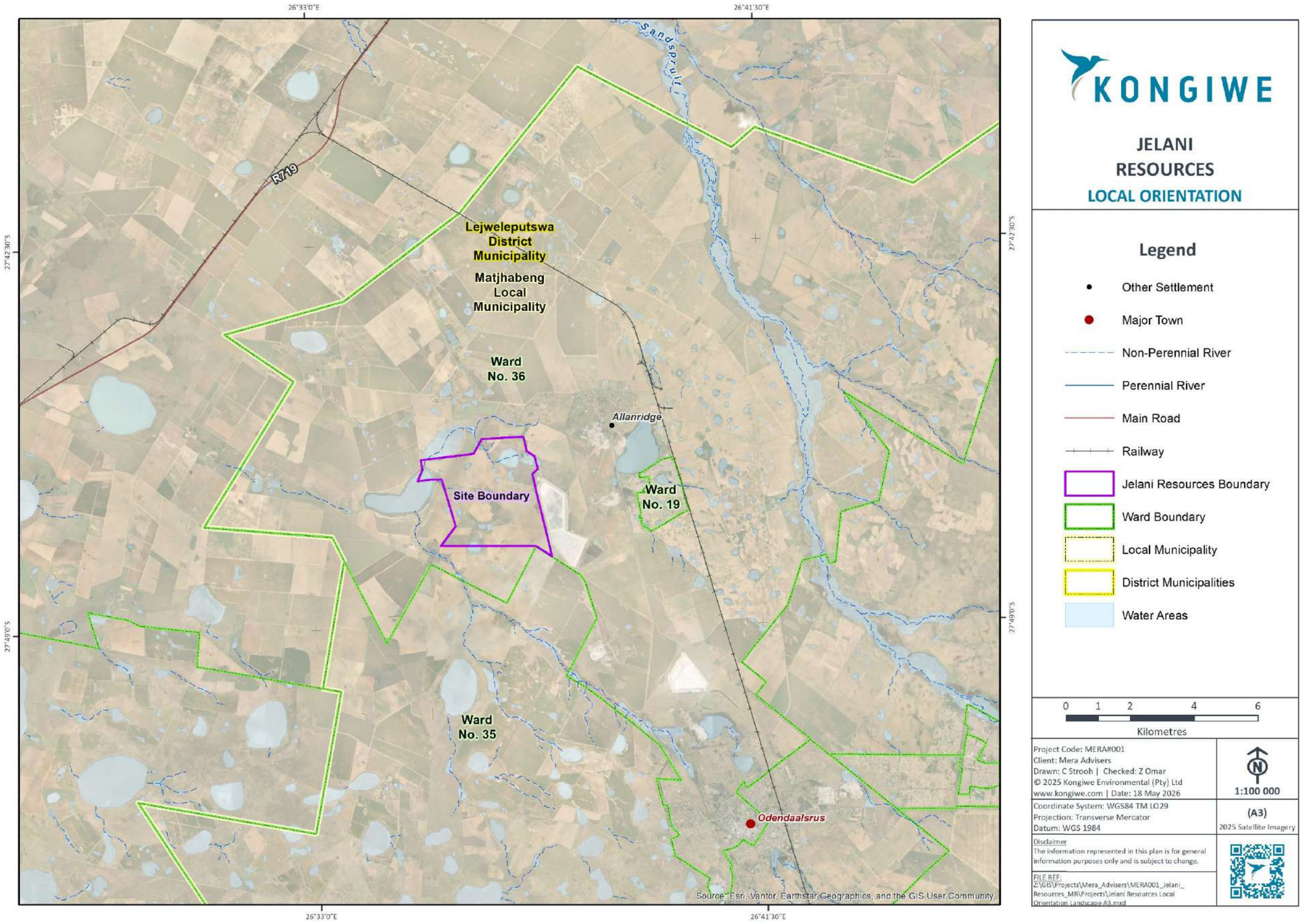


Figure 1-1: Local Orientation of the proposed JV Area Underground Mining Project.

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2. Legal Context, Policies and Regulatory Framework

The consideration of climate change within environmental assessments is informed by a combination of national legislation, environmental policies, strategic frameworks and internationally recognised good practice. Collectively, these instruments establish the legal and policy context for assessing greenhouse gas (GHG) emissions, climate-related risks and climate resilience throughout the project lifecycle. While South African legislation requires climate change to be considered as part of environmental decision-making, it does not prescribe a single methodology for undertaking climate change assessments. Consequently, this assessment has been informed by both the applicable South African legislative framework and internationally recognised guidance to ensure a structured, transparent and consistent approach.

This chapter provides an overview of the principal legislative, policy and strategic instruments relevant to the proposed Jelani underground mining project, together with the key international frameworks that have informed the methodology adopted for this Climate Change Assessment. The discussion is not intended to be exhaustive but rather focuses on those instruments most relevant to the assessment of greenhouse gas emissions, physical and transition climate-related risks, and long-term climate resilience.

2.1 Climate Change Act, 2024 (Act 22 of 2024)

The Climate Change Act 22 of 2024 establishes South Africa's overarching legislative framework for responding to climate change and supporting the transition to a low-carbon, climate-resilient and just economy. The Act provides the legal basis for integrating climate change considerations into national, sectoral and project-level planning, while giving effect to South Africa's commitments under the Paris Agreement.

The Act introduces a range of regulatory mechanisms to reduce GHG emissions and strengthen climate resilience. These include the establishment of Sectoral Emission Targets (SETs), the potential allocation of carbon budgets to significant emitting entities, and enhanced requirements for the monitoring, reporting and verification of GHG emissions. The Act also places considerable emphasis on climate change adaptation by requiring climate risks and vulnerabilities to be considered within planning and decision-making processes. Together, these measures are intended to support South Africa's transition to a lower-carbon economy while improving resilience to the impacts of climate change.

At the time of writing, several regulatory instruments anticipated under the Act are not yet fully operational. Sections 26 and 27, which establish the framework for listed greenhouse gases, listed activities and carbon budget determinations, have not yet come into force. As a result, the detailed regulatory mechanisms governing emissions limitations and sector-specific obligations are still being developed[1]. This evolving regulatory environment introduces a degree of uncertainty for sectors with long-term investment horizons, as future carbon budget allocations and potential regulatory requirements may influence project planning and operational strategies going forward.

The Act remains relevant to the proposed Jelani underground mining project from both mitigation and adaptation perspectives. Although the project will utilise existing mining and processing infrastructure at Harmony Gold's Target Mine, greenhouse gas emissions will arise from underground mining activities, diesel-powered mobile and stationary equipment, electricity consumption and the construction of associated support infrastructure. The Act also emphasises the need to identify and assess physical climate-related risks that may affect the long-term resilience of mining operations, including increasing temperatures, drought, extreme rainfall events and flooding, which have the potential to influence underground mining operations, surface infrastructure, water management systems and operational continuity. As the Climate Change Act is progressively implemented through the promulgation of supporting regulations, additional obligations relating

[1] Climate Change Act 22 of 2024 s 26–27.

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to greenhouse gas reporting, carbon budgets and climate risk management may become applicable to the mining sector. Consequently, ongoing monitoring of developments under the Climate Change Act will be necessary to ensure that the project remains aligned with South Africa's evolving climate change regulatory framework.

2.2 Carbon Tax Act, Act No. 15 of 2019

The Carbon Tax Act 15 of 2019 establishes South Africa's national carbon pricing mechanism, giving effect to the "polluter pays" principle by taxing the direct (Scope 1) emissions of entities conducting listed activities, and forms part of the country's broader mitigation framework in support of its Paris Agreement commitments. Phase 1 ran from 1 June 2019 to 31 December 2025, and Phase 2 commenced on 1 January 2026 and will run to 2030, with the headline rate increasing from R236 to R308 per tonne CO_2e (PWC, 2025). The basic tax-free and trade-exposure allowances are retained until 2030 and the offset allowance has been increased by five percentage points (PWC, 2025), while the former carbon budget allowance falls away in favour of the mandatory carbon budgets introduced under the Climate Change Act 22 of 2024, exceedance of which attracts a higher rate. Liability is activity-based rather than emissions-based: underground mining and associated processing fall under IPCC category 1A2i, for which the threshold is a combined installed thermal input capacity of 10 MW(th), assessed on rated capacity irrespective of utilisation, such that an operation may fall within scope on installed standby generation and process heating capacity alone. Emissions from petrol and diesel combustion, whether in mobile mining equipment or stationary generators, are not taxed at the point of use; they are priced upstream through the carbon fuel levy embedded in the fuel price, which increased to 19 cents per litre for petrol and 23 cents per litre for diesel from 1 April 2026[2], and are declared and then removed from the DA 180 calculation to avoid double taxation. Scope 2 emissions from purchased electricity are likewise untaxed at the point of consumption, Eskom's liability having been substantially neutralised through offsetting levies. Residual liability for the proposed project would therefore attach principally to non-liquid fuels, while separate reporting obligations arise under the National Greenhouse Gas Emission Reporting Regulations independently of tax liability.

2.3 2025 Draft National Guidelines for the Consideration of Climate Change[3]

The *Draft National Guideline for the Consideration of Climate Change Implications in Applications for Environmental Authorisations, Atmospheric Emission Licences and Waste Management Licences* (GN 6759 of 24 October 2025), published for public comment under section 24J of the National Environmental Management Act (NEMA), provides the most recent national guidance for integrating climate change considerations into environmental authorisation processes. Although the guideline has not yet been formally promulgated, it represents current best practice by outlining the minimum information requirements and methodological considerations for assessing greenhouse gas emissions, climate-related risks and climate resilience as part of applications for Environmental Authorisations (EA), Atmospheric Emission Licences (AEL) and Waste Management Licences (WML).

The guideline further emphasises that climate change considerations must form an integral component of environmental decision-making by requiring that development proposals evaluate both:

- The potential impact of the project on climate change, including greenhouse gas emissions and broader environmental implications; and
- The potential impact of projected climate change on the proposed development, including risks associated with changing temperature patterns, rainfall variability and extreme weather events.

[2] South African Revenue Service. Schedule No. 1 Part 5A to the Customs and Excise Act, 1964: Fuel and Road Accident Fund Levies. Version effective 1 July 2026. Available at: https://www.sars.gov.za/wp-content/uploads/Legal/SCEA1964/Legal-LPrim-CE-Sch1P5A-Schedule-No-1-Part-5A.pdf

[3] Draft 2025 National Guideline for the Consideration of Climate Change Implications in Applications for Environmental Authorisations, Atmospheric Emission Licences and Waste Management Licences (GN 6759 of 24 October 2025)

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In the context of the proposed Jelani underground mining project, the guideline is directly relevant as the development will involve underground mining activities, surface infrastructure and associated water management systems that may both contribute to greenhouse gas emissions and be affected by future climatic conditions. Climate-related hazards such as increasing temperatures, changing rainfall patterns, drought, flooding and extreme weather events have the potential to influence operational continuity, water resource management, infrastructure resilience and worker safety throughout the project's life of mine. Consequently, this climate change assessment has been undertaken in accordance with the principles and methodological approach outlined in the draft national guideline by considering both the project's contribution to climate change through greenhouse gas emissions and the potential impacts of future climate change on the proposed development.

2.4 National Environmental Management Act: Air Quality Act (Act 39 of 2004, as amended)

The National Environmental Management: Air Quality Act 39 of 2004 (AQA) provides the regulatory framework for managing air quality in South Africa and complements broader environmental management obligations under NEMA (Rumble, et al., 2018). The Act regulates ambient air quality, emissions from point and mobile sources, and pollution control, with the goal of protecting human health, ecosystems, and socio-economic interests. Under AQA, listed activities that emit atmospheric pollutants are subject to licensing, emission standards and reporting requirements. The Act establishes mechanisms for monitoring, reporting and regulating emissions, which are complementary to South Africa's broader climate change mitigation framework and contribute to the management of emissions associated with industrial and mining operations.

In the context of the proposed Jelani underground mining project, no AEL is anticipated, as the proposed underground mining and associated surface infrastructure are not expected to undertake listed activities requiring an AEL in terms of the National List of Activities which Result in Atmospheric Emissions. Nevertheless, the project will generate emissions from diesel-powered mining equipment, standby generators, material handling activities and fugitive dust sources, which should be managed in accordance with applicable air quality legislation and recognised good practice. While AQA does not prescribe climate change assessment methodologies, it provides an important regulatory framework for managing air pollutant emissions and supports broader national objectives relating to air quality improvement, greenhouse gas emission management and sustainable development.

2.5 National Climate Change Adaptation Strategy (NCCAS)

The National Climate Change Adaptation Strategy (NCCAS) provides South Africa's overarching framework for strengthening climate resilience and guiding coordinated adaptation planning across all spheres of government and key economic sectors. The strategy aims to reduce climate vulnerability, improve adaptive capacity, and support the transition to a climate-resilient economy, while contributing to South Africa's commitments under the Paris Agreement.

The NCCAS identifies sectors such as mining, water resources and infrastructure as particularly vulnerable to climate change and emphasises the integration of climate risk considerations into development planning and environmental management. It promotes the use of climate projections, risk mapping and vulnerability assessments to inform decision-making. Accordingly, this Climate Change Assessment has been undertaken in a manner consistent with the objectives of the NCCAS by identifying climate-related hazards, evaluating project-specific vulnerabilities, and considering appropriate adaptation measures to improve the long-term resilience of the proposed Jelani underground mining operation.

2.6 Corporate Governance and Climate-Related Risk

Climate change has become an increasingly important consideration in corporate governance and decision-making, particularly for projects with long operational lifespans or significant environmental footprints. Under

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the Companies Act 71 of 2008, directors are required to act in good faith, in the best interests of the company, and with the necessary care, skill and diligence. This includes ensuring that material climate-related physical, transition, regulatory and financial risks are appropriately identified, assessed and managed as part of broader enterprise risk management and strategic decision-making.

Within the environmental authorisation process, this includes ensuring that specialist studies adequately evaluate greenhouse gas emissions, climate-related risks, and appropriate mitigation and adaptation measures. For projects seeking international finance, these considerations also support alignment with recognised frameworks such as the IFC Performance Standards and the Equator Principles. Integrating climate change into environmental assessments therefore supports sound corporate governance, informed decision-making and the long-term resilience of development projects.

2.7 National Environmental Management Act (Act 107 of 1998, as amended)

The National Environmental Management Act (NEMA) provides the overarching legislative framework for environmental management in South Africa and is directly relevant to this Climate Change Assessment through its emphasis on sustainable development, risk-averse decision-making, and the integration of environmental considerations into planning and development processes. The Act establishes key environmental management principles which require that decision-making adopts a risk-averse and cautious approach, taking into account the limits of current knowledge about environmental impacts[4], while also ensuring that the needs of present and future generations are considered[5]. Furthermore, NEMA emphasises that disturbance of ecosystems and loss of biodiversity should be avoided or minimised[6], which is particularly relevant in the context of climate change where environmental systems may already be under increasing stress.

In addition, Section 24O of NEMA requires that the competent authority consider the potential impacts of climate change on a proposed activity, as well as the activity's potential contribution to climate change, when evaluating applications for environmental authorisation. In this regard, this Assessment supports the application of these principles by identifying and assessing climate-related risks, such as increasing temperatures, drought, flooding, extreme rainfall events and wildfire, that may influence the resilience of underground mining operations, surface infrastructure, water management systems and overall environmental risk profile of the proposed project. In addition, NEMA requires that the potential environmental impacts of activities are identified, assessed, and appropriately managed prior to implementation, thereby reinforcing the role of this assessment as a tool to inform risk-based decision-making and ensure that climate-related considerations are adequately integrated into project planning and management throughout the Environmental Impact Assessment and environmental authorisation process.

2.8 EIA Regulations under NEMA (2014, as amended)

The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), promulgated under the National Environmental Management Act, provide the procedural framework for the assessment and authorisation of listed activities and are therefore directly relevant to the incorporation of climate change considerations within project-level assessments. While the Regulations do not explicitly prescribe a standalone climate change risk assessment, they require that all potential environmental impacts and risks associated with a proposed activity are identified, assessed, and managed as part of the environmental authorisation process. This implicitly includes climate-related risks, particularly where changing climatic conditions may influence the significance, extent, or duration of impacts.

[4] National Environmental Management Act (Act 107 of 1998), s 2(4)(a)(vii)
[5] National Environmental Management Act (Act 107 of 1998), s 2(4)(a)(i)
[6] National Environmental Management Act (Act 107 of 1998), s 2(4)(a)(ii)

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The Regulations further require that impact assessments consider cumulative impacts, environmental sensitivities, and the potential consequences of the activity across spatial and temporal scales, which aligns closely with the principles underpinning climate risk assessment. In addition, the need to assess alternatives, mitigation measures, and residual impacts supports the integration of climate resilience and adaptive management into project design and operation. Within this context, this assessment contributes to compliance with the EIA Regulations by providing a structured evaluation of both the project's contribution to climate change through greenhouse gas emissions and the potential impacts of climate change on the proposed development, thereby strengthening the overall impact assessment and supporting informed, risk-based decision-making. This is particularly relevant for the proposed Jelani underground mining project, where climatic factors such as increasing temperatures, drought, extreme rainfall events and flooding may influence underground mining operations, surface infrastructure, water management systems, operational continuity and the long-term resilience of mining infrastructure.

2.9 South African National Standard 14064-1

The SANS 14064-1, developed by the South African Bureau of Standards (SABS), provides the national standard for the quantification and reporting of greenhouse gas (GHG) emissions and removals at the organisational level. The standard was first published in 2006 and has subsequently been revised, with the most recent edition issued in 2021. The standard establishes the principles, requirements and methodological guidance for compiling a greenhouse gas emissions inventory. It outlines key accounting principles such as relevance, completeness, consistency, transparency and accuracy, and provides guidance for identifying emission sources, quantifying emissions and reporting results in a transparent and verifiable manner.

The earlier 2006 version of the standard categorised emissions according to three scopes, namely:

- Scope 1: Direct GHG emissions from sources owned or controlled by the organisation;
- Scope 2: Indirect emissions associated with purchased electricity, heat or steam; and
- Scope 3: Other indirect emissions occurring across the value chain.

Within these scopes, emissions were further divided into twelve reporting categories associated with specific activities and sources. In contrast, the 2021 revision of the standard reorganised emissions into six reporting categories, where the first category represents direct emissions and the remaining categories represent different forms of indirect emissions.

For the purposes of this study, the 2006 version of SANS 14064-1 was applied in compiling the GHG emissions inventory for the proposed mine. This approach was adopted as the scope-based classification framework aligns more closely with the other greenhouse gas accounting methodologies used in the assessment and facilitates consistent comparison with established emissions reporting practices.

2.10 National Climate Risk & Vulnerability Assessment Framework[7]

The National Climate Risk and Vulnerability (CRV) Assessment Framework (2020) provides South Africa's nationally endorsed methodology for undertaking climate risk and vulnerability assessments across sectors and spatial scales. Aligned with the Intergovernmental Panel on Climate Change (IPCC) risk framework, it defines climate risk as the interaction between hazards, exposure and vulnerability, providing a consistent approach for assessing climate-related risks.

The framework adopts a structured three-phase approach comprising scoping, planning and assessment, guiding the identification of climate hazards, exposure, vulnerability, potential impacts and adaptive capacity. Within this assessment, the CRV Framework has informed the overall methodology, including the identification and

[7] Department of Environment, Forestry and Fisheries, 2020. National Climate Risk and Vulnerability (CRV) Assessment Framework summary document, Pretoria: South Africa.

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evaluation of climate hazards relevant to the proposed Jelani underground mining project and the application of a qualitative risk matrix to determine risk significance and identify appropriate mitigation and adaptation measures. Its application ensures that the assessment is consistent with national good practice and provides a transparent basis for climate-informed environmental management and project planning.

2.11 Global Industry Standard on Tailings Management

The Global Industry Standard on Tailings Management (GISTM) is an internationally recognised framework developed to promote the safe management of tailings storage facilities (TSFs) throughout their lifecycle. Published in 2020 following the Brumadinho tailings dam failure in Brazil, the standard establishes a comprehensive framework for the governance, design, operation, monitoring and closure of TSFs, with the overarching objective of achieving zero harm to people and the environment.

Although the proposed Jelani underground mining project does not include the construction of the new tailings storage facility as part of the current application, the tailings generated by the operation will be deposited on existing and future tailings storage facilities owned and operated by Harmony Gold. The long-term viability of the mining operation is therefore intrinsically linked to the responsible management and continued integrity of the facilities receiving these tailings. Consequently, the principles of the GISTM remain relevant as an international good practice framework for considering climate-related risks associated with the infrastructure upon which the project relies and have been applied.

The GISTM explicitly recognises climate change as a key consideration in tailings management, requiring operators to evaluate how changing climatic conditions, including increasing temperatures, changing rainfall patterns and more frequent or intense extreme weather events, may influence the safety, performance and long-term stability of TSFs throughout their operational life and following closure. Accordingly, the findings of this Climate Change Assessment may also provide useful information to support the ongoing management and climate resilience of the TSFs receiving material from the proposed mining operation.

Key GISTM principles relevant to this assessment include:

- Principle 2 – Develop and maintain an interdisciplinary knowledge base

Operators should develop and maintain a comprehensive knowledge base that considers technical, environmental, social and climatic factors, including climate change projections and associated uncertainties that may influence the performance of tailings storage facilities throughout their lifecycle.

- Principle 3 – Use all elements of the knowledge base to inform decisions

Climate-related information should be incorporated into risk assessments, operational decision-making and long-term planning to ensure that uncertainties associated with future climatic conditions are appropriately considered in the management of tailings storage facilities.

- Principle 4 – Develop plans and design criteria to minimise risk

The design, operation and management of tailings storage facilities should incorporate appropriate climate resilience measures, including consideration of projected changes in rainfall intensity, flooding, drought and other climate-related hazards that may affect long-term facility performance.

2.12 International Lending, Climate Requirements and Good Practice

Although the proposed Project is not currently subject to specific international lender requirements, internationally recognised climate-related frameworks and standards have been considered to inform the methodology adopted for this Climate Change Assessment. These frameworks represent current international good practice for the identification, assessment and management of greenhouse gas (GHG) emissions, physical and transition climate risks, and climate resilience. They also provide recognised approaches for integrating

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climate change considerations into project planning, environmental management and long-term decision-making.

Collectively, these frameworks complement the South African legislative and policy framework by providing additional guidance on climate governance, risk assessment, emissions quantification, adaptation planning and climate-related disclosure. Their application within this assessment promotes a structured, transparent and consistent approach to evaluating climate-related risks and opportunities associated with the proposed underground mining operation. While this assessment is not intended to demonstrate formal compliance with any individual international framework, the principles contained within these documents have informed the assessment methodology and the development of appropriate mitigation and adaptation measures. A summary of the principal international frameworks considered during this assessment, together with their relevance to the Project, is provided in Table 2-1.

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Table 2-1: Summary of international climate-related frameworks considered in this assessment.

Framework	Purpose	Relevance to the Climate Change Assessment
International Financial Reporting Standards (IFRS) S2: Climate-related Disclosures	Provides a globally recognised framework for identifying, assessing and disclosing climate-related risks and opportunities.	Informs the overall assessment methodology by supporting a structured evaluation of climate governance, physical and transition risks, greenhouse gas emissions and long-term climate resilience. The principles underpinning the Governance, Strategy, Risk Management, and Metrics and Targets pillars have informed the approach adopted within this assessment.
Equator Principles (EP4)	International environmental and social risk management framework applied by financial institutions to project finance.	Provides guidance for the identification, assessment and management of climate-related environmental and social risks. The principles have informed the assessment of greenhouse gas emissions, physical and transition climate risks, stakeholder considerations, and the development of appropriate mitigation and monitoring measures.
IFC Performance Standards (2012)	International framework for identifying and managing environmental and social risks associated with private sector investments.	Informs the assessment of climate-related risks, greenhouse gas emissions, resource efficiency and climate resilience. In particular, Performance Standards 1, 3 and 4 provide guidance on environmental risk management, greenhouse gas quantification, pollution prevention, resource efficiency, and community health and safety in relation to climate change.
World Bank Environmental and Social Standards (ESS)	Establishes environmental and social requirements for projects financed by the World Bank.	Supports the integration of climate change considerations into environmental assessment, risk management and project planning, while promoting long-term climate resilience and sustainable development outcomes.
World Bank Group Environmental, Health and Safety (EHS) Guidelines	Provides internationally recognised technical guidance on environmental performance, occupational health and safety, pollution prevention and resource efficiency.	Informs good practice for energy efficiency, emissions management, pollution prevention, occupational health and safety, and the consideration of climate resilience during the design, construction and operation of mining infrastructure.

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3. Climate Change and Mining: Key Background Information

This chapter provides the conceptual, scientific and sectoral context for the Climate Change Assessment of the proposed Jelani underground mining project. It establishes the key concepts, climate-related risks and pathways through which climate change may affect mining operations, associated infrastructure and supporting systems, while also considering the potential contribution of the Project to climate change through greenhouse gas emissions. The chapter draws on relevant scientific literature, sectoral studies, technical guidance and South African climate research to establish the basis for the assessment of physical and transitional climate risks relevant to the Project.

3.1 Conceptual Framework of Climate Change, Risk and Vulnerability

The climate change discourse is increasingly understood not as a singular issue, but as a complex system of interrelated and nested challenges. This framing recognises climate change as a multifaceted phenomenon that interacts with and exerts pressure on political, economic, and social systems. Disruptions in one domain, such as shifts in agricultural productivity or disease patterns, can propagate across sectors and geographic boundaries, highlighting the limitations of traditional, siloed management approaches and reinforcing the need for integrated responses (Gilder & Swanepoel, 2018). This systemic perspective aligns with more recent interdisciplinary climate change assessments, which emphasise the integration of natural and social sciences, engineering, and policy to better support decision-making under conditions of complexity and uncertainty (Ara Begum, et al., 2022).

The scientific foundation for this understanding is largely derived from the work of the Intergovernmental Panel on Climate Change (IPCC), which synthesises global research to provide a consensus view on climate change (Gilder & Swanepoel, 2018). This body of knowledge is structured around three core pillars: the physical science basis, which confirms that global warming is unequivocal and driven by greenhouse gas emissions; the assessment of impacts and vulnerability across human and natural systems; and mitigation pathways aimed at reducing future emissions (Gilder & Swanepoel, 2018). More recent assessment cycles from the IPCC, particularly the contribution of Working Group II to the Sixth Assessment Report, have further advanced this framework through a stronger emphasis on risk-based and solutions-oriented approaches, which explicitly consider uncertainty, high-impact low-probability events, and the dynamic interactions between climate systems and socio-economic processes (Ara Begum, et al., 2022). This evolution reflects a shift from deterministic projections toward probabilistic and decision-relevant frameworks that are directly applicable to climate risk assessment.

Central to the IPCC's most recent reporting approach informed by Working Group II, is the concept of risk, defined as the potential for adverse consequences arising from the interaction between climate-related hazards, and the exposure and vulnerability of human and ecological systems (Ara Begum, et al., 2022). A key shift within the framing of risk within the IPCC reporting is that it is no longer understood as a static or singular outcome. Rather it is recognised as a dynamic and evolving condition shaped by complex, non-linear interactions that may compound or cascade across systems and scales (Ara Begum, et al., 2022). Importantly, this framing accommodates uncertainty, including circumstances where probabilities cannot be fully quantified, and explicitly incorporates the possibility of high-consequence outcomes. This is particularly relevant in applied contexts such as infrastructure and environmental management, where low-probability events (e.g., extreme rainfall or prolonged drought) may have disproportionately large impacts depending on the specific project to which they are applied.

At a global scale, natural catastrophe losses continue to demonstrate an upward trajectory, with insured losses reaching approximately USD 107 billion in 2025, primarily driven by severe convective storms and wildfires, despite the absence of a major United States hurricane landfall which would drive up the global average (Bevere, et al., 2026). While this placed 2025 below the long-term growth trend of 5-7% per annum, underlying risk remains elevated due to increasing exposure in hazard-prone areas, shifting hazard profiles, and the growing

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contribution of lower-severity, high-frequency hazards (Bevere, et al., 2026). Insured losses are projected to rise to approximately USD 148 billion in 2026 and could reach up to USD 320 billion in a peak loss year scenario (Bevere, et al., 2026).

Climate-related risks are increasingly translating into direct economic consequences, with climate risk now recognised as a central driver of insurance economics, extending impacts well beyond insured assets (Standard Bank Insurance Limited, 2025). In the South African context, climate change has intensified rainfall patterns, contributing to more frequent and severe flood and hail events, with floods emerging as the most economically devastating hazard in recent years (Standard Bank Insurance Limited, 2025). The 2022 KwaZulu-Natal floods alone resulted in approximately R62.3 billion in economic losses, of which only R32 billion was insured, alongside significant socio-economic impacts including loss of life, business interruptions, job losses, and widespread damage to housing and infrastructure (Standard Bank Insurance Limited, 2025). These impacts are further exacerbated by inadequate infrastructure maintenance, amplifying financial losses and disrupting key economic sectors such as manufacturing, transport, and trade. Although less frequent, fire events represent a high-severity risk, capable of causing extensive structural damage and substantial economic losses, as demonstrated by the 2017 Knysna fires, which resulted in billions of rand in damages and widespread displacement (Standard Bank Insurance Limited, 2025). Collectively, these catastrophic events – floods, hailstorms and fires – underscore the growing economic vulnerability associated with climate change, reinforcing the need for proactive risk management and resilience-building strategies across both public and private sectors (Standard Bank Insurance Limited, 2025). Data from the Emergency Events Database (EM-DAT)[8], as summarised in Table 3-1 further supports this assessment, indicating that South Africa has experienced a range of natural hazard events including floods, storms and landslides, thereby highlighting the country's sustained exposure to multiple climate-related and environmental risks. These climate-related hazards translate into quantifiable economic losses, as evidenced by natural catastrophe data for the period 2013–2022, where total losses are estimated at approximately USD 7 billion, of which only around USD 2 billion was insured (Swiss Re, n.d.). This reflects a substantial protection gap of roughly 67% (approximately USD 5 billion), with all figures adjusted to 2022 price levels. In the context of increasingly frequent and severe climate events, this gap underscores the extent of financial exposure and residual risk borne by governments, businesses, and communities.

Table 3-1: Natural Disasters in South Africa, 1900 to present day.

Natural Hazard	Subtype	Events Count	Total Deaths	Total People Affected	Total Damage Adjusted for Inflation ('000 USD)
Drought	Drought	11	0	32 925 000	4 335 491
Extreme Temperatures	Cold Wave	2	52	0	0
	Heat Wave	1	11	20	0
Flood	Flash Flood	9	265	66 345	186 332
	Riverine Flood	18	815	509 916	3 447 942
	Flood (General)	30	1 096	268 977	4 646 569

[8] EM-DAT: The Emergency Events Database – Université catholique de Louvain (UCL) – CRED, D. Guha-Sapir, Brussels, Belgium. URL: https://doc.emdat.be/docs/data-structure-and-content/emdat-public-table/. Accessed 28 April 2026.

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Landslide	Landslide	1	34	0	0
Wildfire	Forest Fire	2	31	1 600	0
	Land Fire (Brush, Bush, Pasture)	7	97	5 780	644 713
Storm	Blizzard/Winter storm	1	22	100 000	8 720
	Hail	2	5	3 576	150 981
	Lightning/Thunderstorms	7	104	25 196	771 682
	Severe weather	7	64	25 852	14 017
	Storm (General)	9	91	18 328	0

Note: Data sourced from the EM-DAT: The Emergency Events Database (CRED/UCL, 2026), comprising over 27 000 recorded disaster events globally from 1900 to present, collated from multiple sources including UN agencies, non-governmental organisations, insurance companies, research institutions, and press agencies. In EM-DAT, a disaster is defined as an event that exceeds local coping capacity and meets at least one of the following criteria: (i) 10 or more fatalities; (ii) 100 or more people affected; or (iii) a declaration of a state of emergency or call for international assistance. Reported Total Damage ('000 US$) values are adjusted for inflation using the Consumer Price Index (CPI). A value of zero (0) indicates that no damage data were available or reported for the event.

Closely linked to risk are the concepts of vulnerability and exposure, which together determine the sensitivity of a system to climate hazards (Ara Begum, et al., 2022). Vulnerability is understood as the propensity or predisposition to be adversely affected; this framing incorporates both biophysical sensitivity and socio-economic capacity to cope and adapt (Ara Begum, et al., 2022). This contemporary approach recognises that vulnerability is spatially and temporally dynamic, varying across and within communities. It is shaped by underlying socio-economic conditions, governance structures, and environmental context (Ara Begum, et al., 2022). These dimensions form a core component of climate risk assessment frameworks and are explicitly incorporated within the GreenBook methodology, which applies spatially differentiated socio-economic and environmental indicators to evaluate vulnerability and support risk-informed decision-making (CSIR, 2023). Exposure, in turn, refers to the presence of assets, infrastructure, ecosystems, or populations in locations that may be adversely affected by climatic hazards. The interaction of these components provides a structured and widely accepted framework for assessing climate-related risks. This risk–vulnerability framework also aligns closely with principles of disaster risk reduction and climate change adaptation, which are increasingly integrated within both scientific assessment and policy practice (Ara Begum, et al., 2022). The convergence of these fields emphasises the importance of iterative risk management, whereby risk assessment is not a once-off exercise but an ongoing process of evaluation, response, monitoring, and adjustment over time (Ara Begum, et al., 2022). Such approaches are particularly relevant in the context of climate change, where evolving hazards, shifting exposure patterns, and changing system vulnerabilities require adaptive and flexible management strategies.

Within the South African context, the literature emphasises a high degree of climate vulnerability (Gilder & Swanepoel, 2018; Dove, et al., 2021). The country is inherently water-scarce, with average rainfall below the global mean, making it particularly sensitive to climatic variability. Observational data since the mid-20th century indicate a clear warming trend, alongside increasing rainfall variability characterised by more intense rainfall events and prolonged dry periods (Gilder & Swanepoel, 2018; Engelbrecht, 2019; Dove, et al., 2021). This is further supported by long-term empirical analyses, which indicate that while the total number of rainfall days has remained relatively stable over the last 100 years (1921-2020), the probability and intensity of significant and extreme daily rainfall events have increased across much of the country (McBride, et al., 2022). Notably,

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increases in high-magnitude rainfall thresholds and return period values suggest a growing likelihood of severe precipitation events, particularly in the eastern regions, with important implications for flood risk, soil erosion, and damage to infrastructure and agricultural systems (McBride, et al., 2022).

Hail and lightning are convective storm hazards that are inherently difficult to project under future climate conditions due to their localised nature and the coarse spatial resolution of global climate models (Davis-Reddy & Vincent, 2017). Nevertheless, a warmer atmosphere is expected to increase atmospheric instability and moisture availability, potentially creating conditions that favour more intense convective thunderstorms across parts of southern Africa (Davis-Reddy & Vincent, 2017). Empirical and stochastic modelling undertaken for South Africa further demonstrates that hail risk is concentrated across the Highveld, including parts of the Free State, where severe convective storms pose a credible hazard to surface infrastructure and exposed assets (Punge, et al., 2023). Although the future response of hail to climate change remains uncertain, severe thunderstorms capable of producing hail should be recognised as a potential physical hazard to the proposed Jelani underground mining operation, particularly in relation to surface infrastructure, electrical equipment, vehicles and operational continuity.

These changes present significant challenges for water resource management, ecosystem stability, and broader socio-economic resilience. In addition, the increasing frequency and intensity of climate extremes introduce the potential for compound and cascading risks, where multiple stressors interact to amplify impacts beyond what would be expected from individual hazards alone (Ara Begum, et al., 2022). In response, South Africa's climate governance framework is evolving toward a more structured and regulatory approach. Emerging mechanisms such as the National Emissions Reduction Trajectory (NERT), Sectoral Emissions Targets (SETs), and carbon budgeting frameworks are designed to operationalise mitigation objectives and guide emissions reductions across sectors. This transition reflects a broader shift from understanding climate change as a scientific concept to addressing it as a practical management and compliance challenge, which is increasingly central to environmental planning and decision-making.

In this context, a risk-based climate assessment framework provides a structured approach for evaluating the potential impacts of climate change on mining operations and associated infrastructure. By considering the interaction between climate hazards, such as extreme rainfall, temperature variability and drought, with project-specific exposure and vulnerability, climate change assessments can identify and prioritise material risks under both current and future climate conditions. This approach is particularly relevant to the proposed Jelani underground mining project, where climate-related hazards may influence underground operations, surface infrastructure, water management, worker safety and operational continuity. Accordingly, the concepts of hazard, exposure and vulnerability provide the foundation for this assessment and support the identification of appropriate adaptation measures to enhance the long-term resilience of the Project under a changing climate (Ara Begum, et al., 2022).

3.2 Overview of Climate Influences on Tailings Storage Facilities

Tailings storage facilities (TSFs) are engineered systems designed to store the by-products of mineral processing, consisting of finely ground waste material typically transported and deposited as a slurry. These facilities comprise containment embankments, commonly referred to as tailings dams and associated infrastructure required to manage both solid waste and process water. Due to the potentially hazardous physical and chemical characteristics of tailings, TSFs must be carefully designed, operated, and monitored to prevent adverse impacts on human health, the environment, and surrounding infrastructure (World Bank, 2021). Despite their critical role in mining operations, TSFs have historically demonstrated a higher incidence of failure compared to conventional water storage dams, with global records indicating more than one major failure per year on average. These failures highlight the inherent complexity of TSFs, which evolve over time as construction occurs in stages and as tailings characteristics change in response to mining and processing conditions. Effective management therefore

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requires a comprehensive understanding of geotechnical, hydrological, and geochemical risks, supported by robust governance, quality control, and adherence to regulatory frameworks (World Bank, 2021).

Although the proposed Jelani Project is predominantly an underground mining operation, it will generate processed tailings that will be deposited on TSF infrastructure associated with the broader Harmony Target Mine complex. Consequently, the Project will contribute additional tailings to existing mine waste infrastructure throughout its operational life. While the receiving TSF forms part of Harmony's broader mine waste management system, the Project shares responsibility for ensuring that its operational activities do not adversely affect the safe and sustainable performance of this infrastructure. Accordingly, understanding the factors that influence TSF performance, including the effects of climate variability and climate change, is directly relevant to the long-term environmental and operational resilience of the Project.

A key aspect of TSF performance is water management, as facilities must maintain a balance between water inputs (slurry deposition, rainfall, runoff) and outputs (decant, seepage recovery, evaporation). Poor control of the water balance can lead to elevated pore pressures, reduced stability, and an increased likelihood of failure. In addition, environmental risks such as seepage contamination and windblown dust emissions further underscore the importance of proper containment and operational practices (World Bank, 2021). The most common failure mechanisms associated with TSFs include overtopping, slope instability, foundation failure, seismic-induced liquefaction, and internal erosion (World Bank, 2021; Hudson-Edwards, et al., 2024). TSFs represent complex, dynamic systems that require ongoing risk assessment and adaptive management. Given that the Jelani Project will utilise existing processing infrastructure and contribute additional tailings to the wider TSF system, the continued safe operation and climate resilience of this infrastructure remain important considerations, even where the TSF itself is managed under a separate operational framework.

Climate change introduces significant uncertainty into the long-term performance and management of tailings storage facilities. Changes in rainfall patterns, including more intense storm events and prolonged droughts, can influence water balances, slope stability, erosion processes, and the overall performance of TSF water management systems. These changes increase the potential for a mismatch between historical design assumptions and future climatic conditions, thereby elevating long-term operational and environmental risks (Walls, 2023). For the Jelani Project, these considerations are particularly relevant because the Project will rely on existing TSF infrastructure for the deposition of processed tailings. Consequently, changes in future climatic conditions may influence the operational capacity, resilience, and long-term performance of infrastructure that is integral to the Project, despite being managed as part of the broader Harmony Target Mine complex.

In water-constrained environments, the depletion of water resources may necessitate increased recovery and recirculation of process water, including enhanced dewatering of tailings to minimise losses through evaporation and seepage. This is particularly relevant to mining operations, where water is required for mineral processing, tailings transport, and return-water recovery. Variability in rainfall patterns, whether above or below long-term averages, may require significant adjustments to the water management system (LPSDP, 2016, p. 11). Reduced rainfall may necessitate the identification and sourcing of supplementary process water supplies, whereas increased rainfall may require additional storage capacity through embankment raising, the development of separate water storage infrastructure, or the implementation of water treatment systems to enable controlled discharge to the environment.

Although framed within the context of Australia, the following considerations are equally applicable to South African conditions. A key climatic driver in relation to TSFs remains high rainfall, which must be managed through the provision of adequate and timely freeboard, or the inclusion of spillways where controlled discharge to the environment is permitted (LPSDP, 2016, p. 39). At the same time, water availability is becoming increasingly constrained, elevating the importance of efficient water management in mineral processing. Post-process water quality presents additional challenges, as it may be impacted by acid and metalliferous drainage (AMD), salinity, residual process reagents, and other contaminants. Accordingly, the volume of water entrained within the

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tailings, the quality of return water, and the availability of raw water collectively determine the extent of recycling to the processing plant, as well as the required capacity for dirty-water storage (LPSDP, 2016, p. 39).

TSFs are continuously exposed to climatic conditions, making climate a key driver of water balance, operational performance, and environmental risk. Rainfall, including seasonal variability and extreme storm events, governs water inputs and infiltration, influencing ponding, overtopping risk, and the mobilisation of contaminants such as AMD, salts, and residual reagents. Temperature and evaporation influence water losses, return-water recovery, and overall water balance, while prolonged dry periods increase reliance on recycled process water. Conversely, wetter conditions increase hydraulic loading and require careful management of pond levels, pumping capacity, and stormwater infrastructure. Climate variability further alters water storage, recycling, and discharge requirements, requiring mine operators to continuously adapt water management practices to maintain operational efficiency and environmental compliance. Effective TSF management must therefore account for continuous climatic exposure to ensure operational efficiency, water balance control, and environmental protection throughout the operational life of the facility (LPSDP, 2016).

3.3 Causes and Examples of Tailings Storage Facility Failures

The literature indicates that most TSF failures can be attributed to a limited number of underlying factors, notably poor management continuity and inadequate resourcing, particularly in terms of financial provision (Roche, et al., 2017; Morton & Van Heerden, 2023). TSFs can fail through a variety of mechanisms associated with environmental, geotechnical, and operational triggers; however, such failures are seldom the result of a single event. Rather, they represent the culmination of long-term deficiencies that progressively increase vulnerability to failure modes such as overtopping or internal erosion. In these instances, the triggering event reflects the final stage of deterioration rather than the root cause of failure (Roche, et al., 2017; Hudson-Edwards, et al., 2024). Where failures are linked to rapid external loading, such as seismic activity, the adequacy of the initial design becomes a dominant controlling factor (Roche, et al., 2017). Design approaches must therefore be appropriate to site-specific conditions, particularly given that certain construction methods prevalent in South Africa, such as upstream construction, are inherently more susceptible to instability under dynamic loading than downstream configurations. This is of relevance to the Project in that tailings arising from processing will be deposited at a tailings storage facility for which Harmony holds the environmental authorisations and retains operational responsibility. The facility therefore lies outside the Project's direct operational control and is assessed here as a critical external dependency rather than as Project infrastructure. The significance of that dependency is direct: processing cannot continue without a compliant destination for tailings, and mining cannot continue without processing. Any condition that removes or materially reduces available deposition capacity, whether a physical failure, a regulatory suspension, or an operational constraint that temporarily prevents the facility from accepting material, propagates into a suspension of mining. The risk to the Project is consequently expressed in terms of continuity of access to deposition capacity rather than embankment stability in isolation, consistent with the treatment of the mine as an interconnected system in which the material climate risks arise indirectly, through surface infrastructure and services on which underground operations depend (Ara Begum, et al., 2022).

Table 3-2 provides a comparative overview of common TSF types, including upstream, centreline, downstream, hybrid, water-retaining, and landform configurations. Each TSF type exhibits distinct structural characteristics, stability profiles, and sensitivities to climatic and environmental conditions. Understanding the differences between TSF types is relevant to the Project because the configuration of the receiving facility governs its sensitivity to extreme rainfall, flooding, prolonged wet periods and drought, and therefore governs the likelihood that deposition may be constrained or interrupted. It should be noted that additional TSF types exist which have not been considered here; the focus is on the most commonly encountered designs relevant to current mining and environmental assessments. The purpose of this information is to provide a foundational understanding of TSF design diversity, which is necessary for interpreting the resilience of the receiving facility and for framing the monitoring, assurance and contingency expectations applied to this dependency under changing climatic conditions.

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A number of studies have examined historical TSF failures to better understand their underlying causes and associated risk factors. A review by Azam and Li (2010) highlights the absence of a comprehensive global database of tailings dam failures, noting that existing datasets including United Nations Environment Programme (UNEP), International Commission on Large Dams (ICOLD), World Information Service on Energy (WISE), United States Commission on Large Dams (USCOLD), and United States Environmental Protection Agency (USEPA), represent only partial records of actual incidents. Despite these limitations, their statistical analysis of available data identified 198 pre-2000 and 20 post-2000 failure events, with sufficient information available for detailed assessment in the majority of cases (Azam & Li, 2010). The study concluded that failures are driven by a combination of environmental and operational factors, with high rainfall and poor management identified as dominant causes. Notably, the contribution of extreme rainfall events increased in the post-2000 dataset, suggesting a growing influence of climatic variability on failure occurrence. This finding is directly material to the Project, in that the projected increase in rainfall intensity for the Welkom area acts on precisely the mechanism most strongly associated with recent failures. It also indicates that where deposition is directed to a facility designed and authorised in the present regulatory environment, there is an opportunity for current understanding of climate risk to be incorporated from the outset, including projected changes in extreme rainfall, water availability and other relevant climatic conditions. Where designed and managed in accordance with contemporary standards such as the Global Industry Standard on Tailings Management (GISTM), such facilities avoid some of the limitations associated with historical TSFs that were designed using less comprehensive climate information and risk management approaches and consequently present a lower likelihood of deposition interruption on which the Project's exposure depends.

More recent analyses reinforce and expand upon these findings. The analysis undertaken by Hudson-Edwards et al (2024) which focused on 339 global TSF incidents, identifies slope instability, seismic activity, seepage, and deficiencies in water management as key failure mechanisms. These studies collectively demonstrate that TSF failures are rarely attributable to a single cause, but rather arise from the interaction of geotechnical, hydrological, and operational factors. Importantly, water-related processes, whether driven by extreme precipitation, poor drainage, or inadequate water balance management, emerge consistently as critical contributors to failure (Azam & Li, 2010; Hudson-Edwards, et al., 2024). This is supported by Morton & Van Heerden (2023) who recognise that the presence and management of water is a critical factor in most TSF failures, highlighting the importance of monitoring both surface water and pore water pressures within dam structures. The study further demonstrates that the application of monitoring technologies such as piezometers, thermal imagery, and remote sensing plays a key role in early detection of seepage and instability, thereby supporting proactive risk management and improved resilience to climate-related hydrological extremes in line with GISTM Principle 7. For the Project, this establishes the basis for seeking assurance over the receiving facility. As the facility is neither owned nor operated by the Project, exposure cannot be managed through direct design intervention. Instead, management relies on the arrangements governing access to the facility. It also requires visibility of the operator’s monitoring data and management systems, together with advance identification of contingency measures should deposition be curtailed.

Understanding these mechanisms is essential for interpreting the resilience of the receiving facility and the continuity of deposition on which the Project depends, particularly in the context of changing climate conditions that may intensify hydrological extremes and associated risks. A critical factor influencing both the likelihood and consequence of failure is the presence of water within the TSF. Water stored on or within tailings increases pore pressures, reduces shear strength, and significantly amplifies the potential scale of release in the event of a breach (Roche, et al., 2017). Key failure types and examples are summarised in Table 3-3 below.

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Table 3-2: High Level Comparison of Common Tailings Storage Facility (TSF) Embankment Configurations and Their Relative Stability and Risk Characteristics.

TSF Configuration	Direction of Raise	Foundation for Raises	Construction Method	Material Requirements	Stability	Relative Cost	Suitable Conditions	Risk/Limitations
Upstream	Upstream (Towards pond)	Previously deposited tailings	Starter dam constructed first; tailings discharged to form a beach; tailings are allowed to drain, dry and consolidate before being used to support subsequent raises.	Low	Low	Low	Low rainfall; low seismic activity.	Highly dependent on tailings strength; sensitive to saturation, poor drainage, seismic activity, and extreme rainfall.
Centreline	Vertically above the starter wall	Combination of tailings and engineered fill	Starter dam constructed first; subsequent raises built vertically above the centreline, supported by both embankment material and consolidated tailings; often includes internal drainage.	Moderate	Moderate	Moderate	Moderate climatic and loading conditions; adaptable to variable environments.	Partial reliance on tailings; still sensitive to water management and consolidation conditions.
Downstream	Downstream (Away from pond)	Engineered fill (not reliant on tailings)	Impervious starter dam constructed; each raise built on the downstream slope of the previous embankment, moving the crest outward with each lift.	High	High	High	High rainfall; significant water storage; seismic regions.	Large footprint required; higher construction costs.
Hybrid/Mixed	Variable (combination of methods)	Combination of tailings and engineered materials	TSF incorporates elements of upstream, centreline, and/or downstream construction; may evolve over time or include waste rock in embankment	Variable	Variable	Variable	Site-specific; often legacy or operationally adapted facilities.	Complexity in design and assessment; variable performance depending on configuration; may inherit risks from upstream sections.
Water Retaining	Typically downstream type (self-supporting wall)	Engineered fill with controlled design	Constructed using imported fill placed in controlled lifts; includes engineered features such as liners, core zones, filters, drainage systems, and riprap; designed to retain water against embankment	High	High	High	Facilities requiring direct water storage against embankment; controlled seepage environments	Requires stringent design and maintenance; potential seepage and piping risks if not properly managed.
Landform (Legacy)	No active raising (eroded/flattened form)	Consolidated historical tailings	Old TSF that has dried and degraded over time; embankment slopes may be eroded and geometry altered; no longer functions as active containment structure	None (inactive)	Low (structural integrity reduced)	N/A	Arid or long-abandoned sites	Erosion, dust generation, potential contamination exposure; no longer engineered to modern safety standards.

It is noted that hybrid, landform and water-retaining facilities are often context-specific or legacy-driven configurations, and their performance under climate stressors is highly variable, requiring case-specific assessment.

Source: Author's compilation and synthesis based on information interpreted from Global Tailings Review (n.d.), Roche *et al.* (2017) and Anglo American PLC (2024).

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Table 3-3: Common TSF Failures. Adapted from **Hudson-Edwards *et al* (2024).**

Failure Type	Mechanism/Description	Example
Slope Instability due to Static Loads	Occurs when the weight of tailings or embankments exceeds the strength of the structure or foundation.	Brumadinho, Brazil (2019)
Seismic-Induced Failure	Triggered by earthquakes causing liquefaction or large-scale deformation of tailings.	El Cobre Old Dam, Chile (1965); Mochikoshi Dykes 1 and 2, Japan (1978)
Seepage Leading to Internal or External Erosion	Water movement through tailings or the dam structure erodes material internally (piping) or externally.	**Bafokeng, South Africa (1974)**; Southern Clay, USA (1989)
Weak Foundation Soils	Inadequate or heterogeneous foundations can lead to settlement, subsidence, or slope failure.	Aznalcóllar, Spain (1998); Mount Polley, Canada (2014)
Excess Ponded Water / Overtopping	Accumulation of water on the tailings surface beyond freeboard causes overtopping and erosion.	**Merriespruit, South Africa (1994)**; Baia Mare & Baia Borşa, Romania (2000)
Structural Inadequacies of Appurtenant Structures	Failure of auxiliary structures such as spillways, decant towers, or retaining walls.	Fundão, Brazil (2015); Tapian Pit, Philippines (1996)
External Erosion from Flooding of Nearby Waterways	High flows from rivers or streams erode TSF perimeters, causing breach or instability.	Pinchi Lake, Canada (1971); Pico de São Luis, Brazil (1986)
Subsidence of Mined-Out Voids	Collapse of old mine workings destabilises the overlying tailings.	Inez, Martin County, USA (2000); Mufulira, Zambia (1970)

Historical analyses, including the Mount Polley tailings dam failure, show that once a breach occurs, stored water can rapidly mobilise large volumes of tailings, causing progressive erosion (Roche, et al., 2017). Reducing free water can lower overtopping risk, but slurry deposition often leads to supernatant accumulation that requires active management. The Gold Ridge breach in the Solomon Islands (2015) illustrates how intense rainfall can trigger failures, releasing contaminated material (Roche, et al., 2017). Two of the failure types listed above carry particular local relevance, in that the Merriespruit (1994) and Bafokeng (1974) events occurred in operating South African gold tailings environments and, in both instances, resulted in the immediate and indefinite cessation of deposition at the affected facility. These cases highlight the increasing challenge of managing tailings storage facilities under changing climatic conditions. They also underscore the need for proactive water management, structural monitoring and climate-informed risk mitigation at the facility on which the Project relies.

Climate change introduces increasing uncertainty and risk to the design, operation, and long-term stability of TSFs. Many existing facilities were not designed to accommodate the current trajectory of climate variability, particularly the increasing frequency and intensity of extreme weather events (Roche, et al., 2017). Empirical evidence suggests that heavy rainfall has been a significant contributing factor in a notable proportion of TSF failures globally, reinforcing the importance of incorporating climate considerations into both design and operational planning (Roche, et al., 2017). Climate-related risks manifest through multiple pathways, including

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increased hydraulic loading during extreme rainfall events, enhanced erosion of embankments, and elevated pore water pressures that may compromise structural stability (Roche, et al., 2017). In addition, more pronounced wet–dry cycles can induce contraction and expansion of materials, while higher temperatures and increased moisture availability may accelerate geochemical processes such as sulphide oxidation, thereby increasing the risk of acid and metalliferous drainage (Roche, et al., 2017). Extreme weather conditions may also facilitate the wider dispersion of contaminants through surface runoff and wind-blown dust, with associated impacts on surrounding ecosystems and communities.

For the Project, the consequence of concern is not confined to catastrophic failure, as deposition capacity may be lost or curtailed through a range of climate-influenced conditions well short of a breach. Sustained or intense rainfall may consume available freeboard and require a temporary suspension of deposition until the water balance is restored. Prolonged wet periods may prevent adequate drying and consolidation of the tailings beach, constraining the rate at which the facility can safely accept material and, where the configuration relies on deposited tailings for support, delaying scheduled raises. Storm events may damage delivery pipelines, pump stations, penstocks and return-water infrastructure, or render access roads impassable, interrupting the tailings stream without any compromise of the embankment itself. Conversely, drought and reduced water availability constrain the water required for slurry transport and reduce the volume of return water available to the processing plant, with consequences for the plant water balance as a whole. In each case the outcome for the Project is the same, in that tailings cannot be discharged, processing must be curtailed or halted, and mining ceases for the duration of the constraint. The risk is therefore characterised as an indirect, cascading risk of high consequence to which the Project has limited inherent resilience in the absence of alternative deposition capacity, and it is on this basis that it is carried forward into the risk assessment and adaptation measures set out in the sections that follow.

3.4 Overview of Transitional Climate Risks to Mining

Transition climate risks refer to the financial, operational and strategic risks arising from the global transition towards a lower-carbon economy. Unlike physical climate risks, which result from changes in climatic conditions, transition risks emerge from changes in climate policy and regulation, technology, markets, investor expectations and societal preferences as governments and industries implement measures to reduce greenhouse gas emissions and achieve net-zero emissions targets. These changes have the potential to influence operating costs, asset values, access to finance, competitiveness and long-term operational viability, particularly for emissions-intensive industries such as mining (United Nations Environment Programme, 2024; IFRS Foundation, 2026b).

The mining sector is considered particularly vulnerable to transition risks due to its relatively high greenhouse gas emissions, significant reliance on fossil fuel-derived energy, and increasing exposure to more stringent environmental regulation (United Nations Environment Programme, 2024; Enemuo & Ogunmodimu, 2025). As global economies decarbonise, governments are strengthening climate policy, expanding emissions reporting requirements, while implementing carbon pricing mechanisms to encourage emissions reductions. These measures may increase operating and capital costs for carbon-intensive mining operations while creating incentives for energy efficiency, renewable energy integration and lower-carbon technologies (Enemuo & Ogunmodimu, 2025). Simultaneously, the transition to a low-carbon economy is expected to fundamentally alter demand for minerals, with increasing requirements for commodities used in renewable energy technologies, battery storage systems, electric vehicles, as well as electricity transmission infrastructure (International Energy Agency, 2026). This creates a dual transition dynamic for the mining sector, whereby carbon-intensive operations may face increasing regulatory and cost pressures, while producers of minerals required for clean energy technologies may experience increased demand and new market opportunities (Carr-Wilson, et al., 2024; International Energy Agency, 2026). Mining companies are therefore expected to reduce the carbon intensity of their operations to remain competitive within an increasingly carbon-constrained economy (United Nations Environment Programme, 2024).

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One of the most significant transition risks facing the mining sector is the increasing implementation of carbon pricing mechanisms. Carbon pricing seeks to internalise the cost of greenhouse gas emissions by assigning a monetary value to carbon emissions, thereby encouraging investment in energy efficiency together with lower-carbon technologies. Carbon pricing may be implemented through carbon taxes or emissions trading schemes, both of which have become increasingly common internationally. As of 2023, 39 national and 33 sub-national carbon pricing initiatives had been implemented globally, collectively covering approximately 23% of greenhouse gas emissions. Carbon prices ranged from approximately USD 1/tCO_2e to USD 156/tCO_2e (United Nations Environment Programme, 2024). In South Africa, the Carbon Tax Act establishes the national carbon pricing framework, with progressively increasing tax rates intended to support the country's decarbonisation objectives, as discussed in Section 2.2.

Increasing carbon prices have the potential to significantly influence the economics of mining operations. Carbon costs may arise directly through the taxation of Scope 1 emissions or indirectly through higher electricity tariffs together with increased costs associated with emissions-intensive inputs such as steel, cement or transport fuels.

The progressive strengthening of carbon pricing mechanisms therefore represents a potentially material transition risk for emissions-intensive mining operations, particularly in jurisdictions with carbon-intensive electricity systems (United Nations Environment Programme, 2024). Analysis undertaken by S&P indicates that approximately one-third of assessed mining operations globally could be exposed to carbon prices of approximately USD 100/tCO_2e by 2030 under scenarios consistent with limiting global warming to below 2°C (United Nations Environment Programme, 2024). The extent of this exposure varies considerably between jurisdictions because the greenhouse gas intensity of mining operations differs according to the energy mix used within each country. This is particularly relevant to South African mining operations, which remain relatively emissions-intensive due to the country's reliance on coal-fired electricity (United Nations Environment Programme, 2024). For the proposed Jelani Project, which will rely on grid electricity, increases in carbon-related costs could therefore be reflected indirectly through higher electricity costs, creating a potential operating cost and competitiveness risk. This risk is further relevant where the Project shares electricity and supporting infrastructure with Harmony Gold, as changes in the cost of grid electricity may have implications across the broader mine complex.

These transition risks are particularly relevant to the proposed Jelani underground mining project. As a joint venture between White Rivers Exploration and Harmony Gold, the project will utilise existing Harmony infrastructure, including electricity supplied through South Africa's national grid to support underground mining, ventilation, pumping, hoisting, mineral processing and associated surface infrastructure. Consequently, many of the transition risks already identified by Harmony Gold are equally applicable to the proposed Jelani operation due to the shared nature of the infrastructure and operational systems. Harmony has identified continued dependence on South Africa's fossil fuel-based electricity grid, increasing carbon prices, tightening carbon budgets, and evolving climate-related regulation as key transition risks affecting its operations (Harmony Gold Mining Company, 2025). Planned amendments to South Africa's carbon tax regime, including the introduction of carbon tax pass-through costs on electricity generation, may increase operational expenditure for both Harmony and the proposed Jelani operation through higher electricity tariffs and energy costs. As a result, the project will be exposed to many of the same transition risks as Harmony's existing operations, demonstrating a cumulative exposure arising from shared infrastructure, common energy sources and an evolving regulatory environment. These transition risks should therefore be considered alongside physical climate risks when assessing the long-term resilience and financial sustainability of the proposed mining operation.

The transition towards a low-carbon economy is expected to fundamentally reshape global demand for metals and minerals, creating both risks and opportunities for the mining sector. As countries accelerate the deployment of renewable energy technologies, battery storage systems, electric vehicles and supporting electricity infrastructure, demand for minerals required to manufacture these technologies is projected to increase

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substantially. Conversely, demand for commodities associated with carbon-intensive industries may decline over time as global economies pursue decarbonisation pathways (United Nations Environment Programme, 2024).

The scale of this transition is expected to be significant. Global mineral production is projected to increase by more than 450% by 2050 to meet the material requirements associated with the clean energy transition (United Nations Environment Programme, 2024). Clean energy technologies generally require considerably greater quantities of minerals than conventional fossil fuel-based alternatives. For example, electric vehicles require approximately six times more mineral inputs than internal combustion engine vehicles, while onshore wind energy facilities require approximately nine times more mineral resources than equivalent gas-fired power generation technologies. The demand for individual commodities is also expected to vary considerably, with lithium, nickel, cobalt and manganese required for battery technologies, rare earth elements supporting electric motors and wind turbines, while copper and aluminium will remain critical for the expansion of electricity transmission and distribution networks (United Nations Environment Programme, 2024).

These changing market dynamics present both risks and opportunities for mining companies. Operations producing commodities that support the energy transition are expected to benefit from increasing global demand, whereas producers of commodities associated with higher-carbon economic activities may experience declining demand or increased market uncertainty (United Nations Environment Programme, 2024). Consequently, mining companies will need to continuously evaluate commodity demand forecasts, investment strategies and long-term market conditions to maintain competitiveness within a rapidly evolving global economy.

For the proposed Jelani underground mining project, the primary commodity is gold. Although gold is not classified as a critical mineral for the energy transition, its market performance remains closely linked to broader economic conditions, investor sentiment and global financial markets. In addition, the project shares infrastructure with Harmony Gold and is therefore also exposed to broader transition risks associated with changes in energy markets, electricity supply, renewable energy integration and capital investment decisions. Harmony Gold has identified rapid decarbonisation pathways as a transition risk that may alter power systems, energy markets, renewable energy integration and the capital costs associated with deploying lower-carbon technologies (Harmony Gold Mining Company, 2025). Consequently, the long-term resilience of the proposed mining operation will depend not only on adapting to evolving regulatory requirements but also on responding to changing market conditions associated with the global transition to a lower-carbon economy.

3.5 Climate-Related Risks to Mining Operations: Global Overview

Underground mining operations are exposed to climate change in ways that differ from surface and open-pit mining operations. The physical separation of underground workings from surface climatic conditions provides a degree of protection from direct exposure to hazards such as extreme temperatures, intense rainfall, strong winds, wildfire and surface flooding. This relative protection does not, however, make underground operations inherently climate resilient. Rather, vulnerability is strongly influenced by the dependence of underground workings on interconnected surface infrastructure and supporting services that remain exposed to climatic hazards. This distinction is particularly important for deep-level underground mining, where safe and continuous operation depends on the reliable functioning of ventilation, cooling, electricity supply, water supply, pumping, hoisting and other critical systems.

The relationship between climate change and underground mining can therefore be understood through both direct and indirect pathways. Direct impacts may occur where changing climatic or environmental conditions influence underground thermal conditions, water ingress, drainage requirements or other characteristics of the underground environment. Indirect impacts arise where climate-related disruption affects surface infrastructure or essential services on which underground operations depend. For example, increased ambient temperatures may increase the thermal burden placed on ventilation and cooling systems, while drought and water scarcity may constrain water-dependent cooling processes. Similarly, extreme weather events may damage electrical

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infrastructure, disrupt access or affect other surface facilities required for continued operation. These effects can subsequently propagate into the underground environment, potentially affecting occupational health and safety, productivity and operational continuity.

This interdependence means that an underground mine should not be considered as an isolated subsurface system when assessing climate change risk. Instead, the mine is better understood as an interconnected operational system in which climate-related impacts to surface infrastructure and supporting services can generate cascading consequences for underground workings. The resilience of critical enabling systems, particularly ventilation and cooling, electricity supply and water management infrastructure, is therefore an important determinant of overall climate resilience. This systems-based perspective is consistent with the broader understanding of climate risk introduced in Section 3.1, where climate-related risks arise through interactions between hazards, exposure and vulnerability and may propagate across interconnected systems (Ara Begum, et al., 2022).

For the proposed Jelani Project, this distinction is particularly relevant because underground mining will depend on existing and shared infrastructure and services associated with the broader mining complex. Consequently, the assessment of climate change risk needs to consider not only the direct exposure of the underground workings, but also the exposure and resilience of the surface infrastructure and supporting systems required to maintain safe and continuous underground operations.

Against this systems-based understanding, climate-related risk to mining has been examined across a range of jurisdictions and commodities over the past two decades, with the body of literature expanding considerably since 2000 (Odell, et al., 2018; Qarahasanlou, et al., 2024). Much of the available evidence originates from Australia, Canada, the United States, Chile and Europe, reflecting the economic significance of mining in these regions and their established research capacity (Odell, et al., 2018; Qarahasanlou, et al., 2024; Hernandez, et al., 2025). This geographical concentration is relevant to the interpretation of the evidence rather than its general applicability. Hazard profiles, magnitudes and seasonality vary between locations and therefore cannot be transferred directly between jurisdictions. However, the mechanisms through which climatic hazards interact with mining infrastructure and operations are transferable where comparable hazards and infrastructure dependencies occur. Accordingly, international literature is used primarily to establish climate-risk mechanisms and pathways, while the magnitude and relevance of individual hazards for the Jelani Project are considered using local and regional climate information.

Historically, attention within the mining sector has been directed more strongly towards greenhouse gas emissions reduction than physical climate exposure (Odell, et al., 2018; Janson & Markowska, 2020). Consequently, climate adaptation remains less standardised than mitigation, with documented adaptation measures often being developed at site or company level rather than being consistently codified across the sector. A recurring finding is that mining infrastructure was generally designed around the assumption of a relatively stable climate and may therefore be poorly adapted to changing climatic conditions. Increasing climate-related hazards can affect operational viability and increase operating, transportation and decommissioning costs (Odell, et al., 2018). Similar observations have been made in South Africa, where physical climate risks have been identified as a source of operational disruption and financial loss (Aleke & Nhamo, 2016).

The infrastructure exposed to these risks extends well beyond the immediate mine workings. It includes transportation infrastructure, containment structures, buildings, energy systems, communications, powered facilities and equipment, and mine-site drainage, while the broader operational value chain includes service providers, utility providers and infrastructure providers (Qarahasanlou, et al., 2024). Climate-related disruption can therefore propagate across operational and supply-chain interfaces. For example, more frequent or intense rainfall may disrupt transport infrastructure, reducing productivity and affecting employment and surrounding communities. The distinction between direct and indirect pathways is consequently important: direct impacts affect the physical condition or performance of mining assets, while indirect impacts arise through disruptions to supplies, energy, transport, labour and other enabling systems (Janson & Markowska, 2020; Qarahasanlou, et

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al., 2024). Vulnerability therefore attaches not only to the mine as a whole but to individual infrastructure components and their interaction with specific climatic variables, making facility-level assessment using local data particularly important (Del Rio, et al., 2023).

Evidence specifically concerning underground operations is more limited and is concentrated around a relatively small number of mechanisms. Higher precipitation has been associated with increased mine-water inflows and dewatering requirements, elevated rates of rock disintegration and potential effects on the stability of underground voids, while atmospheric pressure changes may influence ventilation requirements and gas emissions (Janson & Markowska, 2020). By contrast, the substantial majority of documented physical damage to mining operations concerns surface elements, including pit slopes, waste heaps, tailings storage facilities, processing plants, access roads and electrical infrastructure (Odell, et al., 2018; Del Rio, et al., 2023; Qarahasanlou, et al., 2024). This distribution is consistent with the proposition that the physical separation of underground workings affords some protection from direct climatic exposure and that important climate-related risks to underground mining may instead be transmitted through the surface systems on which operations depend. The distribution of published evidence should not, however, be interpreted as confirmation of this proposition, since the emphasis on surface infrastructure also reflects the predominance of open-pit mining within the jurisdictions and operations represented in the literature.

Of the dependencies identified for underground mining, the thermal pathway is the most directly evidenced in the literature reviewed. Principal underground heat sources include auto-compression, the geothermal gradient, blasting, electrical and diesel machinery, human metabolism, oxidation and ground movement, with the geothermal gradient generally becoming increasingly important at depth as rock temperature increases. Ventilation is frequently the primary means of controlling underground heat (Anderson & De Souza, 2017). Observations of hourly variations in underground air properties in response to changes in the temperature of surface supply air, particularly where workings are close to incoming shaft air, demonstrate a mechanism through which surface ambient conditions can propagate into the underground environment (Anderson & De Souza, 2017). Increased external temperatures can therefore translate into additional refrigeration and ventilation requirements, with associated increases in energy consumption and operating expenditure.

The consequences of increased thermal loading extend beyond energy use. Thermal conditions constrain productive working hours, with permissible continuous working periods linked to prescribed rest requirements through wet bulb globe temperature indices (Anderson & De Souza, 2017). Equivalent indices, standards and limits have also been established specifically for ultra-deep mining conditions in South Africa (Webber, et al., 2003). These limits reflect finite physiological tolerances. Heat strain arises as the body redistributes blood flow towards the skin and secretes sweat to dissipate heat, responses that increase cardiac demand and, where fluid deficits are not replenished, produce dehydration, reduced blood volume and renal strain; where thermoregulatory capacity is exceeded, illness may progress to heat stroke, which is fatal if untreated (Ebi, et al., 2021). High metabolic heat production associated with occupational tasks, combined with high ambient and radiant heat, low air flow and high humidity, compounds heat strain, and personal protective equipment with high evaporative resistance increases it further. Hyperthermia provoked by heat stress directly impairs physical work capacity and tasks relying on complex cognitive function or skilled motor performance, and approximately one third of workers exposed to occupational heat stress experience negative effects, including increased risk of hyperthermia, cardiovascular failure or collapse, and acute kidney disease (Ebi, et al., 2021).

An increase in the frequency of high-heat conditions is consequently expected to reduce productive labour hours, shorten working periods and increase energy requirements for cooling (Janson & Markowska, 2020). Higher temperatures may also increase heat-related illness and affect recruitment, retention, occupational safety and productivity through increased risks of accidents and illness (Qarahasanlou, et al., 2024). Workers exposed to elevated heat typically reduce output through unplanned breaks or slower pacing, with those working to a fixed or externally dictated pace experiencing greater heat strain than those able to self-pace (Ebi, et al., 2021).

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Heat exposure and heat-wave conditions have additionally been identified as a contributor to occupational fatalities within the South African mining context (Aleke & Nhamo, 2016).

Water represents a second important climate-risk pathway and operates in both directions. Drought can increase water stress and constrain the availability of water required for processing, washing, cooling, dust suppression and other operational activities. Increased expenditure on water used for washing and cooling has been identified in South African mining operations (Aleke & Nhamo, 2016), while water scarcity has been identified as a significant climate risk for large-scale processing operations (Del Rio, et al., 2023). Although mining accounts for a relatively small proportion of national water consumption, mining operations are frequently concentrated in water-stressed locations, meaning that climate exposure is influenced more strongly by location and local water availability than by national-sector consumption alone (Del Rio, et al., 2023). Water shortages can affect production rates, dust suppression, mine drainage make-up requirements and tailings management (Qarahasanlou, et al., 2024).

Conversely, increased precipitation and flooding can increase mine-water inflows and the associated dewatering burden. Dewatering requirements, water hazards associated with increased mine-water inflows, planning for future water production rates and gas hazards in flooded areas have therefore been identified as specific considerations for underground operations (Janson & Markowska, 2020). Water consequently represents a dual climate-risk pathway for underground mining: scarcity may constrain water-dependent operations, while increased rainfall or flooding may increase water ingress and dewatering requirements. The significance of either pathway will depend on the local climatic regime, mine hydrogeology and the capacity and resilience of the associated water-management infrastructure.

Electricity supply represents a third and particularly systemic dependency because several of the critical functions required to maintain underground operations are electrically driven. Ventilation, refrigeration, pumping and hoisting all depend on reliable electricity supply. Extreme weather events can damage energy infrastructure, resulting in supply interruptions, demand surges and price volatility. Flooding may affect substations and transmission infrastructure, causing extended outages and costly repairs, while drought can reduce generation capacity and increase reliance on thermal generation. Heat waves may simultaneously increase electricity demand for cooling while reducing generator efficiency (Hernandez, et al., 2025). Droughts and floods have consequently been identified among the highest systemic risks to energy systems (Hernandez, et al., 2025).

The interdependence between electricity, water and transport systems further increases the potential for cascading effects. Energy, water and transport are increasingly considered interconnected infrastructure systems requiring integrated resilience planning, since disruption in one system can delay recovery in another. Within mining operations, hailstorms have been identified as a cause of electricity blackouts capable of severely affecting extraction and processing, while power interruptions are among the principal physical risks identified for the South African mining sector (Aleke & Nhamo, 2016). Similarly, strong winds can damage electrical lines, while low precipitation can restrict water availability, with both effects transmitted to mining operations through the enabling systems on which production depends (Qarahasanlou, et al., 2024). Electricity should therefore not be considered simply as another operational input; for underground mining it is an enabling system upon which several other climate-sensitive functions, including ventilation, cooling, pumping and hoisting, depend.

The potential consequences of losing these interconnected systems are illustrated by water inrush events at an abandoned Polish coal mine, where pumping systems protected adjacent active workings. The events flooded mine workings, water galleries, the main pumping station chamber and, in the second instance, the main electrical facilities at the affected level (Janson & Markowska, 2020). The relationship between preceding regional flooding and the water hazard was not investigated, and the recorded incidents do not establish the original causes of the water inrushes. The case therefore does not demonstrate a climatic trigger. It nevertheless illustrates the operational consequences of losing pumping and electrical infrastructure and demonstrates how disruption to one enabling system can compromise other systems required to maintain underground operations.

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The international evidence is further supported by evidence from South Africa and, more specifically, from the Free State gold-mining sector. Flooding, drought, hailstorms and heat waves have been identified as principal physical hazards confronting South African mining operations (Aleke & Nhamo, 2016). At provincial level, a study of ten gold mining operations in the Witwatersrand Basin, predominantly within the Free State, found that operations in the province are predominantly deep underground and consequently more energy-intensive than surface operations (Nadunga, et al., 2026). Mean annual temperature in the Free State is projected to increase by approximately 2.3 °C, while the number of very hot days exceeding 35 °C is projected to increase from a baseline of approximately 88 days per year by a further 54 days, an increase of approximately 60 per cent in the frequency of extreme heat. These provincial figures are derived from a different baseline period and spatial aggregation to the municipal-scale projections applied in this assessment and are reported here to establish the direction and provincial significance of the thermal signal rather than the site-level magnitude. Site-specific baseline and projected very hot day frequencies for the Project area are presented in Section 7.3.1. Increased energy consumption was attributed by participating sustainability officers and mining specialists to rising temperatures, particularly as a result of underground cooling and ventilation requirements. Company disclosures similarly identify increasing temperatures and their potential effects on underground ambient conditions as material climate-related risks.

The operational responses reported in the Free State provide further evidence of the relationship between climatic conditions and enabling systems. Responses include mine cooling, compressed air and ventilation measures, including optimisation of refrigeration, variable speed drives and inlet guide vanes on main fans, and seasonal ventilation control. Electricity supply constraints, including load-curtailment requests and tariff escalation, have also contributed to investment in self-generation and energy-efficiency measures. These findings indicate that climate-related thermal exposure may create a combined operational and energy-system risk, whereby increasing temperatures increase cooling and ventilation demand while constraints or increasing costs within the electricity system limit the capacity to respond. The projections referenced above derive from the provincial adaptation instrument, which sets out observed and projected changes in climatic conditions for the Free State to 2050 and provides the relevant provincial baseline against which site-level exposure should be assessed (DESTEA, 2024).

Taken together, the evidence supports three propositions that are carried forward into the assessment of the proposed Jelani Project. First, climate-related risk to an underground operation is appropriately assessed at the level of individual enabling systems and their dependencies rather than solely at site or regional scale, since vulnerability attaches to specific infrastructure components and their interaction with particular climatic variables. Second, the principal pathways of concern for a deep-level underground operation are thermal loading of ventilation and cooling systems; constraints on water availability and dewatering capacity; and interruption of electricity supply. These pathways are documented internationally and are corroborated, particularly for thermal exposure and energy demand, within the Free State gold-mining sector. Third, these pathways are interdependent, such that a single climatic hazard may affect several enabling systems simultaneously, while failure of one system may reduce the capacity of another to maintain operations or recover from disruption.

Two limitations qualify the application of this evidence and are carried forward into the assessment. First, the published evidence base remains concentrated in jurisdictions with hazard profiles that differ from those of the Free State. International findings are therefore applied primarily to establish mechanisms and pathways rather than the magnitude of risk, with hazard characterisation and exposure determined using provincial and site-specific information. Second, although the available South African and Free State evidence provides a directly relevant analogue for deep underground gold mining, it addresses thermal exposure and energy consumption more comprehensively than pumping, dewatering, hoisting and water-supply risks. Assessment of these latter systems therefore relies to a greater extent on established international mechanisms and their applicability to the project context rather than on directly analogous local case evidence.

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4. Methodology

4.1 Approach to Climate Change Risk Assessment

The Climate Change Assessment for the proposed Project was undertaken using a structured, risk-based methodology informed by international good practice and relevant national guidance. Although the Project is not subject to specific international lender requirements, the methodology aligns with internationally recognised frameworks including the Equator Principles, the IFC Performance Standards, and the principles underpinning the International Financial Reporting Standards (IFRS) S2 Climate-related Disclosures framework, each of which promotes the systematic identification, assessment and management of climate-related risks in support of informed decision-making and resilient infrastructure.

Within this Assessment, a distinction is drawn between climate change impact assessment and climate change risk assessment. Climate change impact assessment considers the effect of the Project on the climate system, principally through greenhouse gas emissions. Climate change risk assessment considers the converse relationship, namely the effect of a changing climate on the Project, arising through the interaction of climate hazards with the exposure and vulnerability of Project infrastructure and operations. Both directions of interaction are addressed, the former through the greenhouse gas inventory and the latter through the risk-based evaluation described below.

The Assessment commenced with a review of established evidence on the relationship between climate change and mining operations, with particular consideration of underground mining and its dependence on surface infrastructure. This review drew on international and South African research to establish the mechanisms through which climatic conditions affect mining operations and provided the substantiating basis for the risk pathways subsequently evaluated for the Project. Both physical and transition risks were considered. Physical risks include increasing temperatures, changes in rainfall patterns, flooding, drought, wildfire and extreme weather events, while transition risks include evolving climate policy, carbon pricing mechanisms, changing electricity markets, technological advancement and shifting investor and market expectations associated with the transition to a lower-carbon economy. The applicable South African legislative, policy and regulatory framework was considered alongside this evidence, ensuring consistency with current regulatory requirements and accepted methodologies for evaluating both greenhouse gas emissions and climate-related risks.

The risk-based approach adopted recognises climate change as both an environmental and an operational consideration requiring integration into project planning from the earliest stages of development. Rather than identifying climate hazards alone, the Assessment identifies, evaluates and prioritises material climate-related risks arising over the life of mine, supporting the incorporation of climate considerations into mine planning, engineering design, water management, infrastructure planning, operational procedures and environmental management systems, and enabling practical mitigation and adaptation measures to be identified before construction and operation commence.

Climate-related risks are inherently site- and project-specific. The significance of a given hazard depends not only on projected climatic change but also on the characteristics of the receiving environment, the location and design of Project infrastructure, operational activities, and the capacity of the Project to adapt. Projected climate conditions were therefore evaluated against the specific characteristics of the proposed underground operation, including the underground workings, surface infrastructure, water management systems, waste rock storage areas, access roads and supporting utilities, rather than against regional projections alone.

Both physical and transition risks will continue to evolve over the life of the Project. The findings of this Assessment should accordingly be treated not as static, but as an input into ongoing environmental management, operational planning and risk management, with periodic review recommended as new climate projections, operational information and regulatory requirements become available.

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4.1.1 Materiality and Risk

Materiality forms the central organising principle of the Climate Change Assessment and determines which climate-related issues are prioritised, the level of detail applied during the assessment, and the extent of the mitigation and adaptation measures required. Consistent with internationally recognised good practice, including the Equator Principles, a climate-related issue is considered material where it has the potential to result in significant environmental, social, operational or financial consequences for the Project, or where it may influence the long-term resilience, viability or regulatory compliance of the proposed mining operation (Equator Principles, 2023).

The application of materiality ensures that the assessment remains both proportionate and decision relevant. Without a clearly defined materiality framework, there is a risk that the assessment either becomes overly broad by considering all potential climate-related issues without prioritisation or too narrow by overlooking those risks that may materially influence project planning, design or operation. Accordingly, materiality was evaluated by considering the nature of the identified climate-related issue, the likelihood of occurrence, the magnitude of the potential consequence, the Project's exposure and vulnerability, together with the effectiveness of existing or proposed mitigation and adaptation measures.

Materiality is inherently project-specific. It is determined first by the climatic hazards to which the Project's location is exposed, since the hazard profile of a site governs which risk pathways are credible. For the Jelani Project, the relevant hazards reflect the semi-arid, summer-rainfall climate of the Free State goldfields: elevated temperatures and heat extremes; water scarcity and drought; and intense convective rainfall events accompanied by hail, lightning and short-duration damaging winds. Hazards that are not credible at this location, such as coastal flooding and sea level rise, were excluded from detailed assessment. Materiality is determined secondly by the characteristics of the Project itself. These include its location, the design and resilience of underground and surface infrastructure, the nature of operational activities, dependence on water and electricity supply, surrounding environmental sensitivities, proximity to communities, and exposure to the evolving climate policy landscape.

On this basis, both physical and transition risks were considered in identifying the climate-related issues requiring detailed assessment. Physical risks comprise extreme rainfall, flooding, drought and increasing temperatures. Transition risks comprise carbon pricing, increasing electricity costs, evolving climate-related regulation and changing market conditions. This approach keeps the Assessment focused on those risks most likely to influence the long-term environmental performance, operational resilience and sustainability of the proposed Jelani underground mining project.

4.1.2 Scope of Climate Risks Considered

In accordance with the risk typologies defined by the Task Force on Climate-related Financial Disclosures, climate-related risks are generally classified into physical and transition risks.

- Physical risks include both acute events, such as extreme rainfall and flooding, and chronic changes, such as increasing temperatures and altered precipitation patterns.
- Transition risks relate to policy, legal, technological, and market changes associated with the transition to a low-carbon economy.

While transition climate risks are recognised as relevant to the proposed Project, particularly in relation to carbon pricing, electricity supply and evolving climate-related regulation, these risks are considered at a strategic level within this assessment. The detailed qualitative risk assessment therefore focuses on physical climate risks, which present the most immediate and site-specific risks to underground mining operations, associated surface infrastructure and supporting environmental systems.

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4.1.3 Data Sources and Tools

The assessment of climate risks was supported by the use of publicly available, scientifically robust tools and datasets to characterise both current and future climate conditions relevant to the Project area.

The *ThinkHazard!* tool, developed by the Global Facility for Disaster Reduction and Recovery (GFDRR), was used as an initial screening tool to identify climate-related hazards applicable to the Project location. This tool provides a high-level indication of hazard types and their associated likelihood. This is categorised as very low, low, medium, or high. It supports early-stage identification of key risks that should be considered in project design and planning. To supplement this, more detailed and locally relevant climate projections were obtained from the CSIR GreenBook, developed by the Council for Scientific and Industrial Research (CSIR). The GreenBook provides downscaled climate data and projections at a municipal level, including both baseline climate conditions and future scenarios under different Representative Concentration Pathways (RCPs). This dataset is particularly valuable for understanding spatial variability in climate risks and for assessing how these risks may evolve over time under different climate futures (CSIR, 2023).

Other data sources used in this report include:

- Patched rainfall data (1920–2006) – Used for baseline mean monthly and annual rainfall.
- WeatherSpark historical weather data – Allanridge station records (1980–2016) for average low and high temperatures.
- MODIS MCD64A1 Collection 6.1 – Global monthly burned area product (500 m resolution), processed for fire frequency from January 2016 to June 2026.

The integration of these tools allowed for a comprehensive assessment of climate hazards, combining high-level screening with detailed, location-specific projections. This approach supports a robust evaluation of both current and future climate risks, ensuring that the assessment is grounded in credible scientific evidence.

4.2 Risk Assessment Matrix

This section outlines the methodology applied to assess the significance of climate-related risks associated with the Project. The assessment aims to identify and evaluate key climate-related impacts, including environmental, socio-economic, and infrastructural risks, to inform appropriate mitigation, adaptation, and management measures.

The assessment adopts a qualitative risk analysis approach, whereby risk is defined as a function of the probability of occurrence and the consequence (impact) of a given climate-related hazard, expressed as:

Risk = Probability × Consequence

Probability reflects the likelihood of a climate-related hazard occurring and is informed by a combination of baseline conditions, historical trends, and future climate projections derived from GreenBook data. Probability is categorised as follows:

- **Very High:** Expected to occur frequently or continuously during the project lifecycle.
- **High**: Likely to occur multiple times during the project lifecycle.
- **Medium**: May occur at some point during the project lifecycle.
- **Low**: Unlikely but could occur under specific circumstances.
- **Insignificant**: Rare or highly unlikely to occur.

Impact (consequence) is classified based on the degree to which a risk may affect environmental, social, cost, schedule, or operational performance aspects of the Project, defined as:

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- **Very High:** Severe and potentially irreversible impacts on environment, safety, cost, schedule, or operations; may threaten project viability or cause major non-compliance.
- **High:** Significant impacts requiring major mitigation and potentially causing delays, cost overruns, or substantial environmental/social effects.
- **Medium:** Moderate impacts that are manageable with standard mitigation measures and may cause limited disruption.
- **Low:** Minor impacts with minimal disruption to project activities or environmental/social systems.
- **Insignificant:** Negligible or no measurable impact.

The overall significance of each risk is determined by combining the assigned probability and consequence ratings using the risk matrix (Table 4-1), resulting in a composite score ranging from 1 to 25. These scores are further categorised into defined risk bands to ensure consistent interpretation and to guide the level of management response required. Risks falling within the high (red) and moderate (yellow) categories are prioritised for management intervention and require the development of appropriate mitigation and/or contingency measures, while low (green) risks are managed through standard monitoring and good practice controls. The classification of risk ratings is as follows:

- **1: Insignificant** (negligible impact; no specific mitigation required beyond standard controls).
- **2-4: Low Risk** (minor impact; manageable with routine mitigation measures).
- **5-9: Medium Risk** (moderate impact; requires targeted mitigation and monitoring).
- **10-16: High Risk** (significant impact; requires detailed mitigation and active management).
- **17-20: Very High Risk** (critical impact; requires immediate intervention and may necessitate reconsideration of the activity).
- **25: Extreme Risk** (intolerable impact; represents a severe and potentially irreversible risk with widespread or long-term consequences).

For climate change risk assessment, the methodology is applied across relevant project phases and climate scenarios. Consequence ratings are primarily based on the sensitivity of project components and are therefore assumed to remain broadly consistent across scenarios. In contrast, probability ratings are adjusted to reflect projected changes in the frequency and intensity of climate hazards under different climate scenarios, enabling the assessment of how risk levels may evolve over time.

Post-mitigation ratings are derived in the same way. For these ratings, probability refers to the likelihood that the hazard results in the identified impact once the recommended measures are in place. The likelihood of the hazard itself is not changed by the measures. Measures that reduce exposure, such as work scheduling, shelter or containment, therefore lower the probability score. Consequence is reduced only where a measure limits the severity of the outcome, such as protective equipment, early warning or engineered protection. Each rating in the Climate Change Risk Register (Section 8.5) is shown with its probability (P) and consequence (C) scores, so that every rating can be traced to the risk matrix.

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Table 4-1: Risk Assessment Matrix.

Probability					
5 Very High	5	10	15	20	25
4 High	4	8	12	16	20
3 Medium	3	6	9	12	15
2 Low	2	4	6	8	10
1 Insignificant	1	2	3	4	5
	1 Insignificant	2 Low	3 Medium	4 High	5 Very High
	Severity				

4.3 Determining Greenhouse Gas Emissions

A high-level greenhouse gas (GHG) assessment was undertaken in accordance with the Greenhouse Gas Protocol: Corporate Accounting and Reporting Standard, and SANS 14064-1, both of which provide internationally recognised frameworks for the quantification and reporting of greenhouse gas emissions. These methodologies establish organisational and operational boundaries for GHG accounting and provide a consistent basis for identifying, quantifying and reporting emissions associated with project activities.

In accordance with the GHG Protocol, greenhouse gas emissions are classified into three reporting categories based on the source of the emissions and the degree of operational control exercised by the reporting entity. As a minimum, the assessment quantifies Scope 1 and Scope 2 emissions associated with the proposed Project. Material Scope 3 emission sources have also been considered where sufficient project information was available to support a reasonable estimate. The assessment boundary encompasses greenhouse gas emissions associated with the construction and operation of the proposed underground mining project, including the incremental use of existing Harmony Gold mining infrastructure attributable to the Project. Ore processing at Harmony's Target No. 1 metallurgical plant falls outside the boundary, as set out in Section 4.3.1.

- Scope 1 – Direct GHG Emissions and Removals

Scope 1 emissions are direct greenhouse gas emissions from sources within the organisation's operational boundary. These include emissions from stationary and mobile combustion, industrial processes, and fugitive releases from operations owned or controlled by the company.

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- Scope 2 – Indirect GHG Emissions from Energy

Scope 2 emissions are indirect emissions resulting from the generation of electricity, heat, or steam purchased and consumed by the organisation. These emissions occur outside the organisation's operational boundary, commonly from electricity supplied by utilities such as Eskom.

- Scope 3 – Other Indirect GHG Emissions

Scope 3 emissions are all other indirect emissions that occur as a consequence of the organisation's activities but arise from sources not owned or controlled by it. Examples include emissions from the extraction, production, and transportation of purchased materials.

4.3.1 Inventory Boundaries

An operational control approach has been adopted for the development of the Project GHG inventory. However, the operational boundary has been defined specifically for the Jelani Project and does not represent the complete greenhouse gas inventory of Harmony Gold Mining Company Limited's existing mining operations.

The assessment quantifies only those greenhouse gas emissions that are expected to occur as a direct consequence of developing and operating the Jelani Project. Existing mining infrastructure and facilities that are already operational, including the Target No. 2 and No. 3 Shafts and associated processing infrastructure, form part of Harmony's existing operational greenhouse gas inventory and have therefore been excluded from this assessment. The inventory is therefore intended to represent the incremental greenhouse gas footprint attributable to the Jelani Project rather than the total emissions associated with the existing mining complex.

The inventory boundary and the assessment of cumulative impact serve different purposes. The inventory boundary defines the emissions for which the Project is accountable. It has been drawn on an incremental basis to avoid double counting emissions already reported by Harmony at facility level. Cumulative impact concerns the combined effect of the Project alongside other emission sources. As greenhouse gases mix globally, the location of an emission does not alter its climate effect. The relevant receptor for cumulative impact is therefore the national and global carbon budget rather than the local mining complex. The cumulative contribution of the Project has accordingly been assessed by placing its emissions in the context of South Africa's Nationally Determined Contribution (Section 6). Facility-level emissions data for Harmony's existing Target operations were not available for this assessment, so the combined footprint of the shared mining complex has not been quantified. This is recorded as a limitation in Section 9.

The inventory includes direct emissions (Scope 1), indirect emissions associated with purchased electricity required specifically for the Jelani Project (Scope 2), and selected material Scope 3 emission sources where sufficient information was available. Emission sources associated exclusively with existing operations that would continue irrespective of the Jelani Project have not been included within the inventory boundary. This approach is particularly important because the Project has been designed to utilise existing mining and processing infrastructure wherever practicable. Consequently, substantial greenhouse gas emissions associated with constructing new shafts, processing facilities, ventilation systems, hoisting infrastructure, workshops, substations and other supporting infrastructure are avoided. Although these avoided emissions have not been quantified as part of this assessment, the utilisation of existing infrastructure represents an inherent climate benefit of the Project by reducing the embodied carbon associated with greenfield mine development.

During the construction phase, the inventory includes emissions associated with the development of new Project-specific infrastructure, construction equipment, materials, mobile plant, fuel consumption and purchased electricity required to construct the Jelani Project. During the operational phase, the inventory includes only those emissions attributable to the operation of the Jelani Project, including Project-specific electricity consumption, diesel combustion, mining activities and other operational sources introduced by the Project. Existing operational emissions associated with Harmony's established infrastructure remain outside the inventory boundary.

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The inventory has been developed using the best available Project information available at the time of the assessment. Where Project-specific operational information was unavailable, reasonable engineering assumptions have been applied. The inventory should be reviewed and updated as detailed engineering information and operational data become available.

4.3.2 Avoidance of Double Counting

The Jelani Project will utilise existing Harmony mining and processing infrastructure, including shared surface and underground facilities. Accordingly, the GHG inventory boundary has been defined to quantify only those emissions that are attributable to the incremental development and operation of the Jelani Project. Existing emissions associated with Harmony's established operations have been excluded, as they form part of Harmony's existing operational greenhouse gas inventory and would occur irrespective of the proposed Project.

Ore processing is the principal example. Jelani ore will be processed at Harmony's existing Target No. 1 metallurgical plant under a toll treatment agreement. The plant is under Harmony's operational control, and its emissions are reported in Harmony's own greenhouse gas inventory. Under the operational control approach adopted for this assessment, the plant therefore lies outside the Jelani inventory boundary. Its emissions are not quantified in Section 5.

Where infrastructure or services are shared between the Jelani Project and existing operations, only the additional greenhouse gas emissions resulting from the Project have been included within the inventory. This approach is intended to avoid double counting of emissions within the Project inventory and is consistent with the GHG Protocol Corporate Accounting and Reporting Standard[9], which emphasises the importance of clearly defined organisational and operational boundaries and the consistent application of the selected consolidation approach when accounting for greenhouse gas emissions.

4.3.3 Identified GHG Emitting Activities

The greenhouse gas inventory includes all material emission sources that are expected to arise as a direct consequence of the construction and operation of the proposed Jelani Project, and for which sufficient information was available at the time of the assessment. The inventory has been developed to quantify the incremental greenhouse gas footprint associated with the Project and therefore excludes emissions associated with Harmony Gold's existing mining and processing infrastructure that are already operational and would occur irrespective of the proposed development. Any significant data gaps or assumptions applied during the assessment are identified and discussed where relevant. The identified emission sources were classified in accordance with the GHG Protocol as Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased electricity) and Scope 3 (other indirect emissions). Table 4-2 provides a summary of the greenhouse gas emission sources included within the Jelani Project inventory boundary.

Table 4-2: Characterisation of Emission Sources.

Scope of Emissions Disaggregated by Phase	
Scope 1: Direct GHG Emissions	
Construction Phase:	• Diesel consumed by stationary equipment and generators. • Diesel consumed by mobile construction vehicles and equipment. • Petrol consumed by mobile vehicles and equipment. • LPG consumed during development activities, where applicable.

[9] World Resources Institute (WRI) & World Business Council for Sustainable Development (WBCSD). 2004. *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition).* Washington, DC: World Resources Institute and Geneva: World Business Council for Sustainable Development. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

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Operational Phase:	• Diesel consumed by stationary standby generators. • Diesel consumed by operational vehicles, mobile equipment and forklifts. • Petrol consumed by mobile vehicles and equipment. • Explosives consumed during rock blasting.
Scope 2: Energy Indirect GHG Emissions	
Scope 2 emissions have been quantified based on the current assumption that the Project will obtain its operational electricity requirements from the Eskom national electricity grid, supplied to the Target No. 2 and No. 3 Shaft substations. Purchased grid electricity is the primary Scope 2 source for the operational phase. Diesel generators are expected to be used solely for emergency backup power during periods of electricity supply interruption, with the associated fuel combustion emissions reported under Scope 1. Transmission and distribution losses associated with purchased electricity have been accounted for in the quantification.	
Scope 3: Other Indirect GHG Emissions	
Construction Phase:	• Production of construction materials (specifically concrete and steel). • Well-to-Tank emissions associated with diesel consumption. • Well-to-Tank emissions associated with petrol consumption. • Municipal (general) waste generated and disposed of at a permitted landfill site. • Industrial and construction waste generated and disposed of at a permitted landfill site. • Hazardous waste generated and disposed of at a permitted hazardous waste facility. • Transportation of hazardous waste from the site to the disposal facility. • Water supplied to the site, comprising municipal supply for potable use and underground water abstracted for mining activities. • Treatment of wastewater generated on site.
Operational Phase:	• Well-to-Tank emissions associated with diesel consumption. • Well-to-Tank emissions associated with petrol consumption. • Municipal (general) waste generated and disposed of at a permitted landfill site. • Industrial waste generated and disposed of at a permitted landfill site. • Hazardous waste generated from workshop activities and disposed of at a permitted hazardous waste facility. • Transportation of general waste from the site to the permitted landfill facility. • Transportation of hazardous waste from the site to the permitted hazardous waste facility. • Raw water supplied, comprising municipal supply for potable use and underground water for mining activities. • Treatment of wastewater generated on site, noting that treated water is planned to be recycled.
Key Exclusions	
Construction Phase	• Workers commuting. • Petrol consumed by stationary equipment, which is not indicated for this phase. • Transportation of construction materials and goods to site, deemed immaterial.

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	• Travel associated with the disposal of general and construction waste, deemed immaterial.
Operational Phase	• Workers commuting. • Petrol consumed by stationary equipment, which is not indicated in the Bara Consulting study (2026). • Lubricant consumption. • Travel associated with the disposal of general waste, deemed immaterial. • Fugitive refrigerant emissions from the surface refrigeration (ice) plant, as the refrigerant type and charge have not yet been confirmed. Large mine refrigeration plants in South Africa commonly use ammonia (R-717), which has a global warming potential of zero, in which case no fugitive CO_2e arises. If an HFC refrigerant is specified, fugitive losses would be immaterial to the total footprint: an HFC-134a system would need to lose approximately 1.5 tonnes of refrigerant a year to reach 1 per cent of operational Scope 1 and Scope 2 emissions. Such losses could nevertheless be significant relative to Scope 1. The refrigerant type, charge and expected leakage rate should be confirmed, with any HFC losses quantified in the updated inventory.

4.3.4 Emissions Quantification Methodology

Greenhouse gas (GHG) emissions were estimated using an activity-based approach consistent with the Greenhouse Gas Protocol: Corporate Accounting and Reporting Standard and ISO 14064-1:2018. Under this approach, activity data were identified for each applicable emission source and multiplied by the corresponding greenhouse gas emission factors to estimate carbon dioxide equivalent (CO_2e) emissions.

Activity data were obtained from the best available Project information at the time of the assessment, including engineering design information, mining and production assumptions, electricity demand estimates, anticipated fuel consumption, material quantities and other Project-specific operational data. Where Project-specific information was unavailable, reasonable engineering assumptions were applied based on available design information and industry practice. The level of detail reflects the current stage of Project development and provides an estimate of the incremental greenhouse gas emissions attributable to the construction and operation of the proposed Jelani Project.

The GHG inventory and associated calculations were developed in Microsoft Excel. To ensure consistency throughout the assessment, all activity data were converted to the units required by the selected emission factors prior to quantification. This included, where applicable, the conversion of activity data to standard reporting units (e.g. litres, kilowatt-hours, tonnes, kilograms, cubic metres, passenger-kilometres and tonne-kilometres) to ensure compatibility with the selected emission factors and facilitate the consistent calculation of GHG emissions across all applicable emission sources.

The general calculation methodology applied throughout the assessment is presented below.

Please see Section 5 for the results.

GHG Emissions (tCO_2e) = Activity Data × Emission Factor

Where:

- **Activity Data** represents the quantity of fuel, electricity, material, waste, wastewater, or transport activity associated with the emission source.
- **Emission Factor** represents the quantity of greenhouse gases emitted per unit of activity and is expressed as tonnes of carbon dioxide equivalent (tCO_2e) per unit of activity.

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Emission factors were selected from internationally recognised sources appropriate to each emission source. The primary emission factor references used in this assessment include:

- UK Department for Environment, Food and Rural Affairs (DEFRA) Greenhouse Gas Reporting: Conversion Factors 2025 for fuel combustion, transport, waste management, wastewater treatment and other applicable emission sources (DESNZ, 2025).
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories, including applicable default emission factors where project-specific or country-specific factors were unavailable (IPCC, 2006).
- World Steel Association – Environmental Sustainability Indicators for embodied greenhouse gas emissions associated with steel production (World Steel Association, 2022).
- Green Calculus Waste Emission Factors for applicable waste treatment and disposal emission factors (Green Calculus, 2026).
- Eskom published electricity emission factor for grid electricity consumption. The factor used in this assessment is based on Eskom's most recent published data available at the time of writing and reflects Eskom's emissions over the 12-month reporting period from 1 April 2024 to 31 March 2025. Electricity emission factors may vary between reporting periods in response to changes in the national grid generation mix, including changes in the contribution of lower-carbon energy sources such as solar PV (Eskom, 2025).

Where multiple emission factor sources were available, the most appropriate and representative factor was selected based on the activity being assessed. As emission factors are periodically updated to reflect improvements in scientific understanding and reporting methodologies, it is recommended that the greenhouse gas inventory be recalculated using the latest available DEFRA Greenhouse Gas Reporting Conversion Factors for the applicable reporting year when future inventories are prepared.

4.3.5 Reporting Period

The reporting period adopted for this assessment reflects the anticipated construction and operational phases of the proposed Jelani Project. All year references in the inventory follow the mine schedule year numbering used in the Bara Consulting Study Update (2026), in which mine Year 1 corresponds to Year 5 of the overall project programme described in Section 1. The construction-phase inventory covers mine Years 1 and 2, a period of approximately 24 months. The operational-phase inventory covers mine Years 3 to 17, being the 15 years from first production to the end of the life of mine. Together, the two phases span the approximately 17-year life of mine reported by Bara (2026). Table 4-3 sets out how the project programme, the mine schedule and the inventory phases relate to one another. Should the construction programme or operational life of the Project change, the greenhouse gas inventory should be reviewed and updated accordingly.

Table 4-3: Project Programme, Mine Schedule and Inventory Phases.

Project programme year	Mine schedule year (Bara, 2026)	Principal activities	Inventory phase
Years 1 to 3	–	Site data gathering and feasibility studies.	Not quantified; no physical works.
Year 4	–	Detailed engineering design.	Not quantified; no physical works.
Years 5 and 6	Years 1 and 2	Level access work and refurbishment of the Target No. 3 Shaft; construction of Project-specific infrastructure.	Construction phase (Table 5-1).
Years 7 and 8	Years 3 and 4	First production via the No. 3 Shaft (Phase 1). Refurbishment of the No. 2 Shaft and construction of its new surface	Operational phase (Table 5-2). Construction activity in these years is

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Project programme year	Mine schedule year (Bara, 2026)	Principal activities	Inventory phase
		infrastructure continue alongside production.	carried in the operational inventory.
Year 9	Year 5	Phase 2: the refurbished No. 2 Shaft becomes the main access; the surface refrigeration (ice) plant enters service.	Operational phase (Table 5-2).
Years 10 to 21	Years 6 to 17	Production at the full rate of 720 000 tonnes per annum, reached in programme Year 10, to the end of the life of mine.	Operational phase (Table 5-2).

The construction-phase inventory covers mine Years 1 and 2, which correspond to Years 5 and 6 of the project programme. The project programme extends implementation and construction to Year 8. In Years 7 and 8, work on the No. 2 Shaft overlaps with first production from the No. 3 Shaft, so these two years are carried in the operational-phase inventory. Their electricity demand is included in the Bara demand profile on which the operational inventory is based. Development blasting is included from mine Year 3 onward. The surface construction plant allowance applied to the construction phase, equivalent to approximately 550 tCO_2e per year, has not been repeated for these two years. Its omission is immaterial, at less than 0.05 per cent of the operational inventory.

4.3.6 Data Assumptions

The greenhouse gas inventory has been developed using the best available Project information at the time of the assessment. Where Project-specific data were unavailable or had not yet been confirmed, reasonable assumptions were applied to enable the quantification of greenhouse gas emissions. These assumptions establish the basis upon which the greenhouse gas calculations have been undertaken and are considered appropriate for the current stage of Project development.

Two sources carry most of the activity data. The Bara Consulting Joint Venture Project Study Update (2026) provides the mine schedule, the equipment schedules, the electrical load schedules and the annual notified maximum demand profile. The completed project questionnaire response provides site-level operational detail, including waste management arrangements, water supply, and confirmation of the generating plant at No. 2 Shaft. Where the questionnaire returned an unknown value, the parameter has been derived from first principles using the Bara equipment and load schedules, with the derivation recorded in full in the inventory workbook.

All key data assumptions adopted in the preparation of the inventory are presented in Table 4-4 As additional Project-specific information becomes available during detailed design and implementation, these assumptions should be reviewed and the greenhouse gas inventory updated where necessary.

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Table 4-4: Data Assumptions.

Phase	Activity	Assumption / Parameter	Value	Units	Basis / Comment
Construction	Construction duration	Years of construction phase	2	Years	Bara (2026) Table 4-32. First production is reported in Year 3, so Years 1 and 2 constitute the development/construction phase.
	Electricity supply	Purchased grid electricity, full phase	40 532	MWh	Sum of Years 1 and 2 of the derived life of mine electricity profile (18 707 MWh and 21 825 MWh). Represents care-and-maintenance load plus early works at No. 3 Shaft.
		Standby generators	60 000	litres/year	Assumed. Two 500 kVA units at 30 per cent load for 4 hours per day over a 23-day month, until permanent supply is available. Bara (2026) confirms the No. 3 Shaft substation has sufficient existing capacity, so generator reliance is limited.
	Number of workers	Average number per day	400	people	Assumed. Contractor complement for surface refurbishment at No. 3 Shaft and re-equipping of No. 2 Shaft. Incremental to the existing Harmony workforce.
	Raw water required	Potable supply	8 760	kl/year	Calculated. 400 workers at 60 litres per person per day. Potable water is municipal supply.
	Waste water treatment	Discharge to municipal sewer	600	m³/month	Calculated. 50 litres per person per day. No sewage treatment plant on site, so this is a Scope 3 purchased treatment source.
	Steel works	Reinforcement and structural steel	1 000	tonnes	Questionnaire response, in excess of 1 000 tonnes. Lower bound adopted.
	Concrete	Foundations for large infrastructure	4 800	tonnes	Questionnaire response, in excess of 2 000 m³. Converted at 2.4 tonnes per m³ for normal-weight reinforced concrete.
	Cement	Excluded to avoid double counting	0	tonnes	The questionnaire estimates in excess of 200 tonnes of cement, which is a constituent of the concrete accounted for above. The concrete emission factor is inclusive of its cement content.
	Diesel (stationary)	Generators and stationary welding plant	5 000	litres/month	Derived from the 60 000 litres per year generator allowance above.
	Diesel (mobile)	Surface construction plant and vehicles	12 000	litres/month	Assumed. Two excavators at 150 kW and 0.5 load factor, two TLBs at 70 kW and 0.4 load factor, at 0.22 litres per kWh over 8 hours across a 23-day month. Includes two tippers at 60 litres per day, plus five light duty vehicles at 2 000 km per month and 10 litres per 100 km.
	Petrol (stationary)	Not applicable	0	litres/month	Excluded. The questionnaire confirms no petrol is used for stationary equipment.
	Petrol (mobile)	Small four-stroke equipment	200	litres/month	Assumed. Lawnmowers, edge trimmers, dewatering pumps and high pressure cleaners, per the questionnaire response.
	LPG	Workshop cutting and heating torches	100	kg/month	Assumed. Two 48 kg cylinders per month, consistent with the questionnaire response.
	Blasting	Explosives	0	tonnes/month	Excluded from this phase. Bara (2026) Table 4-32 places all development blasting from Year 3 onward, which falls in the operational phase.
	Reagents	Process chemicals	0	tonnes/month	None identified. Process reagents are consumed at the Target No. 1 Plant, which is Harmony infrastructure outside the inventory boundary.
	Waste generation and disposal	Construction waste (rubble, concrete, scrap)	12	tonnes/month	Assumed. 5 per cent wastage on 4 800 tonnes of concrete plus 1 000 tonnes of steel, spread across the 24-month period.
		General waste generation rate	0.5	kg/person/day	Industry average for a worker at place of work.
		General waste generated	6	tonnes/month	Calculated from the average daily complement. Mico Trading is appointed for waste management across the Free State Operations.
		Hazardous waste generated	500	kg/month	Assumed. Used oils, filters, contaminated rags and paint residues from a site of this scale.
		Distance to permitted hazardous landfill	238	km	Vlakfontein hazardous waste facility, per the RFI response.
		Waste vehicle payload	8	tonnes	Assumed. Standard compaction refuse vehicle payload.
		Waste vehicle trips	2	trips/month	Calculated from construction waste tonnage divided by truck payload.
Operation	Life of Mine	Total project life	17	years	Bara (2026) Sections 1 and 11, approximately 17 years inclusive of development. The operational-phase inventory covers the 15 years from first production (mine Years 3 to 17); mine Years 1 and 2 form the construction phase (Table 4-3).
	Number of workers	Average number per day	2 744	people	Bara (2026) technical report. To be confirmed as an incremental figure relative to the existing Harmony complement.
	Electricity	Peak annual consumption, Year 11	217 000	MWh	Bara (2026) Section 7.4.4. Corroborated by the questionnaire figure of 214 500 MWh for Year 12, a difference of 1.2 per cent.
		Life of mine grid electricity	2 720 604	MWh	Derived by scaling the published notified maximum demand profile to the Year 11 energy anchor. Reported as approximately 2.7 million MWh. The operational inventory in Table 5-2 excludes Years 1 and 2, which are accounted for in the construction-phase inventory.
		Grid emission factor	1.08	tCO_2e/MWh	Eskom (2025), reporting period 1 April 2024 to 31 March 2025.
		No. 2 Shaft generating plant	3 000 000	kWh/year	Questionnaire response. 5 MVA plant, assumed diesel-fired.
	Raw water required	Potable supply	60 094	kl/year	Calculated. 2 744 workers at 60 litres per person per day. All other demand is met from mine water make, which the questionnaire confirms is water positive.
	Waste water treatment	Discharge to municipal sewer	4 116	m³/month	Calculated. 50 litres per person per day. No sewage treatment plant on site, so this is Scope 3 purchased treatment.
	Diesel (stationary)	No. 2 Shaft generating plant	72 441	litres/month	Back-calculated from the annual generation figure using generator efficiency, net calorific value and diesel density. Equivalent to 869 291 litres per year.

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	Diesel (mobile)	Underground trackless plus surface fleet	27 895	litres/month	Derived from the Bara equipment schedules. Underground consumption is 297 788 litres per year in a trackless development year, with surface consumption of 36 950 litres per year.
	Petrol (stationary)	Not applicable	0	litres/month	Excluded. The questionnaire confirms no large petrol storage or stationary petrol use.
	Petrol (mobile)	Small four-stroke equipment	200	litres/month	Assumed, per the questionnaire response.
	Oils	Hydraulic, engine and transmission oils	3 010	litres/month	Calculated at 3 per cent of total diesel throughput, a standard allowance for mining fleets.
	Lubricants	Greases and degreasing agents	200	kg/month	Assumed. Recorded for completeness, excluded from quantification as immaterial.
	LPG	Workshop heating torches	48	kg/month	Questionnaire response. One cylinder per month.
	Blasting	Emulsion and Anfex	45	tonnes/month	Calculated. 13 441 558 tonnes of ore plus waste over the life of mine (Bara 2026, Table 4-32) at a powder factor of 0.6 kg per tonne, giving approximately 8 065 tonnes across 15 production years.
	Reagents	Process chemicals	0	tonnes/month	None identified within the Project boundary. Reagents are consumed at the Target No. 1 Plant.
	Waste generation and disposal	General waste generation rate	0.5	kg/person/day	Industry average for a worker at place of work.
		General waste generated	41	tonnes/month	Calculated from the average daily complement.
		Industrial waste generated	50	tonnes/month	Assumed. Scrap metal, conveyor belting and used tyres, handled by Mico Trading. No on-site disposal facility.
		Hazardous waste generated	2 000	kg/month	Assumed. Used oils, filters, batteries and contaminated materials from underground and surface workshops.
		Distance to permitted general landfill	30	km	Assumed. Nearest permitted general waste landfill serving the Welkom area.
		Distance to permitted hazardous landfill	238	km	Vlakfontein hazardous waste facility, per the RFI response.
		Waste vehicle payload	8	tonnes	Assumed. Standard compaction refuse vehicle payload.
		Waste vehicle trips	11	trips/month	Calculated from general plus industrial waste tonnage divided by truck payload.

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4.3.6.1 Quantification of Energy Consumption

Energy is the dominant driver of the Project footprint, so the basis on which electricity and fuel consumption have been established is set out here in full.

The Bara study (2026) reports a single annual energy figure, being peak annual consumption of 217 000 MWh in Year 11 (Section 7.4.4). It does not tabulate energy by year. It does publish a year-by-year notified maximum demand (NMD) profile across Years 1 to 17 in Figure 7-30, together with connected and operating load schedules for both shafts in Tables 7-6 and 7-7. Annual electricity consumption has therefore been derived by scaling the published NMD profile to the published Year 11 energy anchor:

Energy (year) = 217 000 MWh × NMD (year) ÷ NMD (Year 11)

Where the Year 11 NMD is 34.8 MVA. The method assumes that the annual load factor is approximately constant across the operating life. This holds because the load is dominated by continuous-duty systems. The ice plant operates at a load equal to its connected load of 6 370 kW, while underground pumping, ventilation and refrigeration together account for roughly 45 per cent of the No. 2 Shaft operating load. These systems run continuously rather than tracking production. Bara applies a single diversity factor of 0.7 with a power factor of 0.85 uniformly across the life of mine, which supports the same assumption.

An alternative method, scaling energy by annual tonnage, was tested and rejected. Year 10 carries the highest total tonnage in the mine schedule at approximately 1.02 Mt, yet Bara places peak energy consumption in Year 11 at approximately 0.76 Mt. Energy demand grows with depth through pumping head, ventilation distance, refrigeration duty and hoisting lift, rather than with tonnage. The NMD profile captures this behaviour; tonnage does not.

The derived profile gives life of mine grid electricity of approximately 2.7 million MWh. Applying the Eskom grid emission factor of 1.08 tCO_2e/MWh gives approximately 2.9 million tCO_2e of Scope 2 emissions across the life of mine. Four independent checks were applied to the derived profile. The Year 11 load factor resolves to 83.8 per cent, within the 75 to 90 per cent range expected of a deep-level operation on continuous duty. Life of mine specific consumption resolves to 263 kWh per tonne milled, within the 150 to 300 kWh per tonne band typical of deep-level South African gold operations. The implied life of mine power cost at the Megaflex tariff of R2.18/kWh gives an operating cost share of approximately 14 per cent, against the 15 to 20 per cent typical of deep gold operations. The ice plant resolves to approximately 27 per cent of life of mine Scope 2 from a single asset, consistent with its role as the largest continuous load on the mine. All four checks converge on the derived profile.

The NMD values were digitised from Figure 7-30 at an estimated accuracy of ±0.5 MVA, which propagates to approximately ±2 per cent on the life of mine total. This is well within the uncertainty of a prefeasibility-level estimate. Headline figures are reported to two significant figures, since the precision implied by the underlying arithmetic is not supported by the digitised input. Unrounded values are retained in Table 4-4 and Section 5 for traceability to the inventory workbook. Bara holds the underlying load schedule referenced in Section 12.2 of its study, and obtaining it would replace the digitised values with reported figures.

4.3.6.2 Quantification of Mobile and Stationary Fuel

At the current stage of Project development, fuel requirements have not yet been definitively established. The questionnaire returned unknown values for all fuel consumption lines and, accordingly, diesel consumption has been estimated from first principles using the equipment schedules published in the Bara study (2026), together with reasonable assumptions regarding equipment utilisation, operating hours, load factors and specific fuel consumption. These assumptions have been applied to provide an indicative estimate of fuel consumption for the purposes of this Assessment and should be refined as detailed Project design and operational information becomes available.

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Fuel (litres) = Installed power (kW) × Load factor × Specific fuel consumption (litres per kWh) × Engine hours

Specific fuel consumption is taken as 0.22 litres per kWh, typical of modern off-highway diesel engines. This is equivalent to approximately 45 per cent thermal efficiency at a diesel lower heating value of 10 kWh per litre. Working days are taken as 286 per year, derived from the 11-day fortnight shift cycle confirmed in the questionnaire. Engine hours are taken as 40 per cent of a two-shift 16-hour day, giving 6.4 engine hours per machine per day. This reflects the cyclical drill-charge-blast-ventilate-load pattern of development work rather than continuous running. Load factors are applied by duty, ranging from 0.15 for development jumbos, where diesel is used for tramming only because drilling is electric, up to 0.55 for the waste rock dump dozer.

Based on these assumptions, underground trackless consumption is estimated at 297 788 litres per year and applies to Years 3 to 11, the trackless decline development window. Surface fleet consumption is estimated at 36 950 litres per year and applies across the full life of mine. The underground figure is equivalent to approximately 3.1 litres per tonne of trackless development material moved. Development haulage is considerably more fuel-intensive per tonne than production hauling because of long tramming distances with low tonnage per cycle, so this sits just above the upper end of the 1 to 3 litres per tonne band typical of underground trackless operations, as would be expected.

4.3.6.3 Quantification of Stationary Generating Plant

The No. 2 Shaft generating plant is rated at 5 MVA, with an estimated annual generation of 3 000 000 kWh. At the current stage of Project development, the fuel requirements and final operating characteristics of the generating plant have not yet been definitively established. Accordingly, fuel consumption has been back-calculated from the estimated electricity generation using reasonable assumptions to provide an indicative estimate for this Assessment. These assumptions should be confirmed and refined as detailed Project design and operational information becomes available.

Electrical output is converted to energy at 3.6 GJ per MWh, then divided by a generator efficiency of 0.35 to give the fuel energy input. This is converted to mass using the IPCC (2006) net calorific value of 0.043 TJ per tonne, then to volume using a density of 0.8255 kg per litre from the NEM methodological guidelines. The resulting indicative consumption is 869 291 litres per year, applied over Years 5 to 17 from commissioning of the shaft.

Two points attach to this plant. First, the fuel type has not been confirmed and has therefore been assumed to be diesel, consistent with the questionnaire response identifying diesel generators for back-up power. This assumption requires confirmation. Stationary diesel consumption from the generating plant is roughly two and a half times the estimated mobile fleet consumption. If the plant is not diesel-fired, the Scope 1 emissions estimate would reduce materially, with the current estimate indicating a reduction of approximately 70 per cent.

Second, at 5 MVA and a 0.8 power factor, the plant is equivalent to 4.0 MW electrical, implying a rated thermal input of approximately 11.4 MW. This exceeds the 10 MW(th) threshold for IPCC category 1A2i, which is assessed on rated capacity irrespective of utilisation, and may therefore trigger carbon tax liability under the Carbon Tax Act 15 of 2019.

Scope 2 remains the dominant source under either fuel assumption. Life-of-mine grid electricity contributes roughly two orders of magnitude more CO_2e than the entire diesel inventory.

4.4 Impact Assessment

The methodology applied in this assessment is structured to meet the requirements of the EIA Regulations, 2014 (as amended), particularly those set out in Appendix 3. Potential climate-related impacts of the proposed mining project are identified and assessed in terms of magnitude, duration, spatial scale, consequence, probability and overall significance, with overall significance representing the final integrated rating derived from the combined consideration of all the preceding criteria. Significance is generally classified as low, medium, or high, and may be further distinguished as positive or negative. The assessment also considers the degree to which impacts may

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be reversed, the potential for irreplaceable loss of resources, and the extent to which they can be avoided, managed or mitigated. This approach ensures that the project's contribution to climate change is evaluated in a systematic and transparent manner consistent with national environmental assessment practice.

The impact significance rating system is presented in Table 4-5, Table 4-6, as well as Table 4-7 and it involves three parts:

- **Part A:** Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration.
- **Part B:** Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A.
- **Part C:** Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from **Part B**) and the probability of occurrence.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Use these definitions to define the consequence in Part B, as showcased below in Table 4-5.

Table 4-5: Definitions of Magnitude, Spatial Scale and Duration.

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration, as showcased in Table 4-6.

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Table 4-6: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
MAGNITUDE					
Minor	**Duration**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**Duration**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**Duration**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability, as showcased in Table 4-7.

Table 4-7: Significance Rating Methodology

Probability (of Exposure to Impacts)	Consequence Negative			Consequence Positive		
	Low	Medium	High	Low	Medium	High
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

5. High-Level Greenhouse Gas Emissions Assessment

All emissions in this inventory are expressed as carbon dioxide equivalents (CO_2e). Under the Kyoto Protocol, a carbon equivalent provides a standard unit to represent the global warming potential (GWP) of each greenhouse gas relative to carbon dioxide. The GWP reflects a gas's potential to trap heat in the atmosphere compared to CO_2. To allow comparison across different GHGs (e.g. CH_4 and N_2O), all emissions are converted into CO_2e. For this inventory, GWP values are based on the IPCC Sixth Assessment Report (2021).

5.1 Assumptions and Exclusions

The following assumptions as detailed in Table 4-4 underpin both the construction-phase and operational-phase inventories and should be reviewed if project design parameters change. Emissions associated with the workforce, being potable water supply, wastewater treatment and general waste, have been quantified on the full operational complement applied across the entire life of mine. This is a conservative treatment, as the complement will build up over the first years of the operation. The resulting overstatement is immaterial relative to the total inventory.

5.2 GHG Emissions Calculations

With specific reference to this study, the components of the equations are detailed in sections below.

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- The Emission Factor is a conversion factor that can be used to relate the activity data to the associated GHG emissions.
- Activity Data describes the activity being conducted by the source and multiplied by its corresponding emission factor to obtain its resulting GHG emissions.

5.2.1 Activity Data and GHG Emissions

Activity data were obtained primarily through detailed Project questionnaires completed in consultation with the Project team and supported by the best available engineering information available at the time of the assessment. The questionnaires captured information relating to the proposed construction activities, operational requirements, fuel and electricity consumption, material quantities, equipment, transport activities, waste management and other relevant greenhouse gas emission sources. Where Project-specific information was unavailable, reasonable engineering assumptions were applied and are documented in Table 4-4. The greenhouse gas inventory has been developed using the best available information currently available and should be updated as additional Project-specific data become available during detailed design and implementation.

Emissions were calculated by multiplying the relevant activity data by the corresponding emission factor and dividing the result by 1 000 to express the values in tonnes of CO_2e.

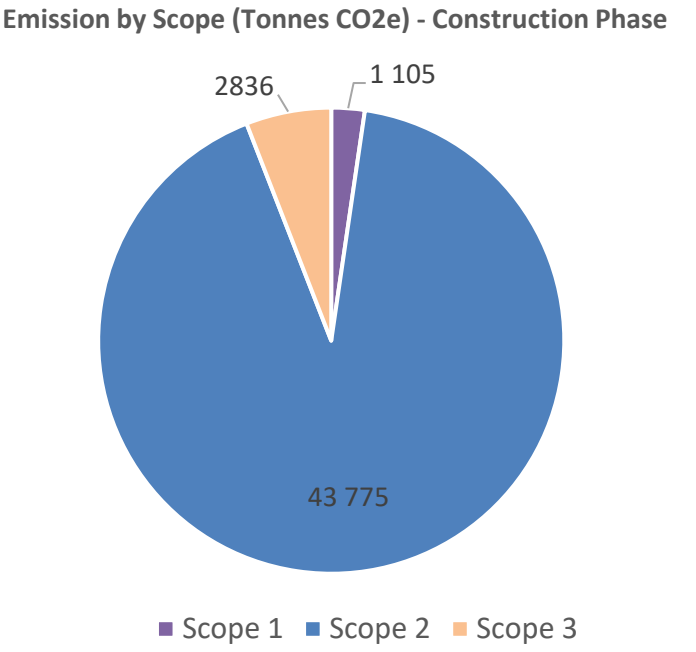
- Scope 1
  - Fuel volume (or mass) × Emission Factor (kg CO_2e per unit) ÷ 1 000
- Scope 2
  - Electricity (MWh) × Grid EF (tCO_2e/MWh)
- Scope 3
  - Materials: Quantity (t) × Material-specific EF ÷ 1 000
  - Waste: Quantity (t) × Disposal-route EF (landfill or incineration).
  - Transport of waste: Distance (km) × Vehicle EF ÷ 1 000
  - WTT diesel: Diesel volume × DEFRA 2025 WTT factor ÷ 1 000

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The estimated activity data and resulting GHG emissions are presented in the summary table below.

Table 5-1: Activity Data and GHG emissions for the Construction Phase.

Scope Category	Activity Metric	Units	Full Estimated quantum	Emissions (tCO_2e)
Scope 1	Diesel - construction equipment and machinery (stationary/mobile)	Litre	120 000	317
Scope 1	Diesel - Mobile	Litre	288 000	770
Scope 1	Petrol - Mobile	Litre	4 800	11
Scope 1	LPG	Kilograms	2 400	7
Scope 2	Purchased Electricity (Grid)	Megawatt hour	40 532	43 775
Scope 3	Water Supplied	m^3	17 520	3
Scope 3	Waste water treatment	m^3	14 400	2
Scope 3	Concrete required	Tonnes	4 800	570
Scope 3	Steel required	Tonnes	1 000	1 910
Scope 3	Construction waste generated and disposed at legal disposal site	Tonnes	288	0.4
Scope 3	Municipal (general) waste generated and disposed	Tonnes	146	73
Scope 3	Hazardous waste generated and disposed	Tonnes	12	12
Scope 3	Distance travelled from site to the hazardous waste disposal facility	Kilometres	11 424	8
Scope 3	Well to Tank Fuel (Diesel)	Litre	408 000	255
Scope 3	Well to Tank Fuel (Petrol)	Litre	4 800	3
Total Construction				**= 47 715 tCO_2e**
Scope 1 and 2				**= 44 879 tCO2e**
Scope 3				**= 2 836 tCO2e**

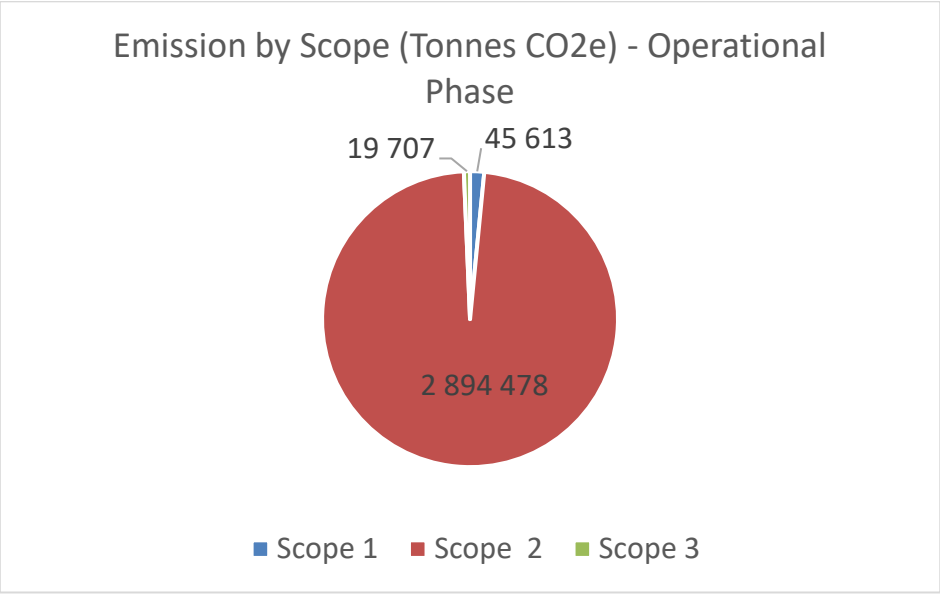


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Table 5-2: Activity Data and GHG emissions for the Operation Phase.

Scope Category	Activity Metric	Units	Full Estimated quantum	Emissions (tCO_2e)
Scope 1	Diesel - Stationary	Litre	11 300 783	29 826
Scope 1	Diesel - Mobile	Litre	3 308 242	8 840
Scope 1	Petrol - Mobile	Litre	36 000	84
Scope 1	Explosives	Tonnes	8 065	6 823
Scope 1	LPG	Kilograms	8 640	26
Scope 2	Purchased Electricity (Grid)	Megawatt hour	2 680 072	2 894 478
Scope 3	Raw water supplied	m^3	901 410	134
Scope 3	Waste water treatment	m^3	740 880	127
Scope 3	Hazardous waste generated and disposed	Tonnes	360	360
Scope 3	Municipal (general) waste generated and disposed	Tonnes	7 409	3 684
Scope 3	Industrial waste generated and disposed at legal landfill	Tonnes	9 000	4 685
Scope 3	Distance travelled from site to waste disposal facilities (all waste streams)	Kilometres	471 240	333
Scope 3	Well to Tank Fuel (Diesel)	Litres	14 609 025	9 117
Scope 3	Well to Tank Fuel (Petrol)	Litres	36 000	22
Total Operation				**= 2 958 538 tCO_2e**
Scope 1 and 2				**= 2 940 077 tCO_2e**
Scope 3				**= 18 462 tCO_2e**

Values in Table 5-1 and Table 5-2 are calculated from unrounded activity data and rounded to the nearest tonne, so totals may differ from the sum of the rounded rows by 1 tCO_2e. The operational-phase quantities cover mine Years 3 to 17, as set out in Table 4-3.



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5.2.2 Emission Factor

Emission factors (EFs) are used to convert activity data into quantitative estimates of greenhouse gas (GHG) emissions for specific activities. Different emission factors exist for different greenhouse gases and emission sources. In some instances, customised emission factors may be developed by the reporting entity using project-specific data; however, for general GHG accounting and reporting, the application of recognised default emission factors is considered appropriate. The emission factors and conversion factors applied in this assessment were obtained primarily from the IPCC 2006 Guidelines for National Greenhouse Gas Inventories (Tier 1), the DEFRA 2025 Greenhouse Gas Reporting Conversion Factors, the World Steel Association 2022 Life Cycle Inventory Methodology Report, the South African National Environmental Management: Air Quality Act Greenhouse Gas Reporting Methodological Guidelines (for applicable density factors), and the most recent Eskom grid emission factor published at the time of the assessment for the quantification of Scope 2 emissions. These factors are listed in Table 5-3.

The IPCC recommends a tiered approach when selecting emission factors which was applied:

- Tier 1: Uses default factors when project- or country-specific data are unavailable.
- Tier 2: Uses country-specific emission factors where available.
- Tier 3: Uses project- or facility-specific data for the most accurate emission estimates.

Table 5-3: Emission Factors utilised for this inventory.

Source/Fuel	Emission Factor	Reference
Diesel (Stationary)	2.639 kg CO_2e/L	(IPCC, 2006)
Diesel (Mobile)	2.672 kg CO_2e /L	(IPCC, 2006)
Petrol (Mobile)	2.328 kg CO_2e /L	(IPCC, 2006)
Diesel (Well-to-Tank (WTT))	0.62409 kg CO_2e /L	(DESNZ, 2025)
Petrol (Well-to-Tank (WTT))	0.60664 kg CO_2e /L	(DESNZ, 2025)
Electricity	1.08 tonnes CO_2e/MWh	(Eskom, 2025)
Explosives	0.846 tCO_2e per tonne	DFFE Guidelines
LPG	2.987 kg CO2e /kg	(IPCC, 2006)
Concrete	118.793 kg CO_2e/Tonne	(DESNZ, 2025)
Water Supplied	0.149 kg CO_2e /m^3	(DESNZ, 2025)
Steel	1.910 Tonne CO_2e/Tonne	(World Steel Association, 2022)
Municipal (general) waste generated and disposed (incinerated)	497.24244 Kg CO_2e/Tonne	(IPCC, 2006)
Hazardous waste generated and disposed	1 000 Kg CO_2e/Tonne	(DESNZ, 2025)

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Construction waste generated and disposed at legal disposal site.	1.263 kg CO2e/Tonne	(DESNZ, 2025)
Wastewater Treated	0.171 kg CO2e/m^3	(DESNZ, 2025)
Note: Eskom Data is based on the most recent published data at the time of writing. This data reflects Eskom emissions over a 12-month period from 1 April 2024 to 31 March 2025. Eskom's electricity emission factors may vary between reporting periods due to changes in the generation mix of the national grid. For example, an increase in the contribution of lower-carbon energy sources, such as solar, may result in a reduced emission factor in a given reporting year.		

5.3 Project Alternatives

5.3.1 No-Go Alternative

Under the No-Go alternative, the proposed underground mining project would not proceed. The existing Target Mine infrastructure would continue under care-and-maintenance or limited existing operations, and the mineral resources within the JV area would remain unmined. The implications for the climate would be that direct project-related emissions are avoided; however, it also forgoes the opportunity to extract the mineral resource using already-established infrastructure. From a broader just-transition and resource-efficiency perspective, utilising existing mining infrastructure generally results in a lower incremental carbon footprint per unit of metal produced compared with developing an entirely new mine elsewhere. Accordingly, although the No-Go alternative results in the greatest absolute avoidance of project-related emissions, it is not considered a feasible approach to accessing the mineral resource, as doing so would require the development of a new mine and associated infrastructure elsewhere, forgoing the efficiencies associated with the existing brownfield infrastructure.

5.3.2 Alternative Mining or Access Methods

Limited alternatives exist because the project is predicated on the use of the existing Target shafts and processing plant. Alternative mining methods (for example, greater use of mechanised mining) or alternative access arrangements would require substantial new infrastructure and are not considered feasible within the current project scope. Any such alternatives would likely increase both capital intensity and the associated greenhouse gas emissions during construction.

5.3.3 Preferred Alternative

The proposed project involves the development of underground mining operations within the Jelani JV area, utilising the existing Harmony Target Mine infrastructure. Only limited new surface infrastructure is required, mainly small seismograph stations and short access tracks. The project will generate Scope 1 (diesel) and Scope 2 (grid electricity) emissions over an approximately 17-year life of mine, including approximately 14 years of full production. Because it re-uses existing shafts and processing infrastructure, the construction-phase emissions footprint is significantly lower than would be the case for a greenfield mine requiring new shaft systems, a new processing plant, or extensive surface infrastructure.

The project will be exposed to projected increases in temperature, very hot days, extreme rainfall events, and wildfire risk. However, the limited new surface disturbance and reliance on existing and upgradable infrastructure provide opportunities to incorporate climate-resilient design and operational measures.

Overall, this project is highly favourable relative to a new greenfield development, provided that energy efficiency measures and climate adaptation actions are implemented.

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5.4 Limitations and Future Refinement

The inventory has been prepared at prefeasibility level and is limited by the Project information available at the time of the Assessment. Several parameters have been derived from first principles using the published equipment and load schedules, rather than from measured consumption data, and a number of inputs remain subject to confirmation during detailed design. The calculations and assumptions nevertheless remain valuable as indicative estimates of the Project's likely emissions output. They establish the order of magnitude of the footprint, identify the sources that dominate it, and provide a defensible basis for assessing significance and for framing mitigation at this stage. The inventory should be refined as Project-specific information becomes available, particularly measured fuel consumption, confirmed electrical load schedules and finalised design parameters, so that the estimates can be replaced with reported figures over time.

6. Climate Impact Assessment

Climate change is a global phenomenon resulting from the cumulative accumulation of anthropogenic GHG emissions in the atmosphere. The climate change impact associated with the proposed project therefore needs to be considered in the context of the project's contribution to the broader national and global GHG emissions profile. As an individual mining project, the emissions generated by the project are not expected to be of a magnitude that would independently alter global climatic conditions. Rather, the project's contribution represents one component of the cumulative emissions generated by mining, industrial, energy, transport and other activities nationally and internationally.

The project will nevertheless contribute to anthropogenic GHG emissions throughout its life cycle. During construction and decommissioning and closure, emissions will primarily arise from the combustion of diesel in construction, demolition, earthmoving and rehabilitation equipment, as well as from associated vehicle movements and materials transportation. During operation, the principal sources of emissions are expected to be associated with the energy requirements of underground mining, including mobile equipment, ore hoisting, ventilation, pumping and associated surface infrastructure. These activities will generate Scope 1 emissions where fossil fuels are combusted directly by project-controlled equipment, including diesel-powered mobile equipment and standby generation. The project will also generate Scope 2 emissions associated with the consumption of purchased electricity from the national electricity grid. Ore processing at the existing Target No. 1 metallurgical plant is under Harmony’s operational control, and the plant’s emissions are reported in Harmony’s own inventory. The plant therefore lies outside the Jelani inventory boundary, as set out in Section 4.3.2, and its emissions are not quantified in this assessment. The processing of Jelani ore is nevertheless recorded as impact 3 in Table 6-1, as a qualitative indirect impact.

The distinction between the project's direct and indirect emissions is relevant to the assessment of its spatial scale. Although the sources of emissions are physically located at or associated with the project, the environmental effect is not confined to the project site or surrounding locality. GHG emissions are dispersed and accumulate in the atmosphere, irrespective of the location at which they are generated. The project will therefore contribute to the wider national GHG emissions inventory through its direct and indirect emissions, while the resulting climate change effect is ultimately global in extent. For the purposes of this impact assessment, the spatial scale of the principal operational impact has therefore been assessed as national/international, recognising both the project's contribution to South Africa's overall emissions profile and the global nature of the resulting climate change impact.

South Africa's participation in the international climate change response provides the broader policy context for this contribution. The Paris Agreement was adopted in December 2015, with the objective of strengthening the global response to climate change and limiting the increase in global average temperature to well below 2°C above pre-industrial levels while pursuing efforts to limit warming to 1.5°C. South Africa submitted its Intended Nationally Determined Contribution (INDC) in September 2015, subsequently signed the Paris Agreement in April

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2016 and ratified it on 1 November 2016. South Africa's commitments under the Paris Agreement are implemented through its Nationally Determined Contributions (NDCs), which establish national-level efforts to reduce GHG emissions. At an average of approximately 176 000 tCO_2e per year of Scope 1 and Scope 2 emissions over the 17-year life of mine, including construction, the Project would account for roughly 0.04 to 0.05 per cent of South Africa's 2030 Nationally Determined Contribution target range of 350 to 420 Mt CO_2e, being the range within which national emissions must fall to remain consistent with the Paris Agreement's 1.5 °C and well-below-2 °C limits respectively. The majority of this contribution arises from purchased grid electricity, which is accounted for within the national inventory at the point of generation.

The proposed project will consequently contribute incrementally to South Africa's overall GHG emissions through both Scope 1 and Scope 2 sources. While the project cannot, as an individual development, materially determine whether South Africa achieves its national climate commitments, the emissions associated with the project form part of the cumulative emissions against which national mitigation objectives are pursued. This provides the basis for considering the project's contribution to climate change as a national-scale impact, notwithstanding that the ultimate environmental consequence is global.

Importantly, as the impact is directly related to the generation of GHG emissions, the only means of materially reducing the project's contribution to climate change is to reduce the quantity of GHG emissions generated by the project. The proposed mitigation measures are therefore directed primarily towards emissions avoidance, reduction and efficiency improvements rather than attempting to eliminate the impact entirely. Some level of GHG emissions is inherent to the proposed mining activities under the current project configuration, particularly where diesel-powered mobile equipment, standby generation and purchased electricity are required to support mining and processing activities. Accordingly, the implementation of mitigation measures does not mean that the climate change impact can be completely avoided.

The mitigation hierarchy for this impact therefore focuses on reducing emissions where technically and economically feasible. During construction, this includes optimising construction scheduling and logistics, reducing unnecessary vehicle movements, maintaining equipment in good operating condition and considering local sourcing of materials where feasible. During operation, opportunities include improving the efficiency of ventilation, pumping and other electrically driven systems; using energy-efficient equipment and lighting; improving the efficiency of mobile mining equipment; and maintaining accurate GHG monitoring and accounting. The project should also investigate the feasibility of alternative and lower-carbon electricity supply options, including renewable energy generation, electricity wheeling or other appropriate renewable-energy procurement arrangements. The technical, economic and operational feasibility of these options should be evaluated as the project develops, with implementation pursued where practicable.

The Project's electricity demand should also be considered in the context of the decarbonisation commitments of Harmony Gold Mining Company Limited, the Project's joint venture partner. Harmony has an approved 1.5 °C science-based target, validated by the Science Based Targets initiative, to reduce absolute Scope 1 and Scope 2 emissions by 63 per cent by FY36 against an FY21 base year. This target forms part of a longer-term ambition to reach net zero by 2045 (Harmony Gold Mining Company, 2025). Harmony's deep-level South African operations account for the majority of the group's electricity consumption, making renewable energy and energy efficiency the principal levers of its decarbonisation strategy (Harmony Gold Mining Company, 2025). In FY25, the group generated 64.3 GWh of renewable energy from its Sungazer 1 solar photovoltaic project and smaller installations (Harmony Gold Mining Company, 2025). Given that purchased grid electricity accounts for approximately 98 per cent of the Project's operational emissions, access to this renewable supply presents the most direct opportunity to reduce the Project's Scope 2 footprint. The Project should therefore explore whether its electricity demand could be partly supplemented by renewable energy generated through Harmony’s existing or planned renewable energy projects, subject to technical, commercial and contractual feasibility, thereby reducing its reliance on grid electricity and associated Scope 2 emissions.

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Alternative project configurations or energy sources should therefore not be interpreted as eliminating the climate change impact. Alternative energy sources may reduce the emissions intensity associated with electricity consumption, but the development and operation of any alternative energy system may itself involve embodied and operational GHG emissions. Similarly, alternative mining or processing configurations may alter the emissions profile without eliminating the underlying requirement for energy and associated emissions. The assessment consequently places emphasis on optimisation and emissions reduction, rather than assuming that the climate change impact can be fully avoided through the consideration of alternatives.

The cumulative nature of climate change is also important in determining the significance of the impact. The project's emissions will occur in addition to emissions from other mining operations, power generation facilities, industrial activities, transportation and other sources. The climate change effect therefore results from the cumulative atmospheric concentration of GHG emissions from numerous sources over time. Although the contribution from the proposed project alone is not expected to materially alter global climate conditions, its emissions represent an incremental contribution to the cumulative emissions burden. This cumulative relationship is particularly relevant to the operational phase, given the extended duration of mining activities and the ongoing energy requirements associated with underground mining and processing.

On this basis, the mitigation measures proposed for the project are expected to reduce the magnitude and emissions intensity of the impact but are not expected to materially alter the fundamental consequence or spatial extent of the climate change impact. The residual impact therefore remains associated with a national/international spatial scale and, particularly during operation, a long-term duration. The assessment consequently retains a significant residual impact despite the application of mitigation measures. This reflects the nature of climate change as a cumulative global environmental impact and the fact that project-level measures can reduce, but cannot eliminate, the project's contribution to GHG emissions.

The assessment should therefore be understood as recognising two complementary considerations: first, the project is not individually capable of causing a material change to the global climate system; and second, the project nevertheless has a responsibility to minimise its incremental contribution to climate change through the reduction of GHG emissions wherever reasonably practicable. The proposed mitigation measures are consequently aimed at ensuring that the project operates as efficiently and with as low a GHG emissions intensity as practicable within the technical and operational constraints of underground mining. A summary of the identified climate change impacts and associated mitigation measures is provided in Table 6-1.

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Table 6-1: Summary of Impacts.

No.	Activity	Impact Description	BEFORE MITIGATION						CI	Mitigation measures / Recommendations	AFTER MITIGATION					
			m	D	SS	C	P	S			m	D	SS	C	P	S
Construction																
1	Construction and refurbishment of surface infrastructure, shaft upgrades, and associated vehicle and equipment use	Generation of greenhouse gas emissions from diesel-powered construction equipment, vehicles, and materials transport, contributing to anthropogenic climate change.	Mode rate -	Medium Term 18 months to 5 years	National/ International	High	Definite	High	Yes	Optimise construction scheduling and logistics to reduce unnecessary vehicle movements; ensure well-maintained equipment; prioritise local sourcing of materials where feasible; implement a construction-phase emissions tracking system.	Minor -	Medium Term 18 months to 5 years	National/ International	Medium	Definite	Medium
Operation																
2	Underground mining operations, ore hoisting, ventilation, pumping, and surface support activities	Ongoing generation of Scope 1 (diesel combustion in mobile equipment and standby generators) and Scope 2 (electricity consumption from the national grid) greenhouse gas emissions over the life of mine, contributing to global climate change.	Major -	Long Term > 5 years	National/ International	High	Definite	High	Yes	Implement energy efficiency measures (optimised ventilation-on-demand, efficient motors and pumps, LED lighting); explore opportunities for renewable energy or wheeling; prioritise fuel-efficient mobile equipment; maintain accurate GHG monitoring and reporting in line with the Carbon Tax Act and future carbon budget requirements; develop a progressive emissions reduction plan.	Moderate -	Long Term > 5 years	National/ International	High	Definite	High
3	Mineral processing at the existing Target plant and associated materials handling	Indirect greenhouse gas emissions associated with electricity use and any process-related energy consumption at the metallurgical plant, contributing to the project's overall carbon footprint. The plant is under Harmony's operational control and lies outside the Jelani inventory boundary. The impact is therefore assessed qualitatively, and the plant's emissions are reported in Harmony's inventory rather than in Section 5.	Mode rate -	Long Term > 5 years	National/ International	High	Definite	High	Yes	Support energy efficiency initiatives at the processing plant; investigate opportunities to increase the renewable energy component of the electricity supply; maintain transparent GHG accounting for Scope 2 emissions.	Minor -	Long Term > 5 years	National/ International	High	Definite	High
Decommissioning and Closure																
4	Decommissioning of surface infrastructure, rehabilitation earthworks, and associated vehicle/equipment use	Temporary generation of greenhouse gas emissions from diesel-powered equipment used during the removal of monitoring infrastructure, regrading of access tracks and revegetation of disturbed footprints. Emissions are limited by the small scale of the rehabilitation obligation within the Jelani mining right area, where no shafts, processing facilities, tailings facilities or waste rock dumps require decommissioning.	Minor -	Short Term < 18 months	National/ International	Medium	Definite	Medium	No	Minimise the duration and intensity of earthworks; use well-maintained equipment; prioritise progressive rehabilitation to reduce the overall equipment hours required.	Minor -	Short Term < 18 months	National/ International	Medium	Definite	Medium

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7. Status Quo and Overview of Projected Climatic Changes

The Köppen climate classification, originally developed by Wladimir Köppen in 1900, remains one of the most widely used systems for classifying global climates (Peel, et al., 2007). The classification is based on observed patterns of temperature and precipitation and their relationship with natural vegetation, allowing for the delineation of distinct climate zones across the world. Despite significant advances in climate data availability and analytical techniques over time, the Köppen system has persisted due to its simplicity and strong empirical basis. This has maintained a widespread adoption in both scientific and applied contexts (Peel, et al., 2007). The project area is classified as BSk (Cold Steppe) under the Köppen-Geiger climate classification, corresponding to a cold semi-arid climate characterised by low to moderate annual rainfall, hot summers and cool to cold winters (Beck, et al., 2018).

This classification is defined by Peel, *et al.* (2007) as having three key criteria:

- Dry Climate (B): It receives very little rainfall—more than a desert, but not enough to support forests or heavy crops. Total rain falls in a specific dry range based on temperature.
- Grassland/Steppe (S): Rainfall is enough to grow short grasses and shrubs, making it a semi-dry grassland rather than a bare desert (*BW)*;
- Cold Temperature (k): The average temperature across the entire year is below 18°C, which means it has cold, often freezing winters.

This climatic classification provides an important baseline for understanding the environmental conditions influencing the study area. The semi-arid climate is characterised by relatively low and highly variable annual rainfall, with most precipitation occurring during the summer months, together with high evaporative demand and cool, dry winters. These conditions are directly relevant to the proposed underground mining operation, as they influence water availability, stormwater management, erosion potential, dust generation and the resilience of surface infrastructure to climate variability. The Köppen-Geiger classification therefore provides an important climatic context for identifying the physical climate hazards and associated risks considered within this assessment.

7.1 Baseline Conditions

This section provides a description of the existing environmental conditions within the project area.

7.1.1 Temperature

Figure 7-1 illustrates the typical weather at Allanridge, a small gold-mining town situated less than 3 km from site, based on a statistical analysis of historical hourly weather reports and model reconstructions from January 1, 1980 to December 31, 2016 (Weather Spark, 2026). This area experiences a clear seasonal temperature cycle typical of the central South African Highveld interior. Summers are long, mostly clear and warm; winters are short, clear, dry and cold. Over the course of the year the temperature typically varies from about 0 °C to 30 °C and is rarely below -3 °C or above 34 °C. The hot season lasts approximately four months (early November to early March), when average daily highs exceed 28 °C. The cool season lasts about 2.5 months (late May to early August), when average daily highs remain below 21 °C. Night-time temperatures in mid-winter frequently fall to near or below freezing, while summer nights remain mild (typically 14–17 °C). These patterns form the observed baseline against which future climate-change projections are compared.

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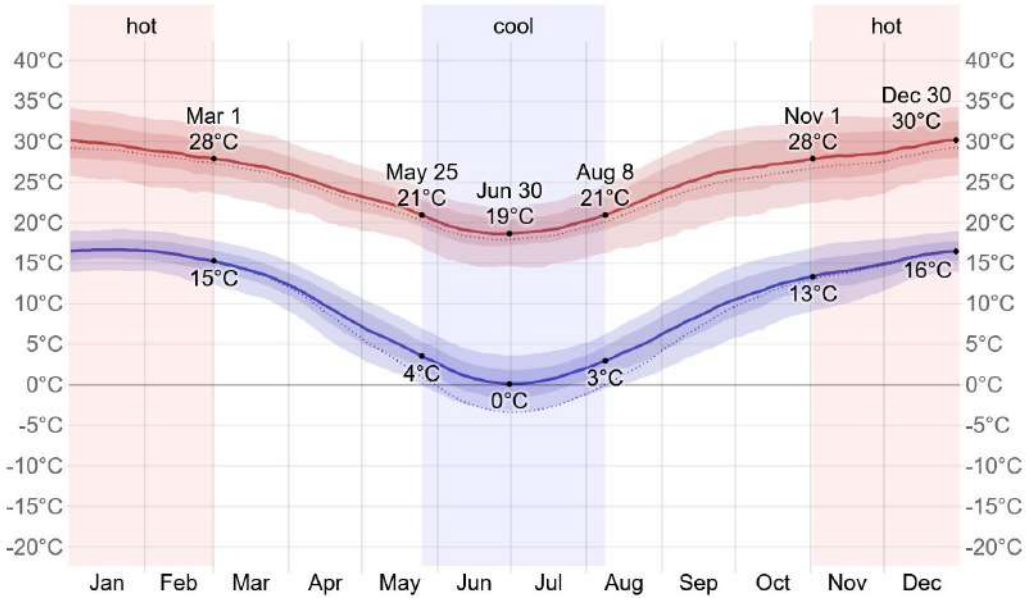


Figure 7-1: Average low (blue line) and high (red line) temperatures recorded at the Allanridge weather station (Copyright © 2026 WeatherSpark.com).

7.1.2 Rainfall

The Free State Province lies within South Africa's summer rainfall zone and experiences a strong west-east rainfall gradient. Rainfall is delivered primarily by convective systems, including tropical-temperate troughs (TTTs), mesoscale convective systems (MCSs), and associated thunderstorms (Munday, et al., 2025).

The mean monthly rainfall for the Welkom (0364300 W) weather station between October 1920 – March 2022 is shown in Figure 7-2. Rainfall is highest over the summer months of October to April, with December and January generally being the wettest months. Very little rainfall falls over the winter months.

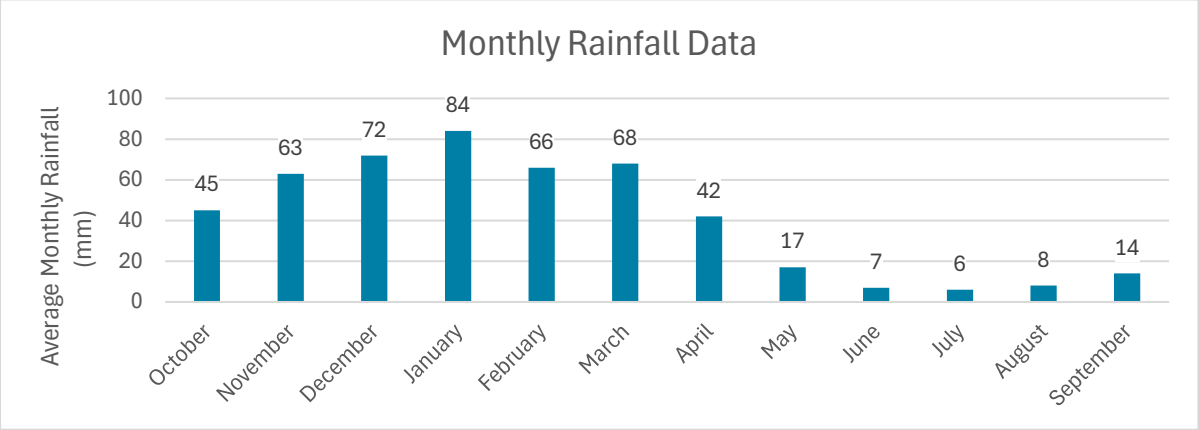


Figure 7-2: Average Monthly Rainfall over the project area (0364300 W).

7.1.3 Wind Intensity

Baseline average wind speeds, illustrated in Figure 7-3, at Allanridge are moderate throughout the year and exhibit a clear seasonal cycle. Mean daily wind speeds are lowest in late summer and early autumn, reaching a minimum of approximately 2.9 m/s around the end of March, before gradually increasing through the winter months. Speeds rise more notably from August onwards, peaking at about 4.1 m/s in late September, and remain elevated through October and November during the windiest period of the year. Across the full annual cycle, the mean typically ranges between roughly 2.9 and 4.1 m/s, while the broader variability envelope indicates that

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instantaneous or higher-percentile speeds can reach 6–7 m/s during the spring windy season and drop to around 1–2 m/s under calmer conditions.

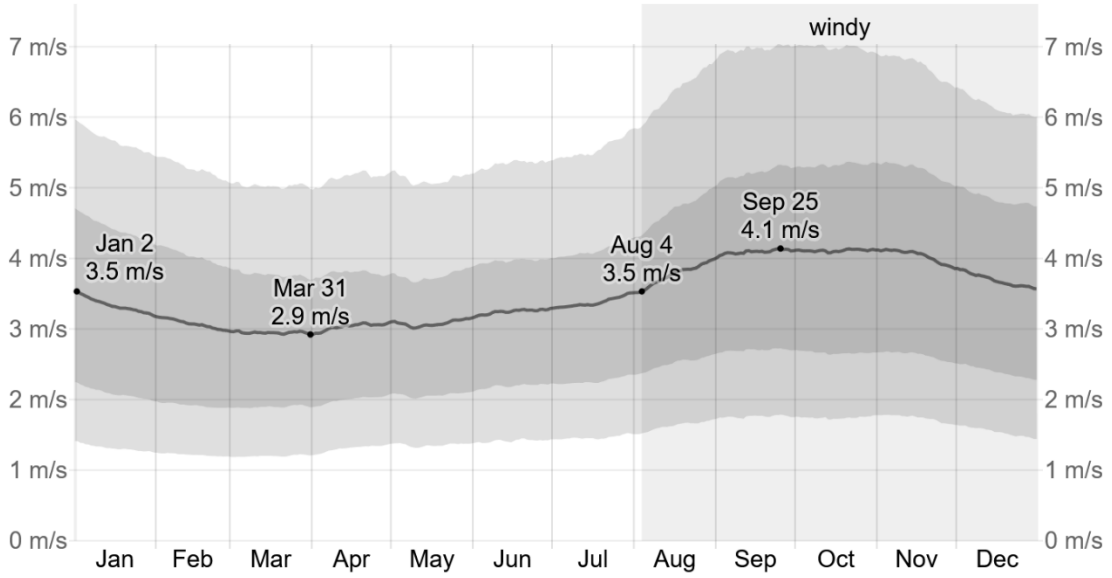


Figure 7-3: Average Annual Wind Speed in Allanridge.

7.1.4 Regional Catchments and Drainage

The DWS has divided South Africa into primary, secondary, tertiary and quaternary catchments. Primary catchments are the largest defined catchments for South Africa, of which there are 22, and are assigned a letter ranging from A – X (excluding O). Secondary catchments are subdivisions of the primary catchments and are the second largest catchments in South Africa and are assigned the primary catchment letter within which they are located and a number e.g. C2 (secondary catchment 2 located within primary catchment C). Similarly, tertiary catchments are subdivisions of secondary catchments and are represented for example by C21 (tertiary catchment 1 located within secondary catchment C2). Lastly, quaternary catchments are the smallest defined catchments and are assigned the tertiary catchment number, along with a quaternary catchment letter e.g. C21D (quaternary catchment D located within tertiary catchment C21).

Further to the above, the DWS has divided South Africa into 6 Water Management Areas (WMAs), that is, the Breede-Olifants, Inkomati-Usuthu, Limpopo-Olifants, Mzimvubu-Tsitsikamma, Pongola-Mtamvuna and Vaal-Orange WMAs. The Project area is predominantly located within the Vaal-Orange WMA and within quaternary catchment C25B.

Several naturally occurring pans characterise the landscape. The Losdoringspruit is located to the west of the project area within the C25B quaternary catchment.

7.1.5 Topography

The elevation of the Jelani Project varies from a high of 1 310 metres above mean sea level (mamsl) in the north-eastern corner, to a low of 1 298 mamsl at Pan A on the western boundary. The topography of the Jelani Project is flat, with an average slope of less than 3 %. The only areas where steep slopes occur are along the sides of the TSFs and WRDs outside the Project area. (See Figure 7-4).

The Jelani Project drains towards the Losdoringspruit and Pan A. Several naturally occurring pans characterise the landscape, resulting in much of the area of the Jelani Project being endoreic (i.e. not discharging into any of the surrounding river systems).

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7.1.6 Wetlands

A total of 12 wetland units have been identified within the Jelani Project area. Much of the area of the Jelani Project is endoreic (i.e. not discharging into any of the surrounding river systems). There is one drainage line through Swartpan, down a natural channel to an unnamed Pan (Pan A) (See Figure 7-6).

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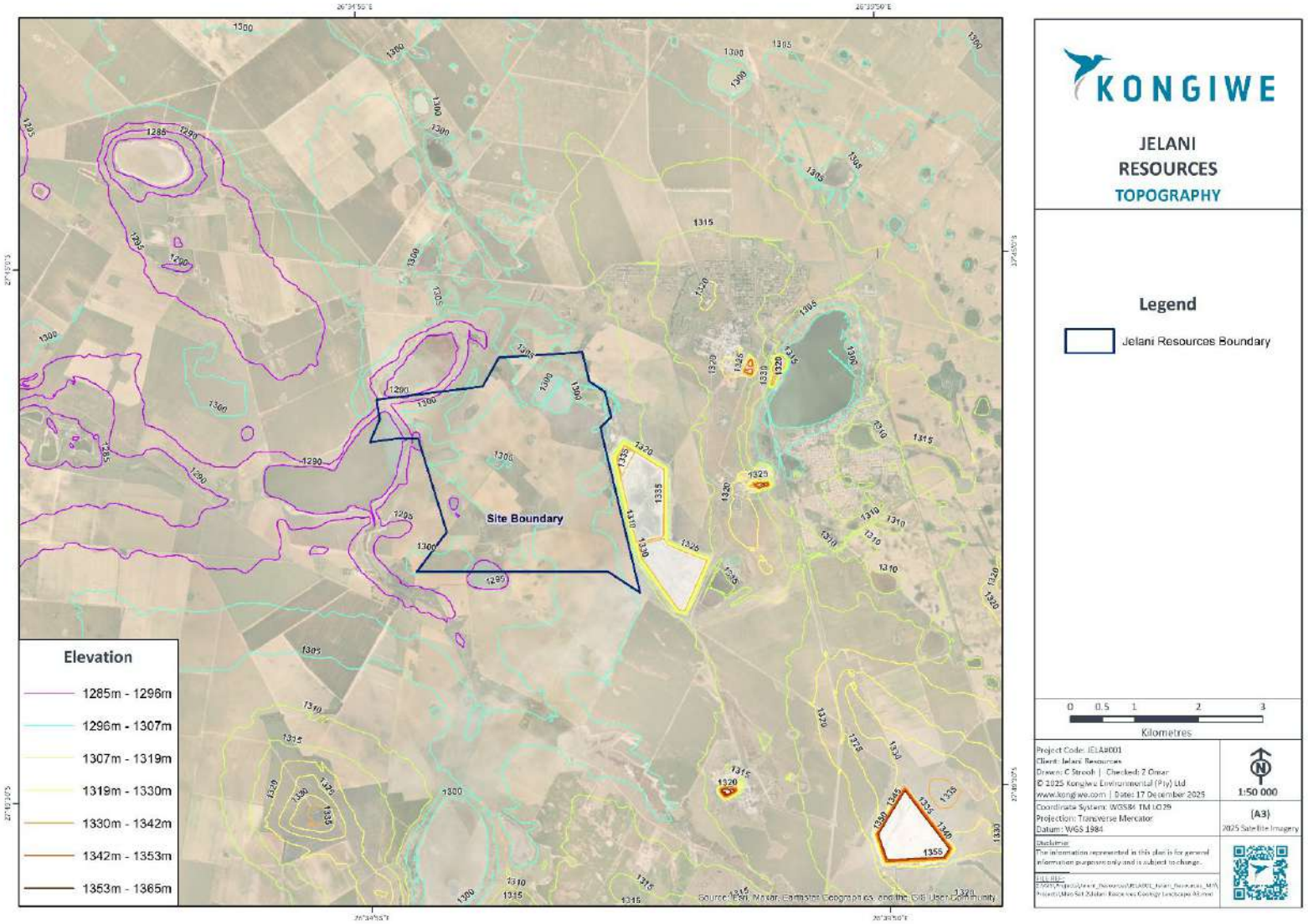


Figure 7-4: Topography.

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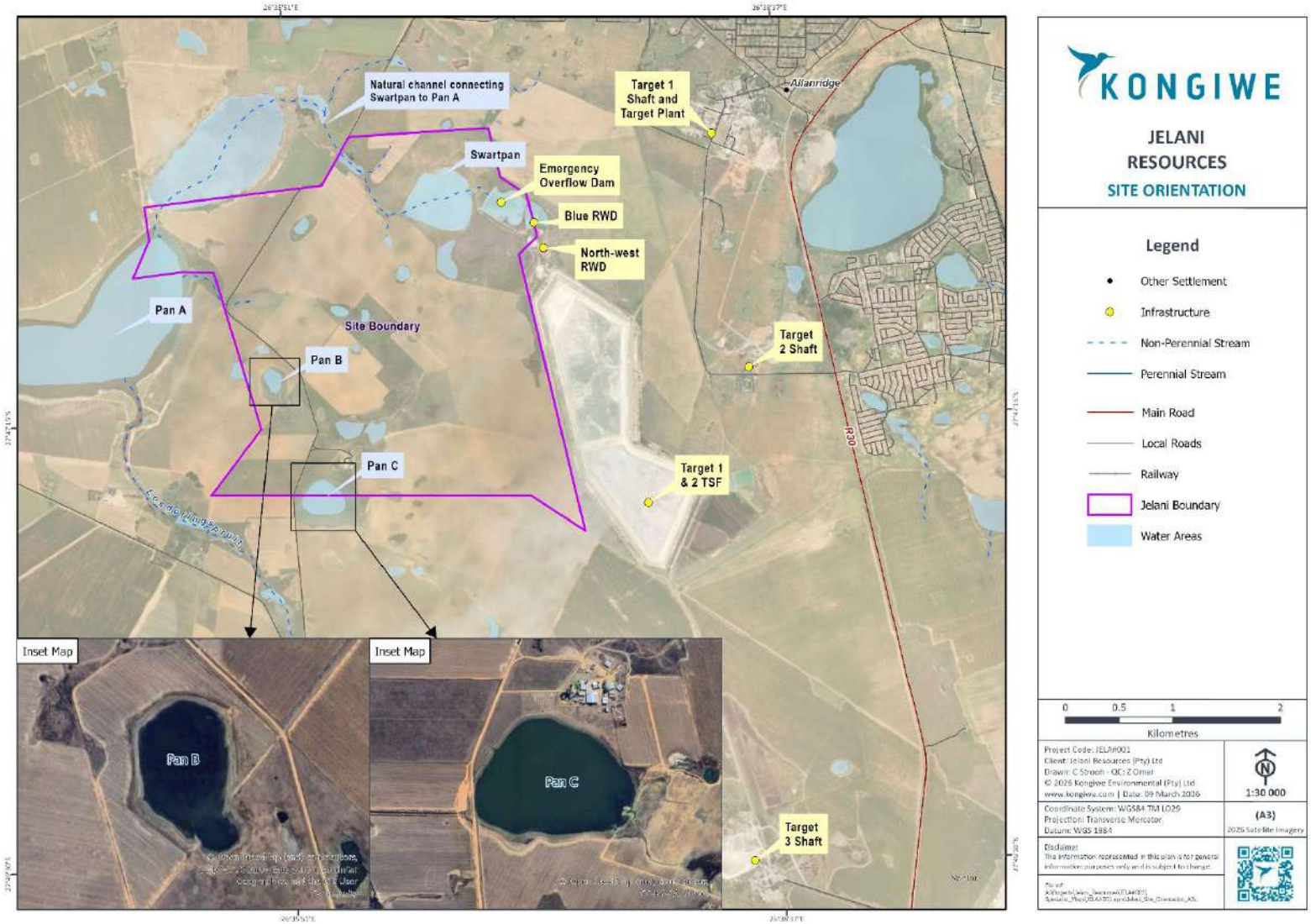


Figure 7-5: Site Orientation.

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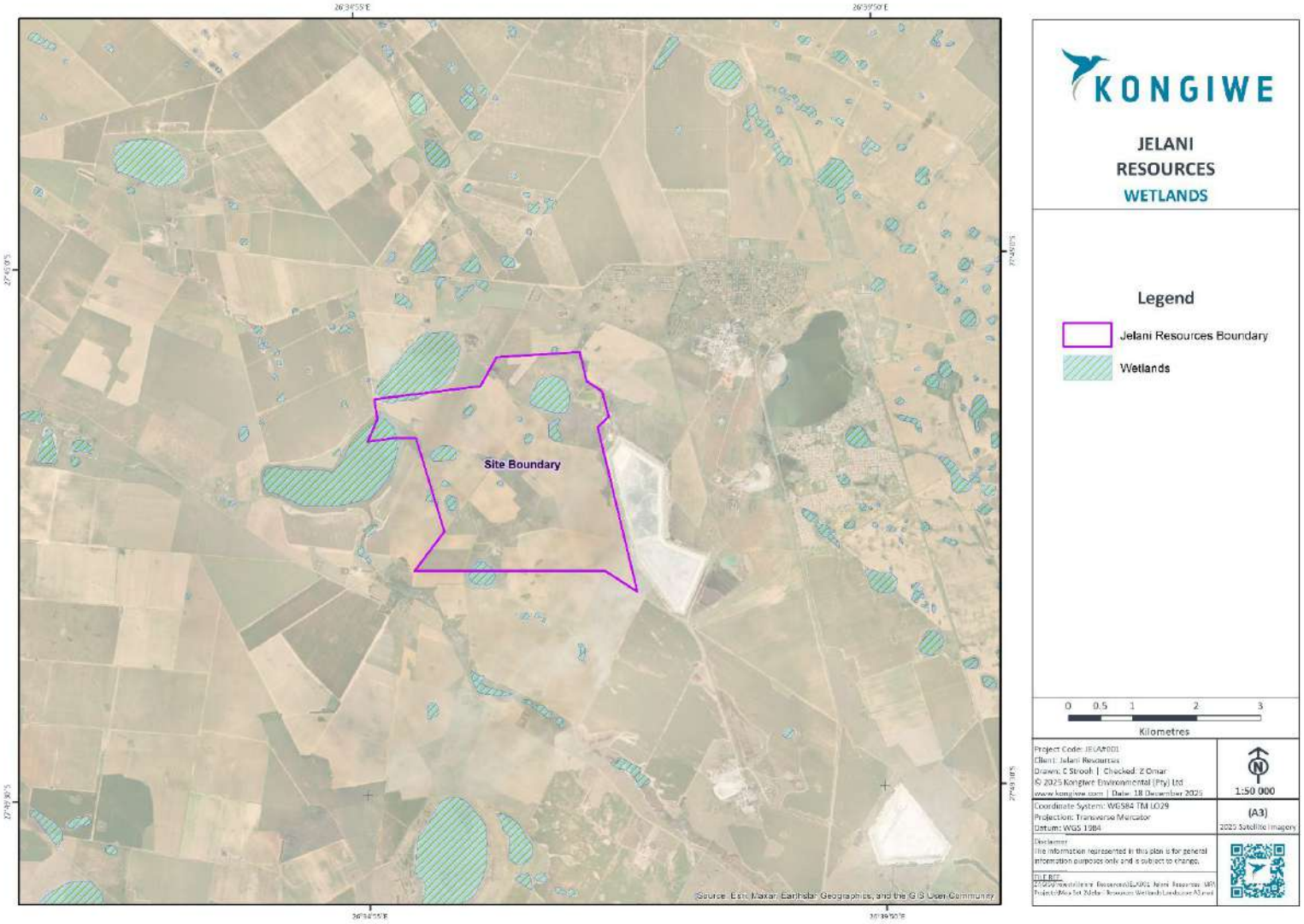


Figure 7-6: Wetlands.

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7.2 Approaches to Climate Change Modelling

Global Climate Models (GCMs) are widely recognised in the literature as the primary tools used to simulate and project long-term climate change. These models represent the complex interactions between major components of the Earth's climate system, including the atmosphere, oceans and land surface, and are used to assess both historical climate variability and potential future climate conditions (Davis-Reddy & Vincent, 2017, p. 22; FCFA, 2017). Through these simulations, GCMs provide insight into large-scale climate processes such as global temperature change, shifts in atmospheric circulation patterns and sea-level rise. Projections generated by GCMs are dependent on assumptions regarding future GHG emissions, which are influenced by socioeconomic development pathways, technological advancement and policy responses to climate change (Davis-Reddy & Vincent, 2017, p. 22).

Earlier climate assessments utilised the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES), which outlined four development pathways (A1, A2, B1 and B2), each linked to different greenhouse gas emission trajectories and potential future climate outcomes (Davis-Reddy & Vincent, 2017, p. 22; FCFA, 2017). More recent climate modelling frameworks replaced the SRES scenarios with Representative Concentration Pathways (RCPs), which are defined by projected radiative forcing by 2100. Radiative forcing is the change in the balance of energy in Earth's atmosphere (measured in watts per square metre, W/m²) caused by factors like increased greenhouse gases, aerosols, and land-use changes compared to pre-industrial times (around 1750). There are four commonly used pathways (RCP2.6, RCP4.5, RCP6.0 and RCP8.5, visualised in Figure 7-7) to represent a range of possible futures, from strong emission reductions to continued increases in greenhouse gas emissions (Davis-Reddy & Vincent, 2017, p. 22; FCFA, 2017).

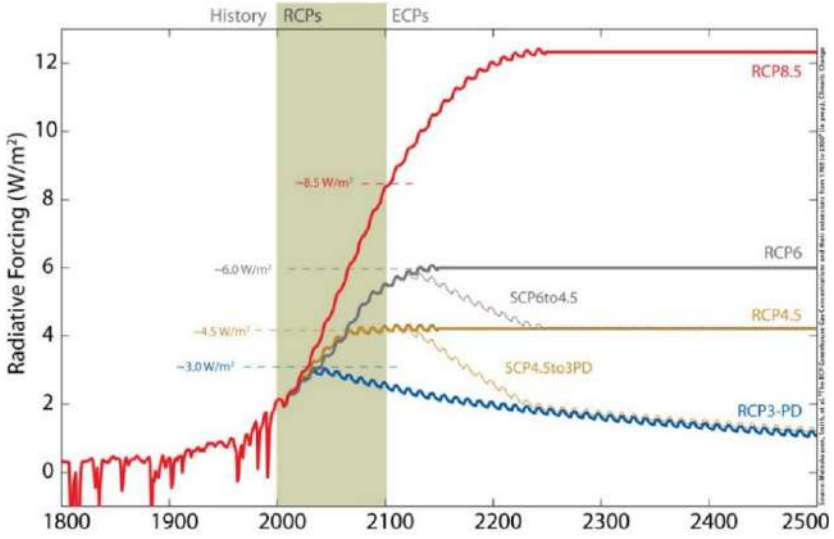


Figure 7-7: Total radiative forcing (anthropogenic plus natural) for RCP2.6, RCP4.5 & RCP6, as well as RCP8.5 (Meinshausen et al., 2011).

The RCPs describe a range of possible future greenhouse gas emission trajectories and their associated climate outcomes:

- At the low end, RCP2.6 reflects a stringent mitigation pathway where emissions peak early and decline rapidly, limiting warming to below 2°C.
- Intermediate scenarios include RCP4.5, where emissions peak around mid-century and then stabilise under moderate mitigation efforts,
- RCP6.0, where emissions continue to rise for longer before eventually stabilising.
- At the high end, RCP8.5 represents a business-as-usual trajectory with continuously increasing emissions, resulting in substantially higher greenhouse gas concentrations and the potential for global temperature increases exceeding 4°C by 2100 (Ara Begum, et al., 2022).

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Global emissions are currently most consistent with an intermediate climate pathway (RCP4.5), with higher-emission scenarios primarily used to represent worst-case risk conditions (Hausfather, 2025).

Although GCMs are effective at projecting large-scale temperature trends, their coarse spatial resolution (approximately 200–300 km) limits their ability to accurately simulate local climatic processes such as rainfall and small-scale atmospheric dynamics. Consequently, downscaling techniques are used to translate these large-scale projections into finer spatial scales suitable for regional and local assessments. There are two primary approaches to downscaling: statistical (empirical) and dynamical downscaling. Statistical (empirical) downscaling establishes statistical relationships between large-scale atmospheric variables produced by GCMs and observed local climate conditions using historical data. Dynamical downscaling involves the use of higher-resolution regional climate models that are nested within GCM simulations to represent climate processes at finer spatial scales (Davis-Reddy & Vincent, 2017, p. 23). While downscaled projections can provide more detailed regional climate information, they remain subject to uncertainties inherited from the underlying GCM simulations and modelling assumptions.

In the context of this Climate Change Assessment for the proposed Jelani underground mining project, GCMs, greenhouse gas emissions scenarios and downscaled climate projections provide the climate information used to evaluate future climatic conditions over the anticipated 17-year life of mine. These projections are fundamental to assessing how projected changes in temperature, rainfall patterns, drought frequency and extreme weather events may influence the operation and resilience of the Project. Potential impacts include changes to water availability, stormwater management, flooding, erosion, heat stress, dust generation and the performance of critical surface infrastructure, including shaft complexes, waste rock storage areas, access roads, electrical infrastructure and water management systems. As climate conditions are expected to evolve throughout the life of the Project, reliance on historical climate observations alone is insufficient to adequately characterise future climate-related risks. Scenario-based climate projections therefore provide a structured means of evaluating plausible future climatic conditions under different greenhouse gas emissions pathways. However, because GCM outputs are produced at relatively coarse spatial resolutions, downscaling is required to translate global climate projections into information that is representative of local conditions within the project area. These modelling approaches therefore underpin the hazard characterisation component of the Climate Change Assessment, ensuring that the subsequent evaluation of climate-related risks and the development of appropriate mitigation and adaptation measures are informed by projected future climate conditions rather than historical climate variability alone.

7.3 The CSIR GreenBook

The GreenBook is an online planning support tool developed by South Africa's Council for Scientific and Industrial Research (CSIR). It provides an open-access digital repository for baseline and future municipal climate risk data and insights. It offers one of the most detailed and authoritative sets of dynamically downscaled climate projections specifically tailored for national coverage and local (municipal-level) planning and adaptation purposes.

GreenBook's climate projections come from an ensemble of six CMIP5 (Coupled Model Intercomparison Project Phase 5) GCMs, dynamically downscaled using the Conformal-Cubic Atmospheric Model (CCAM). Simulations were first run at 50 km globally (aligned with CORDEX standards), then refined to 8 km over South Africa (Engelbrecht, 2019). To ensure consistent comparison between present and future conditions, the GreenBook also provides a modelled baseline climatology for the standard 1961–1990 period, generated on the same 8 km grid, to enable consistent and spatially coherent comparisons between current conditions and the future climate projections. The 8 km resolution delivers major improvements over coarser simulations by partially resolving convective rainfall processes. This means the model can more realistically represent intense, short-lived thunderstorms that drive flash floods, erosion, and drainage exceedance. At the same time, the finer grid better captures South Africa's complex topography allowing the model to simulate realistic orographic effects. These

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include enhanced rainfall on windward slopes, pronounced rain shadows on the leeward side, sharp temperature gradients across elevation changes, wind channelling through valleys and passes, and local patterns of convergence and divergence that strongly shape weather extremes in the country's varied terrain (Engelbrecht, 2019). Taken together, these advances produce sharper and more credible simulations of key climate extremes, including heatwaves, very hot days, high fire-danger conditions, convective storms, and localised hazards, making the projections far more suitable for site-specific risk assessment, infrastructure asset planning, and building long-term resilience.

The two Representative Concentration Pathways (RCPs) used in the GreenBook, RCP4.5 and RCP8.5, represent a moderate-mitigation scenario and a low-mitigation scenario, respectively. RCP4.5 assumes substantial global efforts to reduce emissions, with CO_2 and other greenhouse gases peaking around 2040 and then declining significantly. This pathway stabilises radiative forcing at about 4.5 W/m² by the end of the century relative to pre-industrial levels. RCP8.5, in contrast, is a high-emissions scenario often described as low-mitigation or "business-as-usual" in the absence of aggressive climate policies. Emissions continue to rise throughout the 21st century, driven by heavy reliance on fossil fuels, leading to radiative forcing reaching about 8.5 W/m² by 2100. This results in more rapid and intense warming often 3.5-4.5°C or higher globally by century's end, along with amplified risks like hotter heatwaves, more frequent droughts, intensified convective storms, and greater fire danger in South Africa. The GreenBook includes very hot days and extreme rainfall events as core climate indicators because they represent high-impact extremes that drive many of the most serious risks to South African settlements, infrastructure, and ecosystems. A very hot day is defined as a day when the maximum temperature exceeds 35 °C, while an extreme rainfall event is defined as more than 20 mm of rain occurring within 24 hours. These are expressed as the annual average number of events per 8 km × 8 km grid point.

Table 7-1 summarises the baseline climatic conditions and the projected changes under RCP 4.5 and RCP 8.5 for the mid-century period (2021–2050), discussed further in the upcoming sections. The baseline values reflect the long-term average climate (1961–1990), while the future projections illustrate the expected shifts in key climate variables relevant to the site. The moderate-mitigation RCP 4.5 pathway results in noticeably less severe changes than the high-emissions RCP 8.5 pathway. Comparing these scenarios highlights the range of potential future conditions and demonstrates the benefits of global mitigation. This is particularly useful for risk assessment and adaptation planning, as it shows how increased average temperatures, more frequent very hot days, and shifts in extreme rainfall events could influence underground mining operations, the performance and integrity of surface infrastructure, water management and stormwater drainage, dust generation and suppression, worker health and safety, equipment reliability, fire risk, and overall site operational resilience.

Table 7-1: Baseline conditions compared to future predictions.

Climate Variable	Baseline	RCP 4.5	RCP 8.5
Average Temperature (°C)	16.75	19.09 (+2.34)	19.49 (+2.74)
Very Hot Days (Days/annum)	6.2	13.6 (+7.4)	21.1 (+14.9)
Average Rainfall (mm)	1058.63	1072.85 (+14.22)	1164.93 (+106.30)
Extreme Rainfall (Days/annum)	11.5	12.2 (+0.7)	12.7 (+1.2)

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7.3.1 Temperature shifts

Baseline conditions (Figure 7-8) indicate an average annual temperature of approximately 17°C across most of Matjhabeng Local Municipality, consistent with the monthly ranges described in Section 7.1.1. The moderate-mitigation RCP 4.5 pathway projection (Figure 7-9) indicates an increase in average annual temperature of roughly 2.0–2.5 °C relative to the baseline. Under the high-emissions RCP 8.5 pathway the increase is more pronounced, ranging from approximately 2.35 °C to 3.47 °C across the municipality. This would shift the current 17 °C annual average into the low-to-mid 19–20 °C range by mid-century.

The projected increase in ambient temperatures is therefore relevant to occupational exposure conditions, particularly for workers undertaking surface-based activities. Solar ultraviolet (UV) radiation is already an extreme ambient hazard at the site, with the South African UV Index reaching 13 in summer, well above the value of 11 at which exposure is classified as extreme (Wright & Norval, 2021). Ambient UV is not projected to rise substantially at these latitudes over the assessment period, as stratospheric ozone recovery under the Montreal Protocol exerts a downward influence on surface irradiance through the twenty-first century (Neale, et al., 2025). Personal exposure among South African outdoor workers already exceeds occupational threshold limit values at a number of sites (Nkogatse, et al., 2019). Adequate management of solar UV exposure among surface personnel is therefore a material concern alongside the heat-related issues discussed in Section 3.5. Solar ultraviolet exposure is accordingly carried into the risk assessment as a present-day occupational hazard requiring active management, rather than as a hazard whose magnitude is projected to change over the assessment period.

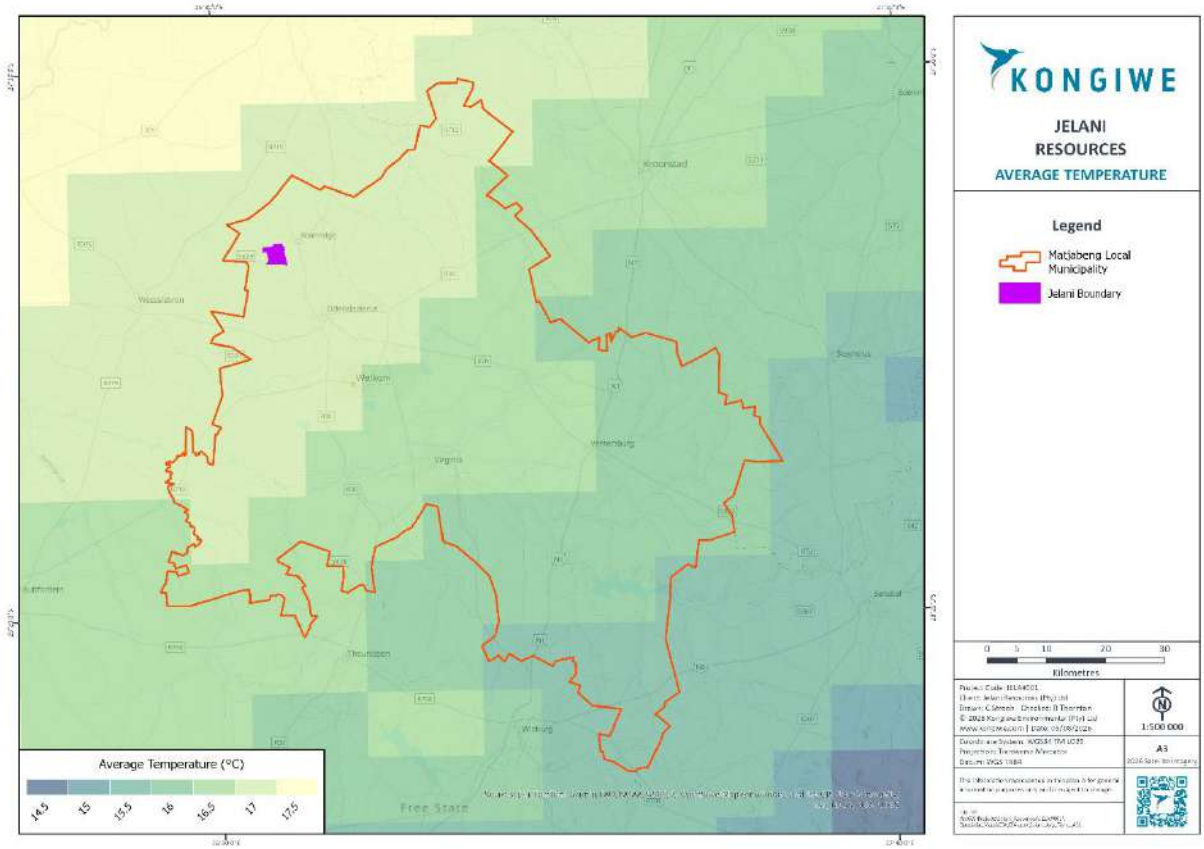


Figure 7-8: Baseline Average Annual Temperature of Matjhabeng Local Municipality.

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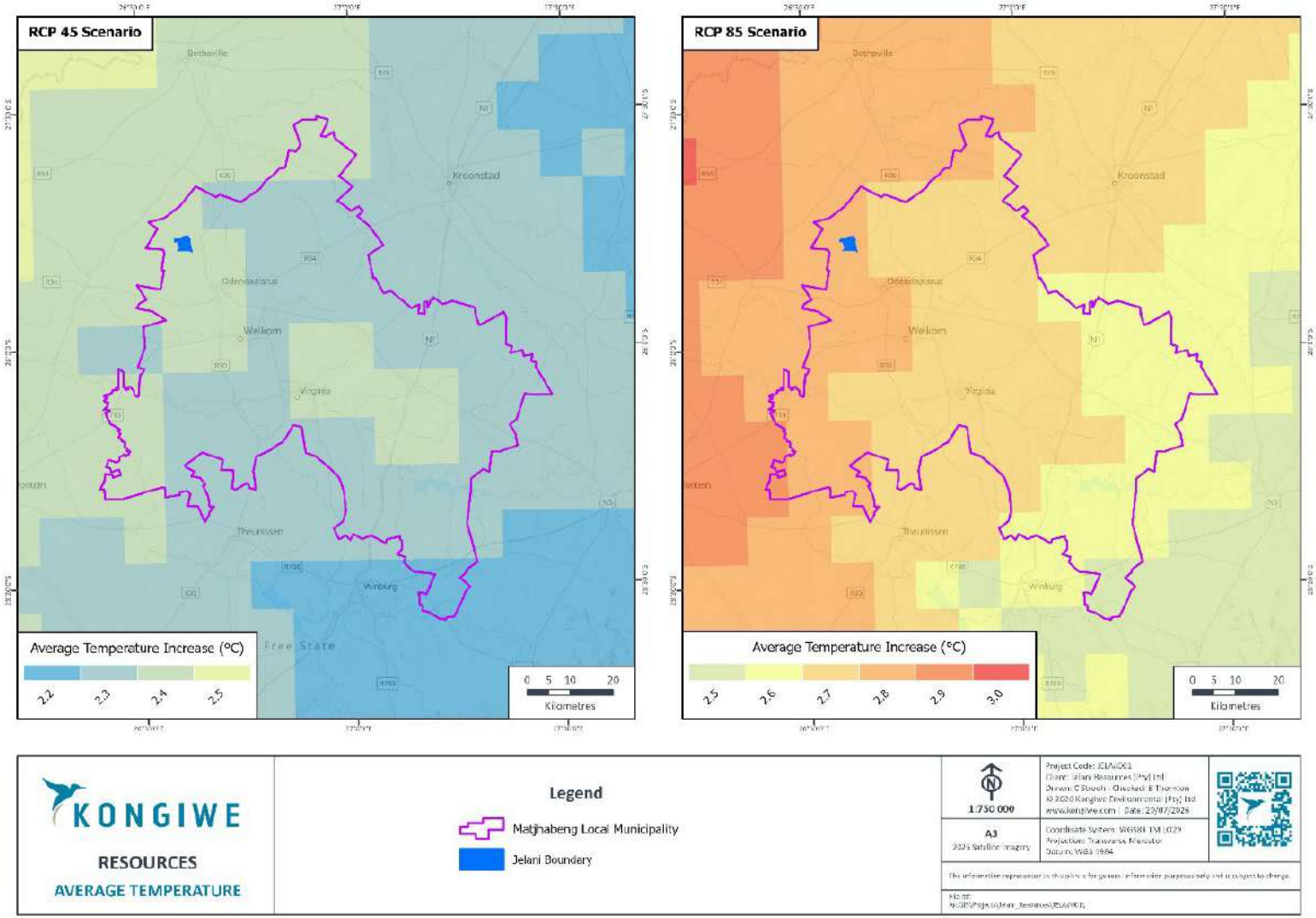


Figure 7-9: Projected Changes in Average Annual Temperature of Matjhabeng Local Municipality for 2050.

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Very hot days currently number between 2-9 days per year across the western section of Matjhabeng Local Municipality. Under the RCP 4.5 scenario, the project area is projected to rise to roughly 13 days per annum, while under the high-emissions RCP 8.5 scenario the increase is substantially more pronounced, with the project area expected to experience around 20 very hot days per year by mid-century.

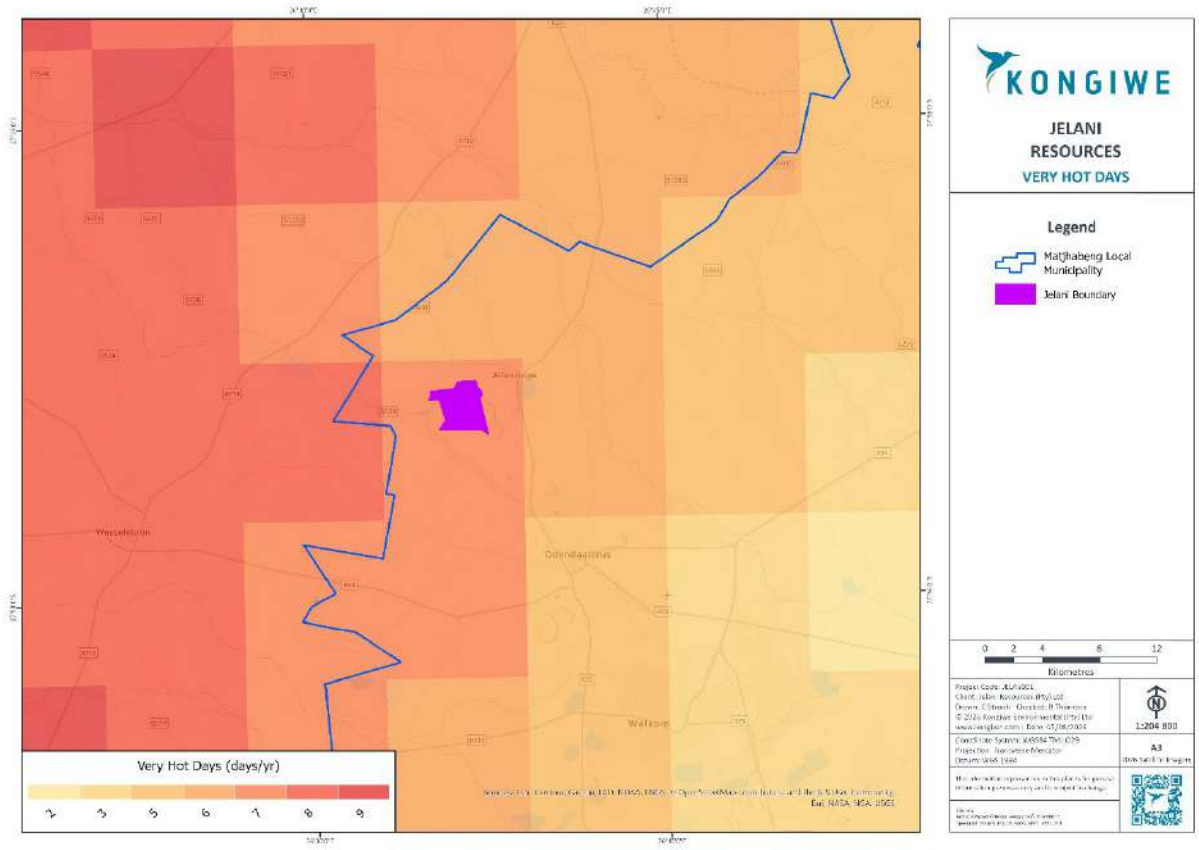


Figure 7-10: Baseline Very Hot Days over Matjhabeng Local Municipality.

These temperature shifts have direct implications for the Jelani underground mining project. More frequent and intense heat extremes will elevate occupational health and safety risks for surface personnel, increase cooling and ventilation loads associated with underground operations, and place additional thermal stress on electrical and mechanical equipment at the shaft complexes and surface infrastructure. Higher average temperatures and more frequent very hot days will also raise evaporative demand on water resources, increase dust generation from exposed surfaces and any waste-rock handling areas, and heighten wildfire risk in surrounding vegetation during dry periods. While the project largely utilises existing surface infrastructure and therefore involves relatively limited new surface disturbance, any areas requiring rehabilitation at closure (including temporary construction footprints, monitoring stations, access tracks, and any associated waste-rock or disturbed ground) may experience reduced vegetation establishment success under hotter and drier conditions. This could necessitate the selection of more heat- and drought-tolerant indigenous species and, where required, temporary irrigation support during the establishment phase.

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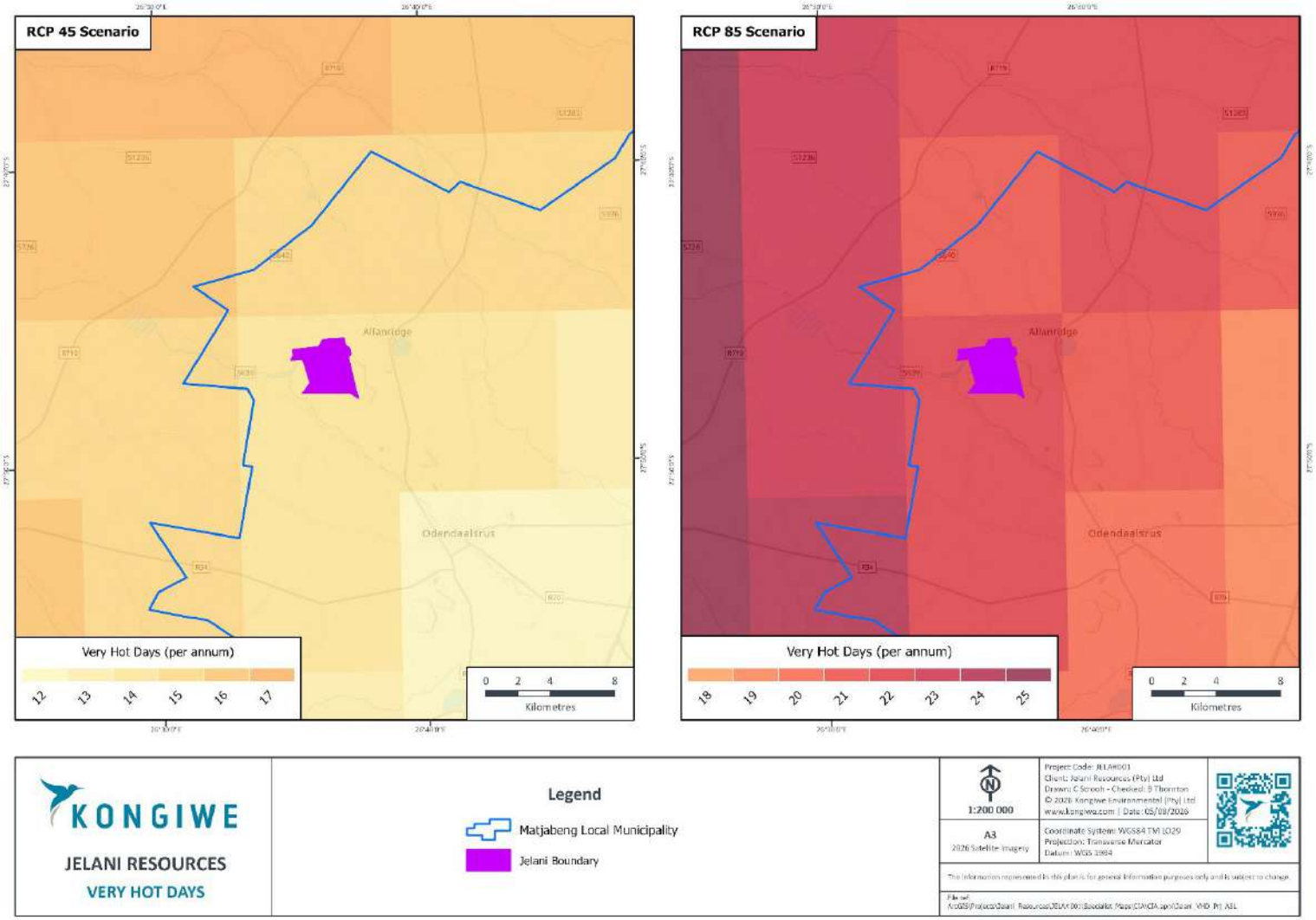


Figure 7-11: Projected Changes in Very Hot Days over Matjhabeng Local Municipality for 2050.

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7.3.2 Wildfire Risk

The surrounding landscape is characterised by grassland and open veld that is susceptible to ignition during the dry winter months, a risk that is expected to increase under projected climate change conditions of higher average temperatures, more frequent very hot days and prolonged dry periods. The presence of Nyakallong township in close proximity to the ventilation shaft introduces an additional dimension to wildfire risk in the project area. A veld fire originating in the vicinity of the shaft complex or spreading from adjacent land could threaten surface infrastructure, disrupt ventilation operations and endanger personnel. More critically, the proximity of the township means that any fire or associated smoke plume could rapidly affect residential areas, elevating the potential for community health and safety impacts and complicating emergency response. These factors underscore the need for robust firebreak maintenance, vegetation management around the shaft and ventilation infrastructure, early-warning monitoring during high fire-danger periods, and clear coordination protocols with local emergency services and community structures.

To analyse wildfire risk, burned area data for the project site were derived from the MODIS MCD64A1 Collection 6.1 global monthly burned area product (500 m spatial resolution). Monthly images from January 2016 to June 2026 were processed where pixels were classified as burned if the burn date value was greater than zero. These binary monthly layers were summed to produce a single fire frequency raster, where each pixel value represents the number of months in which burning was detected during the 10-year period. This approach provides a measure of fire occurrence frequency across the study area. Added to this is the Fire Likelihood data from GreenBook, which refers to the probability or chance that a wildfire will occur in the wildland-urban interface (WUI) around a settlement. The GreenBook uses a qualitative scale (Rare, Unlikely, Possible, Likely, Almost Certain), primarily based on vegetation type, fuel load, and the frequency of high fire-danger days. The final map (Figure 7-12) visualises areas that experienced fire, and the likelihood that a wildfire will occur. The MODIS burn-history analysis indicates that observed fire occurrence in and immediately around the Jelani project area has been infrequent over the analysis period. This site-level record is lower than the High wildfire rating assigned to the Lejweleputswa District Municipality by ThinkHazard! and the high baseline fire likelihood indicated by the GreenBook (CSIR, 2023), both of which are derived at municipal or district scale from vegetation type, fuel load and fire-danger day frequency rather than from observed burn records. The regional rating reflects the wider landscape, in which extensive grassland and adjacent agricultural land carry a substantially higher fuel load than the project area itself. The regional classification is therefore retained as the screening-level hazard, while the site-level burn history indicates that ignition is more likely to originate beyond the project boundary than within it. Wildfire is accordingly carried into the risk assessment as a credible hazard to surface infrastructure and personnel, with the emphasis placed on fire entering the site from surrounding land.

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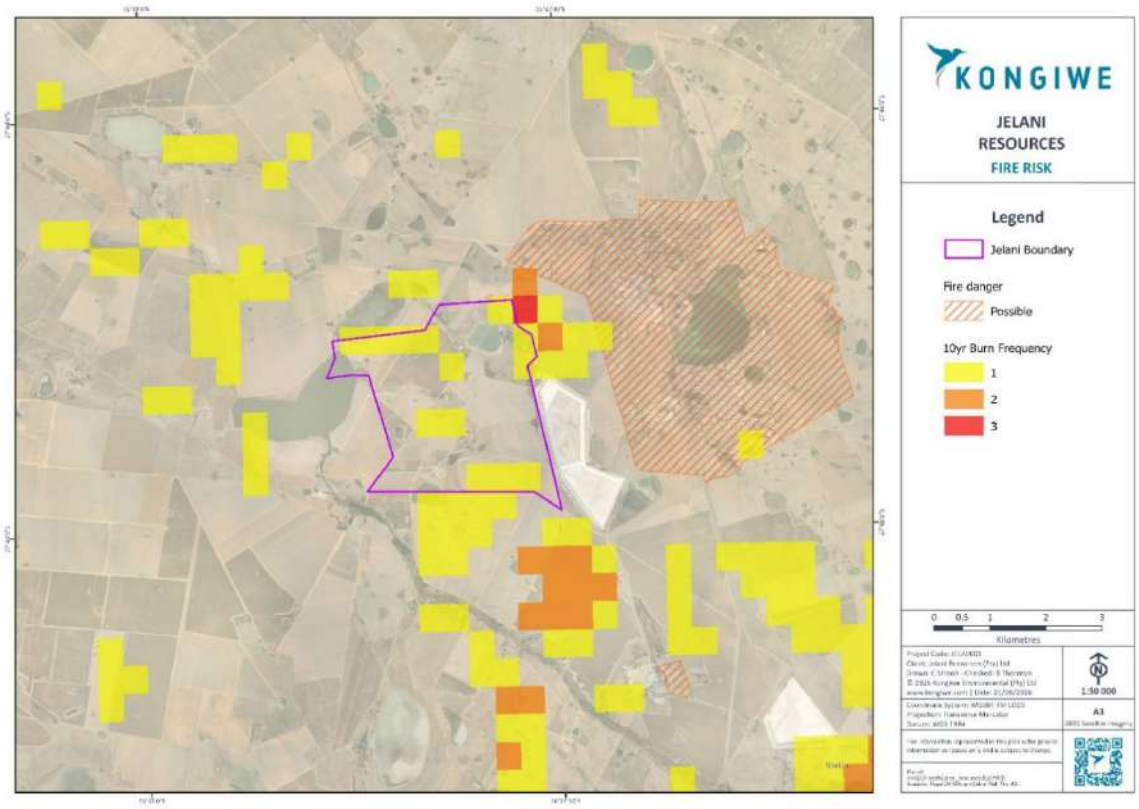


Figure 7-12: Wildfire Risk around Jelani.

7.3.3 Rainfall Shifts

The modelled average rainfall across Matjhabeng Local Municipality (Figure 7-13) shows a clear west-to-east gradient, increasing from west to east. Compared with rain-gauge observations, the GreenBook modelled baseline rainfall for the project area is approximately 1 000 mm – roughly double the observed mean annual rainfall of approximately 500 mm recorded at the Welkom station (0364300 W). This observed value is corroborated independently by the Department of Agriculture, Land Reform and Rural Development, which places mean annual rainfall across the study area in the range of 500 to 600 mm per annum (Zimpande Research Collaborative, 2026). These elevated values reflect the fact that GreenBook's baseline is derived from CCAM regional climate model simulations rather than rain-gauge observations. Climate models frequently exhibit a wet bias over the South African interior, particularly in the eastern parts of the Free State along the escarpment (Dedekind, et al., 2016). Consequently, the absolute modelled rainfall totals should be treated with caution. The GreenBook projections simply provide a baseline from which the direction and relative magnitude of future change can be assessed.

Compared to the baseline (Figure 7-13), climate projections indicate relatively modest increases in average annual rainfall under both RCP 4.5 and RCP 8.5 scenarios (Figure 7-14). Importantly, the more significant signal relates to extreme rainfall rather than total annual amounts.

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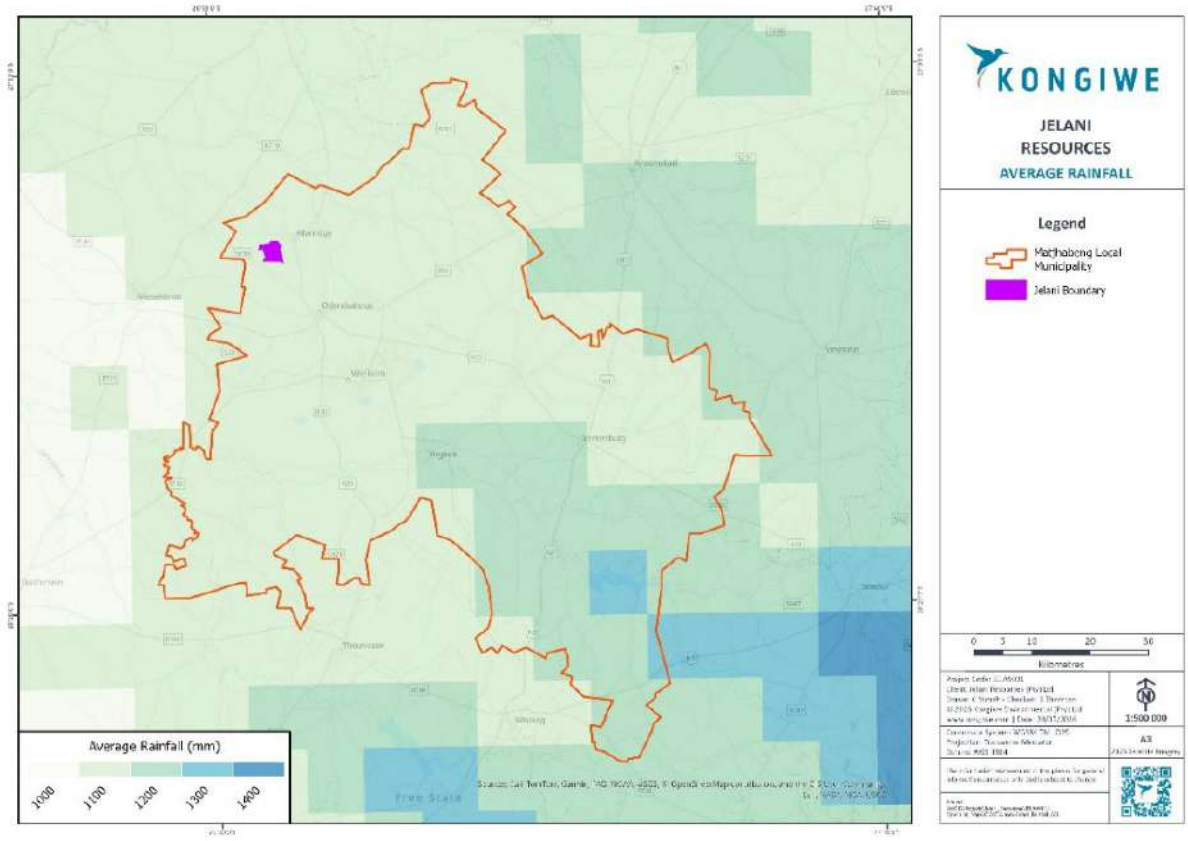


Figure 7-13: Average Annual Rainfall for Matjhabeng Local Municipality.

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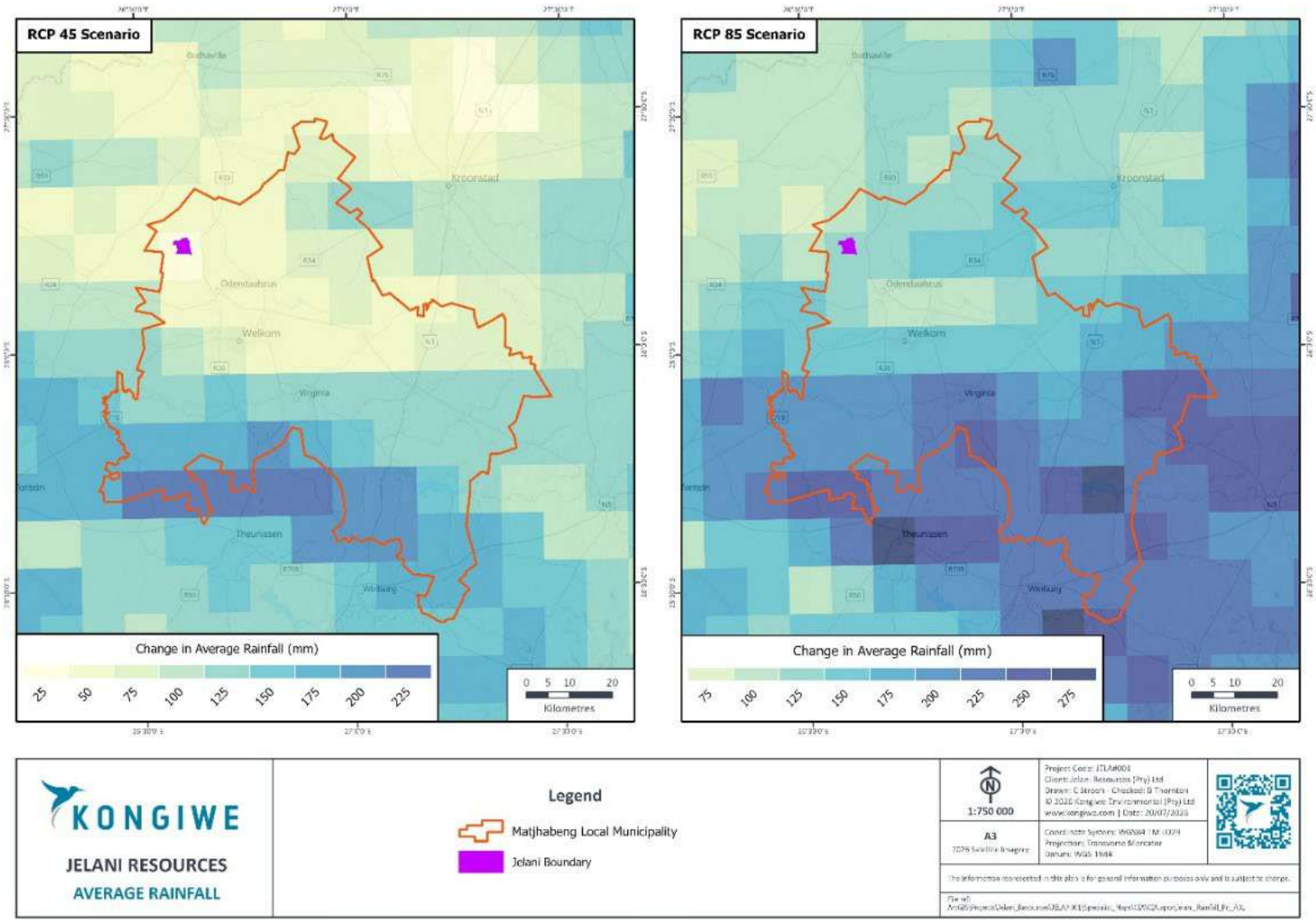


Figure 7-14: Projected Changes in Average Annual Rainfall for Matjhabeng Local Municipality for 2050.

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Under baseline conditions (Figure 7-15), the project area experiences approximately 12 extreme rainfall days per year. Climate projections (Figure 7-16) indicate a modest increase in the frequency of these events by mid-century. Under the RCP 4.5 scenario the change is relatively small, typically in the order of 1-3 additional extreme rainfall days per year across the Municipality. Under the higher-emissions RCP 8.5 scenario the increase is more pronounced in parts of the municipality, with changes of up to 4-5 additional days in some grid cells, although the project itself remains in a zone of moderate increase of 2-4 additional days.

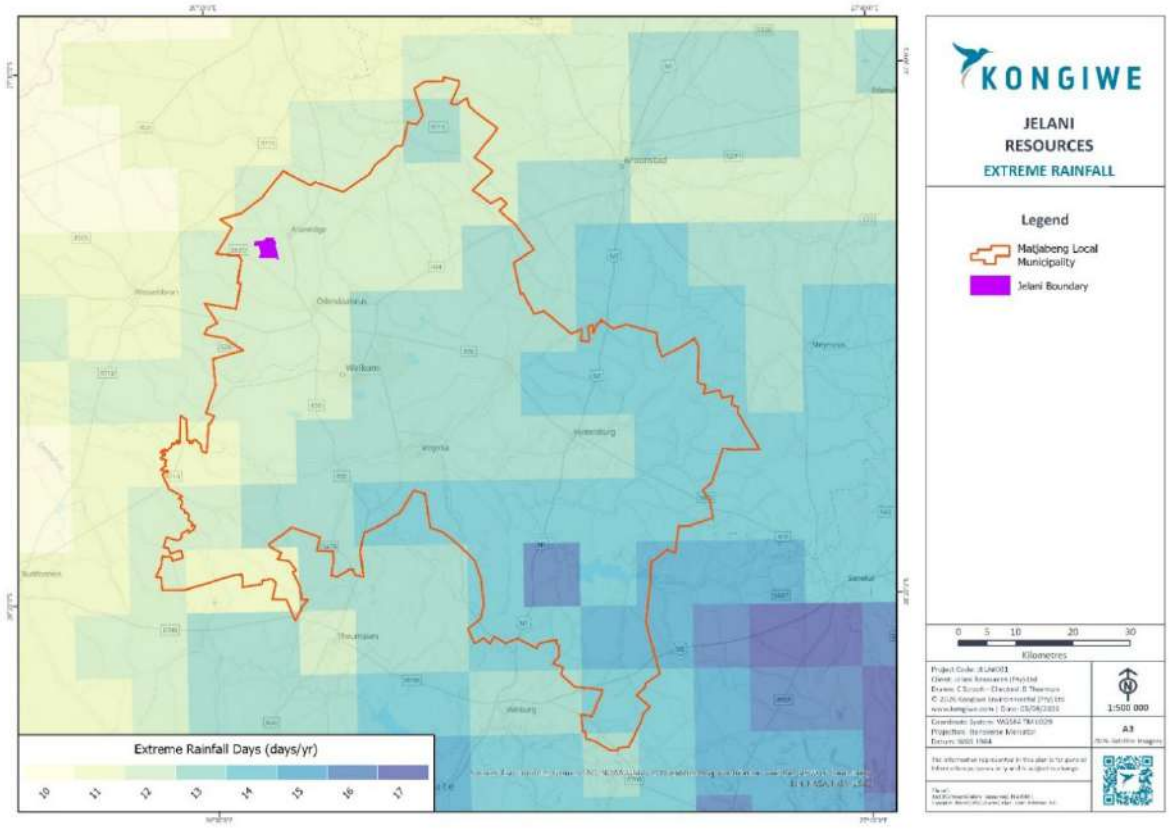


Figure 7-15: Baseline Extreme Rainfall Events for Matjhabeng Local Municipality.

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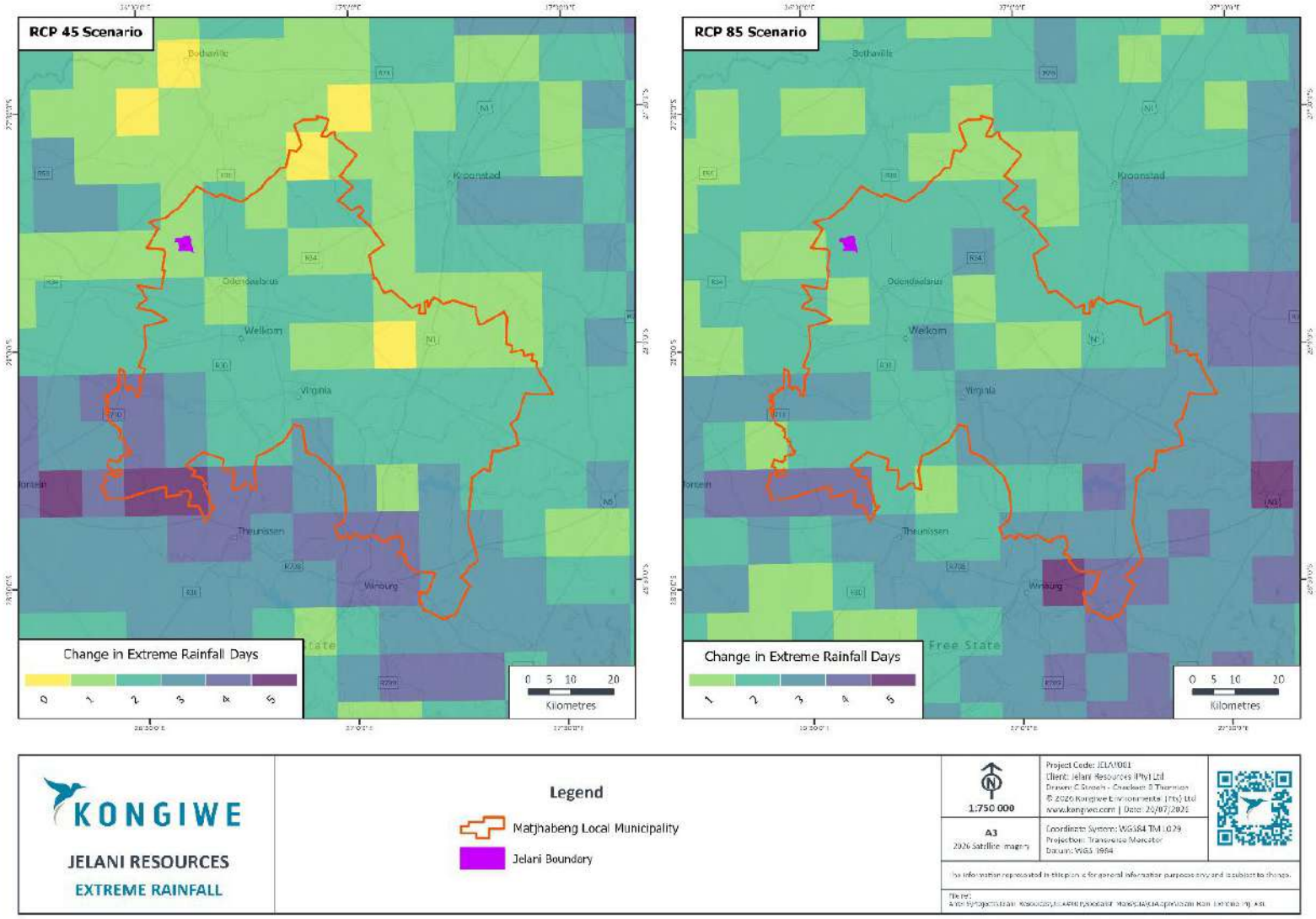


Figure 7-16: Projected Changes in Extreme Rainfall Events for Matjhabeng Local Municipality for 2050.

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Observed records indicate that the frequency of extreme rainfall events has already increased across the province, even while mean annual rainfall shows a weak or uncertain decline (Engelbrecht, et al., 2025). Analysis of station and gridded data for South Africa, including Free State sites, shows a general rise in the probability of significant daily rainfall (>50 mm) and heavier extremes between the early and late 20th and early 21st centuries, with the number of rain days remaining relatively stable (McBride, et al., 2022).

Broader southern African modelling supports this pattern. Coarser models, such as the 8 km simulations used in the GreenBook, rely on a convection parameterisation scheme. This scheme estimates the overall effects of thunderstorms on temperature, moisture and rainfall within each relatively large grid cell, based on larger-scale atmospheric variables. In contrast, convection-permitting models use a much finer grid, typically 4 km or less, and can explicitly simulate the main features of individual convective storms. Convection-permitting simulations at 4.5 km grid spacing project that wet-season mean 3-hourly precipitation intensity will increase by 20–40 % across most of southern Africa by the end of the century under high-emissions scenarios (Munday, et al., 2025). These intensity increases are substantially larger than those produced by coarser models that parameterise convection. The same high-resolution simulations, together with supporting CORDEX and CMIP analyses, indicate fewer rainy days overall but more intense rainfall when it occurs, consistent with a shift toward fewer but heavier convective storms.

These projected increases in high-intensity rainfall events have direct implications for the project. More frequent heavy downpours raise the risk of localised flooding and stormwater exceedance at surface infrastructure, including the shaft complexes, substations, workshops, access roads and water management facilities. This can result in temporary disruption of operations, accelerated erosion of exposed or disturbed surfaces, and increased maintenance requirements for drainage systems. Because the project largely utilises existing surface infrastructure, the scale of new stormwater works is limited; however, existing and any upgraded drainage systems should be verified or designed to accommodate more intense short-duration rainfall. Operational contingency measures are recommended to maintain resilience throughout the life of mine.

7.3.4 Wind Intensity

Wind constitutes a moderate existing hazard for surface infrastructure at the project, driven primarily by short-duration convective gusts rather than sustained high mean wind speeds. Analysis of long-term South African Weather Service station data shows that the strong-wind hazard across South Africa is highly variable both spatially and seasonally (Kruger, et al., 2016). The highest relative hazard extends from the south-western Cape through the central and eastern Northern Cape and into parts of the central interior, with a corridor that reaches Welkom. In the more northerly interior, including the Free State Goldfields, the seasonal signal is pronounced: the lowest risk occurs in autumn and winter, while the highest risk occurs in spring and summer when convective thunderstorms and associated gust fronts and downbursts are most frequent. Recent local events in Welkom, Odendaalsrus and surrounding areas have demonstrated the capacity of these storms to uproot trees, damage roofs and cause temporary power interruptions (Mosebetsi, 2025), confirming that surface infrastructure such as shaft complexes, substations, workshops, access roads and temporary structures is already exposed under present-day conditions.

Projected changes in mean wind speed over South Africa are generally small. Dynamically downscaled regional climate model ensembles indicate that seasonal daily mean near-surface wind-speed increases rarely exceed 6 per cent and decreases remain within about 3 per cent by the mid-twenty-first century under both moderate and high-emissions pathways (Herbst & Rautenbach, 2015). In the Highveld region, which encompasses much of the Free State interior, modest increases are projected in most seasons outside of December-February, when slight decreases are possible. A broader southern African risk assessment that combines emissions and climate-sensitivity uncertainty with multiple global models similarly finds a median change close to zero by 2050 for long-term mean wind speed, with more extreme shifts ranging from –15 per cent to +15 per cent, associated with low probability (Fant, et al., 2016). IPCC assessments assign medium confidence to a future increase in mean wind

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speeds and wind-energy potential over southern Africa more generally, but the magnitude of change remains modest relative to inter-annual variability. Winter-time extratropical cyclones, which dominate strong-wind events along the southern and western coasts, are projected to decrease in overall frequency and track density over South Africa under high-emissions scenarios, although track density may increase along the western coastal margin. Models indicate generally weaker future cyclones, with reduced peak relative vorticity and higher minimum sea-level pressure, while storm severity exhibits regional variation that includes possible increases in northern regions (Chinta, et al., 2025). Because the Jelani site lies well inland of the primary extratropical cyclone tracks, these winter systems contribute less to local wind risk than the summer convective regime.

Taken together, the observational and modelling evidence indicates that mean wind speeds are unlikely to change sufficiently to alter the overall wind-loading regime for permanent infrastructure designed to current South African standards. The more relevant residual risk lies in the potential intensification of short-duration convective gusts associated with thunderstorms. Although confidence in projections of extreme winds is lower than for mean conditions, the expectation of more intense convective rainfall under warming, driven by higher atmospheric moisture, suggests that the same storms may also produce stronger local gust fronts. For a project that relies largely on existing surface infrastructure, this translates into a need to verify that temporary structures, crane operations, power-line clearances and post-storm inspection protocols adequately account for present-day convective extremes, rather than a requirement for major redesign driven by future mean-wind trends. Operational contingency measures during periods of high convective potential remain the most practical means of maintaining resilience throughout the life of the mine.

8. Climate Change Risk and Mitigation Assessment

8.1 Overview of Climate Hazards on a Regional Scale

This chapter identifies and evaluates the key climate-related hazards relevant to the study area, forming the basis for the subsequent climate risk assessment. The identification of hazards has been supported by the use of *ThinkHazard!* [10], a screening tool designed to support the integration of disaster risk and climate resilience into project planning and design.

The *ThinkHazard!* report generated for the Lejweleputswa District Municipality provides a regional-scale overview of the natural hazards that may affect the broader project area. This information has been used as a screening tool to identify climate- and natural hazard-related risks that may be relevant to the proposed Jelani underground mining project, taking into consideration the project's location, operational activities, and associated infrastructure. The tool assesses ten hazard types associated with geophysical, hydrological and meteorological processes and assigns qualitative likelihood ratings ranging from very low to high. In addition to indicating the relative level of hazard, *ThinkHazard!* provides guidance on potential risk reduction measures and directs users to supplementary technical resources where appropriate. The hazard classifications are derived from a range of recognised datasets produced by academic institutions, government agencies and other technical organisations, ensuring that the assessment is based on credible and widely accepted information. Accordingly, the *ThinkHazard!* outputs have been used as a screening-level input to inform the identification of hazards requiring further consideration within the climate change risk assessment for the proposed Jelani underground mining project.

ThinkHazard! provides information on ten hazard types associated with geophysical, hydrological, and meteorological processes. These hazard categories represent different natural systems and drivers, each with varying relevance to the study area.

[10] ThinkHazard!, *Lejweleputswa District Municipality Profile*, available at: ThinkHazard. Accessed 3 August 2026)

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- Geophysical hazards originate from processes within the Earth and are generally not influenced by climate variability or human activity. These include hazards such as earthquakes, which result from tectonic movements and can cause ground shaking, structural failure, and secondary impacts such as landslides. Earthquakes typically occur along fault lines and may trigger aftershocks that compound damage. Other geophysical hazards include tsunamis and volcanic eruptions, which are associated with large-scale displacement of water or the release of volcanic material, respectively. However, given the inland location of the study area within the Lejweleputswa District Municipality, hazards such as tsunamis and volcanic activity are not considered applicable to the Jelani Project and are therefore not assessed or discussed further.
- Hydrological hazards are associated with the occurrence, movement, and distribution of water, and are influenced by both climatic conditions and human activities. Flooding represents a key hydrological hazard and may occur in different forms. Fluvial (riverine) flooding arises when prolonged or intense rainfall exceeds the capacity of river systems, resulting in overbank flow and inundation of surrounding areas. Pluvial (surface water) flooding occurs when heavy rainfall overwhelms drainage systems or where infiltration capacity is limited, leading to the accumulation of water in low-lying or urban areas. Landslides may also be associated with hydrological conditions, particularly where soil saturation from rainfall reduces slope stability. Coastal flooding and storm surge events are also classified as hydrological hazards; however, these are not relevant to the study area due to its inland setting and are therefore excluded from further consideration.
- Meteorological and climatological hazards arise from atmospheric processes and extreme weather events. Meteorological hazards typically occur over short timescales, whereas climatological hazards reflect longer-term variability and trends, including those associated with climate change. Relevant hazards for the proposed Jelani underground mining project include extreme rainfall, drought, heatwaves, strong winds, and wildfire where vegetation conditions permit. These hazards have the potential to affect the integrity and operation of surface mining infrastructure, including shafts, processing and materials handling facilities, waste rock dumps, electrical substations, workshops, offices, access roads, rail infrastructure, conveyors, water management infrastructure, and other ancillary facilities. Extreme rainfall may result in localised flooding, erosion, and disruption to surface operations, while drought and prolonged periods of elevated temperatures may reduce water availability, increase dust generation, and place additional demands on water management systems. Heatwaves may also affect the performance of equipment and electrical infrastructure, as well as the health and safety of personnel working on the surface. Strong winds may contribute to dust emissions and affect the safe operation of exposed infrastructure, whereas wildfire may present a secondary risk to surface facilities where combustible vegetation is present. Large-scale storm systems such as tropical cyclones are not considered relevant to the project area owing to its inland location within the Free State Province and are therefore not considered further in this assessment.

ThinkHazard! classifies hazards into four qualitative levels (Very Low, Low, Medium and High) based on the likelihood of potentially damaging events occurring within a project or human lifetime. A High hazard rating indicates a strong likelihood of severe impacts, with damaging events expected to occur, and potentially recur frequently in the case of hydro-meteorological hazards. A Medium rating reflects a moderate likelihood of damaging events, for which mitigation measures should be considered. A Low rating indicates that damaging events are less likely but remain possible, particularly when considering long-term variability, and risk reduction measures may still be warranted in sensitive areas. A Very Low rating suggests that damaging impacts are unlikely based on available data, although residual risk cannot be entirely excluded. Where No Data is available, the absence of information is noted, and further investigation may be required.

Hazard classifications are based on defined intensity thresholds, above which damage is expected to occur. These thresholds are specific to each hazard type and are applied at a general level, rather than being tailored to

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particular infrastructure or project components. As such, the ratings provide a screening-level indication of hazard severity and should be interpreted in conjunction with site-specific conditions and project characteristics. The screening tool utilises hazard information in raster (grid-based) format, derived from datasets that vary in geographic scale, spatial extent, and content. These datasets may be presented as probabilistic data, which estimate the frequency and severity of hazard events, or as index-based data that indicate the relative susceptibility of a given area to specific hazards.

A damaging intensity threshold, defined as the level above which impacts are expected to occur, is specified for each hazard type. These thresholds are applied at a general level and are not tailored to specific structures or infrastructure types. Depending on the hazard, the intensity thresholds used to define hazard levels may be consistent across categories or may vary to allow for clearer differentiation between levels of severity as seen in Table 8-1.

Table 8-1: ThinkHazard! - Damage Intensity Thresholds.

Hazard	Intensity Parameter	Intensity Unit	Intensity Threshold Value		
			High	Medium	Low
Earthquake	Acceleration (PGA)	g	0.2	0.1	0.1
Extreme Heat	Wet Bulb Globe Temperature (WBGT)	°C	32	28	25
River Flood	Inundation depth**	m	0.5	0.5	0.5
Urban Flood	Inundation depth	m	0.5	0.5	0.5
Cyclone	Mean wind speed	km/h	80	80	80
Water Scarcity	Water availability	m^3/capita/yr	≤ 500	≤ 1000	≤ 1700
Wildfire	Canadian Fire Weather Index	CFWI	30	20	15

* Hazards and associated thresholds not relevant to the study area have been excluded from further consideration in this table.

** Measure of how deep floodwater gets above ground level during a river flood.

The identical intensity thresholds applied across hazard categories (including flood inundation depth and cyclone wind speed as seen in Table 8-1) reflect the *ThinkHazard!* methodology, which is designed as a globally standardised, screening-level risk classification system. For flood hazards, a conservative 0.5 m inundation depth threshold is used as the lower bound at which flooding typically begins to cause significant impacts on infrastructure, mobility, and safety; although earlier methodological versions used a 1.0 m threshold due to uncertainties in low-resolution elevation data, subsequent analysis showed that at administrative scales (ADM2 and above) pixel-level errors tend to average out, while earlier exceedance-based approaches (where a single grid cell triggered a hazard classification) led to systematic overestimation of risk. The updated approach therefore uses area-based exposure above a defined threshold to improve representativeness and reduce bias.

For cyclones, hazard classification is based on the UNISDR GAR15 dataset, which models tropical cyclone wind fields from 2 594 historical events using topography, terrain roughness, and bathymetry to generate wind speed estimates across return periods (50–1 000 years), while excluding extra-tropical cyclones and representing storm surge separately under coastal flooding; cyclone intensity is defined using a fixed 80 km/h wind speed threshold, aligned with NOAA hurricane warning criteria and Beaufort scale 9 (Strong/severe gale), representing the onset of damaging wind conditions, with risk differentiation therefore driven primarily by exceedance probability

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rather than incremental intensity gradation, which explains why uniform threshold values are applied across categories in the classification table.

Frequency thresholds are used to assign hazard levels once the defined damaging intensity threshold has been exceeded. These thresholds are hazard-specific and are typically based on commonly applied return periods for each hazard type, reflecting the timescales over which different hazards occur. For example, flood events generally have shorter return periods than earthquakes, as they are driven by atmospheric processes that operate over shorter temporal scales compared to tectonic processes. Return periods may vary depending on the data source. For instance, earthquake hazard data produced for the insurance industry are often based on return periods of 100, 250, 500, and 1,000 years, whereas engineering and scientific studies commonly apply return periods of 475, 975, and 2,475 years. In cases where standard return periods are not well established, frequency thresholds are defined using expert judgement, based on the expected frequency and severity of impacts. In general, hazards with the potential to cause structural failure and loss of life are assessed over longer timeframes (e.g. 50 years or more). Whereas hazards that more frequently affect living conditions, such as floods and droughts, are typically assessed over shorter durations as summarised in Table 8-2.

Table 8-2: ThinkHazard! - Frequency Threshold.

Hazard	Return Period (Years)		
	High	Medium	Low
Earthquake	100-200	475-500	1000-2500
Extreme Heat	5	20	100
River Flood	10	50	1000
Urban Flood	10	50	1000
Cyclone	50	100	1000
Water Scarcity	5	50	1000
Wildfire	2	10	30

* Hazards and associated thresholds not relevant to the study area have been excluded from further consideration in this table.

The *ThinkHazard!* Risk Profile for the Lejweleputswa District Municipality is presented in Table 8-3.

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Table 8-3: ThinkHazard! Risk Profile for Lejweleputswa District Municipality.

Hazard Type	Risk	Interpretation	Comments
Wildfire	High	High likelihood of damaging wildfire conditions; fire risk should be a key design, operational, and emergency planning consideration.	The GreenBook indicates a high baseline wildfire likelihood across the Lejweleputswa District Municipality, including the Matjhabeng Local Municipality, with climate projections indicating that increasingly hot and dry conditions may contribute to elevated fire danger through reduced vegetation moisture and increased fuel availability (CSIR, 2023). For the proposed project, wildfire presents a potential risk to surface infrastructure, operational continuity and personnel safety. Wildfire is more likely to originate from surrounding agricultural or urban areas than from natural vegetation within the site itself. Appropriate fire prevention, emergency preparedness and vegetation management measures should therefore be maintained throughout the operational life of the project. Site-level burn history for the project area is presented in Section 7.3.2.
Water Scarcity	Medium	Up to 20% chance of drought in 10 years; water efficiency, storage, and supply security are important for the mining operation.	The GreenBook identifies the Lejweleputswa District Municipality, including the Matjhabeng Local Municipality, as being susceptible to increasing drought frequency under future climate conditions, with projections indicating a greater occurrence of below-normal rainfall and prolonged dry periods over the coming decades (CSIR, 2023). Given the project's 17-year life of mine, these changes may begin to influence operational conditions during the latter stages of the project. Increased water scarcity has the potential to place pressure on water availability for mining operations, dust suppression and ancillary surface activities, highlighting the importance of efficient water use, water recycling where practicable, and appropriate water management planning to maintain operational resilience.
Urban Flood	Low	Occasional intense rainfall may cause localised flooding; drainage and stormwater management should be considered.	The GreenBook indicates that, although the current municipal-scale urban flood hazard is relatively low, the Lejweleputswa District Municipality, including the Matjhabeng Local Municipality, is projected to experience an increase in urban flooding under future climate conditions as a result of more frequent high-intensity rainfall events (CSIR, 2023). Given the project's 17-year life of mine, these changing rainfall patterns may increasingly influence operational conditions over time. Localised flooding may affect surface infrastructure, including shaft complexes, workshops, substations, access roads, parking areas, and water management infrastructure where drainage capacity is exceeded. Accordingly, the project should incorporate appropriate stormwater management, drainage design and routine maintenance to minimise disruption to operations and protect critical infrastructure.
Extreme Heat	Low	5–25% chance of prolonged heat events in 5 years; heat stress measures and planning are required.	The GreenBook indicates that the Lejweleputswa District Municipality, including the Matjhabeng Local Municipality, is projected to experience an increase in the frequency of very hot days (>35°C) and heatwave conditions under future climate scenarios (CSIR, 2023). Given the project's 17-year life of mine, these changes may increasingly influence operational conditions over time. Elevated temperatures may affect the health and safety of surface personnel, increase cooling and ventilation demands associated with underground mining, and reduce the efficiency and reliability of electrical and mechanical equipment. Appropriate occupational health measures, equipment maintenance and operational planning should therefore be implemented to enhance resilience to increasing heat stress.
River Flood	Medium	Potentially damaging river floods (>20% chance in 10 years); flood risk should be considered in project siting, design and stormwater management.	There are several surface water resources within and surrounding the project area, including non-perennial drainage lines (Figure 7-4). However, the proposed mining infrastructure is not located adjacent to a major perennial river, and the likelihood of flooding associated with riverine processes is therefore considered relatively low. Nevertheless, intense rainfall may result in the overtopping of non-perennial channels, localised ponding and the inundation of low-lying areas, which should be addressed through appropriate stormwater and water management measures.
Landslide	Very Low	Landslide risk is minimal at municipal scale; may occur locally on steep, unstable slopes.	The project area is characterised by generally flat topography, resulting in a very low regional susceptibility to landslides. Consequently, the likelihood of natural slope failure is considered low. However, localised instability may occur on engineered slopes associated with mine infrastructure, including waste rock dumps, tailings storage facilities (where applicable), and other earthworks during periods of intense rainfall. Given the project's 17-year life of mine, projected increases in the intensity of extreme rainfall events may marginally increase the risk of erosion and shallow slope instability. Appropriate geotechnical design, routine inspections, slope stability monitoring and erosion control measures should therefore be implemented to maintain the integrity of engineered infrastructure.
Cyclone	Very Low	Direct cyclone impacts are unlikely so far inland, but remnant systems can bring heavy rain.	The project area is located well inland within the Free State Province and is not directly exposed to tropical cyclones. However, the remnants of tropical systems may occasionally result in periods of heavy rainfall, strong winds and thunderstorms. Given the project's 17-year life of mine, these episodic events may contribute to localised flooding, disruption to surface operations and increased stress on surface infrastructure, including shafts, workshops, substations, conveyors, access roads and water management infrastructure. Although the overall cyclone hazard remains very low, these secondary impacts should be considered in the design, operation and maintenance of surface infrastructure to enhance the project's resilience to extreme weather events.

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While the *ThinkHazard!* screening provides a useful regional overview of potential climate-related hazards within the Lejweleputswa District Municipality, its outputs are based on broad-scale datasets and standardised hazard classifications that do not account for project-specific conditions. The results therefore provide a valuable basis for identifying and contextualising climate hazards; however, they do not fully reflect how local site characteristics may influence hazard exposure, vulnerability and overall risk. For example, although the regional river flood hazard may be moderate, the level of risk to individual project components will depend on their proximity to surface water features, local drainage characteristics and the resilience of site stormwater infrastructure. Similarly, hazards such as heat stress or wildfire may affect different infrastructure components and operational activities to varying degrees. Accordingly, the identified hazards are refined through a project-specific assessment, which applies a qualitative risk matrix incorporating likelihood and consequence criteria to evaluate risk significance and inform appropriate mitigation and adaptation measures. This distinction is particularly evident for extreme heat. The regional screening assigns a Low hazard rating on the basis of the return period of prolonged heat events measured against a generic wet bulb globe temperature threshold. The site-specific assessment rates the same hazard considerably higher, because the underground operation depends on a ventilation and refrigeration system engineered around a fixed design summer surface temperature, with limited operating margin and reduced fan redundancy at the No. 4 and No. 5 Shafts. The consequence of exceedance for this Project is therefore materially greater than the generic screening threshold implies. The site-specific rating in Section 8.5 therefore governs for this assessment.

8.2 Site-Specific Climate Change Risk Assessment Approach

The site-specific Climate Change Assessment for the proposed Jelani underground mining project builds on the regional climate hazard screening presented in Section 8.1. Rather than assuming that regional hazard classifications directly represent project-level risk, the assessment considers how current and projected climate conditions may interact with the specific characteristics of the proposed operation. This includes consideration of underground mining infrastructure, surface infrastructure, water management systems, energy requirements, worker health and safety, supporting infrastructure, and critical dependencies on infrastructure outside the direct control of the Project.

The assessment recognises that the significance of a climate hazard is determined by the interaction between the hazard, the Project's exposure and sensitivity, and its capacity to manage or adapt to changing conditions. Accordingly, the assessment considers the local environmental setting, proposed infrastructure, mining methods, operational requirements and existing environmental conditions. A qualitative risk matrix is applied to evaluate the likelihood and potential consequences of identified climate hazards, while considering existing or planned measures that may influence the Project's adaptive capacity. The assessment also accounts for the uncertainty associated with future climate projections.

Key Climate Risk Pathways and Dependencies:

- A key consideration for the Jelani Project is that not all climate-related risks will arise from infrastructure directly owned or controlled by the Project. The Project will form part of the broader Harmony Target Mine complex and will rely on shared infrastructure and services that are critical to its operation.
- The TSF represents an important secondary climate risk pathway. Although the receiving TSF may be owned and operated by Harmony, the Jelani Project will rely on this infrastructure for the deposition of processed tailings generated by its mining activities. Climate hazards affecting the TSF, including extreme rainfall, flooding, erosion and drought, may therefore represent a risk to the Project even where Jelani does not have direct operational control over the facility. The assessment consequently considers the TSF as a critical project dependency, recognising that climate-related constraints on its safe operation or available deposition capacity could affect the ability of Jelani to continue mining as planned.

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- Underground mining also introduces climate-sensitive infrastructure and operational dependencies. Ventilation shafts, ventilation fans, cooling systems, pumping infrastructure and associated surface equipment are essential to maintaining suitable underground working conditions. Increasing temperatures and more frequent or prolonged hot periods may increase thermal loads on these systems, potentially affecting their operating requirements and resilience. The assessment therefore considers the exposure of these systems to changing temperature conditions as a climate risk pathway, including the potential for increased cooling and ventilation requirements and greater stress on associated equipment.
- The Project may also be exposed to climate-related risks associated with external water and electricity supplies and other supporting infrastructure. Changes in rainfall patterns and drought conditions may influence water availability, while extreme weather events may disrupt electricity generation, transmission or other infrastructure on which the operation depends. These dependencies are considered as part of the broader climate risk profile of the Project.

Assessment Approach:

- The assessment adopts a systems-based approach to climate risk, recognising that climate hazards may affect interconnected components of the mining operation rather than individual assets in isolation. For example, increased temperatures may influence ventilation and cooling requirements, while drought may affect water availability and extreme rainfall may affect drainage systems, surface infrastructure and the TSF relied upon by the Project.
- Particular attention is therefore given to the relationship between the Project and shared or external infrastructure. Where infrastructure is outside the direct operational control of Jelani, the assessment does not attribute responsibility for its management to the Project. Rather, it considers whether the Project is exposed to climate-related risks through its dependence on that infrastructure. This is particularly relevant to the receiving TSF, where climate-related constraints affecting the facility could create a secondary risk to Jelani's ability to maintain planned mining activities.
- As the Jelani Project has not yet been developed, the assessment uses the existing receiving environment to establish baseline exposure and sensitivity, supplemented by proposed infrastructure and operational information. Future climate projections are then used to consider how changes in temperature, rainfall, drought and extreme weather conditions may alter the Project's climate risk profile.

Climate risks are dynamic and may change as the mine develops, infrastructure is commissioned, operational requirements evolve, and climate information is refined. Ongoing monitoring of relevant climate indicators, infrastructure performance and critical project dependencies should therefore form part of the Project's environmental and operational risk management processes. This will allow identified risks to be reviewed periodically and management measures to be adjusted where changing climate conditions or operational circumstances warrant.

8.3 Potential Physical Risks to the Project

The proposed Jelani Project will comprise a combination of surface and underground infrastructure required to support the planned mining operation. The physical climate risk assessment therefore considers the exposure of these infrastructure systems to current and projected climate hazards, as well as the interdependencies between individual components. Particular consideration is given to infrastructure that is critical to maintaining safe underground working conditions, water availability, electricity supply, ventilation and cooling, together with infrastructure outside the direct operational control of Jelani but upon which the Project will depend.

The key physical climate risk pathways identified for the Project are summarised below:

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- **Extreme rainfall and flooding:** Extreme rainfall may affect surface infrastructure, access routes, drainage systems, return-water infrastructure, dams and other water-management facilities. Increased runoff and hydraulic loading may place additional pressure on drainage, pumping and storage capacity, while erosion or localised flooding may affect access to shafts, workshops, stores and other critical surface facilities. The sensitivity of these systems is particularly relevant where infrastructure has limited drainage or storage capacity and where access to critical mining infrastructure may be temporarily restricted during extreme rainfall events. A site-specific hydrological assessment has been undertaken for the Project (Kongiwe Environmental, 2026). Storm rainfall depths derived at the centre of the project area give a 1:50-year 24-hour depth of 126.7 mm and a 1:100-year 24-hour depth of 141.7 mm, against a mean annual precipitation of 502 mm. The study confirms that the site already floods under present-day conditions, with the return water dam complex found to be full during site inspections in December 2025 and January 2026. The proposed solution separates clean and dirty water, routing clean runoff to Swartpan, which attenuates flow even when full. Two margins are relevant to climate risk. The bypass channel is designed to operate at 2.44 m/s under the 1:100-year event against a scour tolerance of 2.5 m/s, while the dirty water containment system is sized for the 1:50-year event, with a small discharge to Swartpan occurring at 1:100. Both designs derive from historical rainfall statistics and carry no allowance for projected change. Given the increase in short-duration rainfall intensity discussed in Section 7.3.3, these margins may reduce over the life of mine. Where tailings are hydraulically placed, extreme rainfall and resulting saturation may additionally elevate the risk of liquefaction-related failure (Bara Consulting, 2026, p. 254). Overlying landowners have separately raised concerns regarding existing flooding, standing water and runoff onto their properties, which may be compounded by the cumulative presence of the existing TSF within the same joint venture, and by a proposed excess-water pipeline (approximately 20 km) that would cross a number of farm portions and property boundaries (Bara Consulting, 2026, pp. 205-206).
- **Elevated temperatures and heatwaves:** Increasing temperatures and more frequent or prolonged hot periods may increase thermal stress on surface and underground equipment. This is particularly relevant to the underground mining operation, where ambient conditions at depth are managed through ventilation and cooling infrastructure. The proposed operation will utilise the existing Target No. 4 and Target No. 5 return ventilation shafts, which are equipped with fan installations, while intake air will enter the mine through the No. 3 and No. 2 production shafts. The ventilation system has been calculated to require approximately 500 m^3/s of air. Cooling is provided by a surface modular ice plant, a 12 000 kW three-stage counterflow Bulk Air Cooler on 57 Level, and 500 kW closed-circuit cooling cars along the decline (Bara Consulting, 2026, pp. 163-164). This system is engineered around a design summer surface temperature of 18.0/25.0°C (wet bulb/dry bulb) and a design air reject temperature of 28.5/32.5°C; rising ambient temperatures reduce the operating margin built into this fixed design (Bara Consulting, 2026, pp. 152-153). The return airway to No. 5 Shaft already carries heat rejected from the No. 1 Shaft underground refrigeration plant, and conditions in this area currently exceed the heat-stroke threshold of 32.5°C wet bulb, requiring the refrigeration plant to be shut down and the area cooled before safe entry. Not all main fans at No. 4 and No. 5 Shafts are currently operable, reducing redundancy in the exhaust ventilation system. Future increases in temperature may increase the thermal load on the mine, placing greater demands on ventilation fans, cooling systems and associated electrical infrastructure.
- **Drought and water scarcity:** The Project will rely on bulk water supply, service-water reticulation, potable water, cooling-water systems, return-water infrastructure, dams and settling facilities. Prolonged dry conditions may reduce water availability while increasing the demand for cooling and other operational requirements. Climate-related changes in water availability may therefore increase the sensitivity of the Project to interruptions or constraints in its water supply and return-water systems. The surrounding area is characterised by a semi-arid climate with average annual

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rainfall of 400–550 mm, concentrated in short, intense summer thunderstorms; the predominantly maize-farming land use in the surrounding area increases the sensitivity of neighbouring communities to reduced water availability. Farmers and communities have separately raised concerns regarding existing groundwater pollution, which may compound perceptions of project-related impact during periods of water scarcity, regardless of attribution.

- **Electricity supply and energy infrastructure:** The Project will depend on bulk power supply, electrical power reticulation and underground electrical systems to support ventilation, cooling, pumping, workshops and other mining activities. Increasing temperatures may increase electricity demand through greater ventilation and cooling requirements, while climate-related disruptions to external electricity infrastructure may affect the reliability of supply. The interdependence between electricity availability, ventilation and cooling is therefore an important consideration within the Project's physical climate risk profile.
- **Severe storms, strong winds, hail and lightning:** Severe weather events may affect exposed surface infrastructure, electrical systems, workshops, vehicles, storage facilities and other equipment. Lightning may damage electrical and control systems, while hail and strong winds may damage exposed equipment or structures. These hazards may also temporarily restrict surface activities where weather conditions compromise the safe operation of equipment or access to infrastructure. These hazards are consistent with the region's summer thunderstorm season (typically October to March), during which most of the area's rainfall and associated severe weather occur.
- **Underground infrastructure and services:** The underground operation will rely on service and cooling-water reticulation, hydropower systems, potable and return-water systems, settling facilities, compressed-air reticulation, electrical power supply and reticulation, workshops, battery bays, refuelling facilities, refuge bays and stores. Although much of this infrastructure is located underground, its functionality remains dependent on interconnected surface systems, including electricity supply, water supply, ventilation and cooling infrastructure. Climate-related changes affecting these supporting systems may therefore create secondary risks to underground operations. The return airway system linking these underground services to surface is itself constrained: several sections rely on old workings of unknown condition, with the possible presence of undocumented ventilation doors or seals that could restrict airflow if climate-driven cooling demand increases (Bara Consulting, 2026, pp. 152-153).
- **Receiving TSF as a critical secondary dependency:** Although the receiving TSF may be owned and operated by Harmony as part of the broader Target Mine complex, the Jelani Project will depend on this infrastructure for the deposition of processed tailings generated by its mining activities. Climate hazards affecting the TSF, including extreme rainfall, flooding, erosion and drought, may therefore create a secondary physical climate risk to the Jelani Project despite the absence of direct operational control. The climate resilience, available capacity and continued operational availability of the receiving TSF are consequently important dependencies for the Project.
- **Interconnected and cascading climate risks:** Climate hazards may affect several Project systems simultaneously, resulting in interconnected risk pathways. For example, increasing temperatures may increase ventilation and cooling requirements, which may increase electricity demand and place additional stress on associated infrastructure. Similarly, climate-related constraints affecting water availability may influence cooling requirements, while disruption to the receiving TSF could constrain the Project's ability to deposit processed tailings. The assessment therefore considers climate risk at a systems level rather than treating individual infrastructure components as isolated assets.

Overall, the physical climate risk profile of the Jelani Project is influenced not only by the direct exposure of its surface and underground infrastructure, but also by its dependence on interconnected systems and shared infrastructure outside its direct operational control. Particular consideration is therefore given to temperature and heat, extreme rainfall and flooding, drought and water scarcity, severe storms, electricity supply, ventilation

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and cooling systems, and the receiving TSF. These risks are assessed qualitatively based on the likelihood of the relevant climate hazard, the sensitivity of exposed infrastructure and systems, and the capacity of the Project to withstand or adapt to changing climatic conditions.

8.4 Potential Regulatory, Policy and Transitional Risks

The Jelani Project is expected to rely predominantly on electricity supplied by the Eskom national electricity grid throughout its operational life. Consequently, the Project's operational resilience is closely linked to the long-term reliability and climate resilience of South Africa's electricity supply system.

Climate change has the potential to affect electricity generation and transmission infrastructure through increased temperatures, prolonged droughts, reduced water availability for thermal power station cooling, and more frequent extreme weather events. These impacts may reduce generation efficiency, constrain electricity supply and increase the frequency of electricity supply interruptions. International experience has demonstrated that climate-induced drought conditions can significantly affect thermal power generation where adequate cooling water is unavailable, highlighting the vulnerability of electricity systems to changing climatic conditions.

For the Jelani Project, reduced electricity supply reliability or increasing electricity tariffs could result in higher operational costs, production interruptions and an increased reliance on diesel-powered backup generators. Greater utilisation of backup generation would increase both operating costs and Scope 1 greenhouse gas emissions, while potentially increasing future carbon tax liabilities. As electricity represents one of the Project's most significant operational inputs, improving energy efficiency, evaluating renewable energy opportunities and maintaining adequate backup power capacity will improve the Project's resilience to both climate-related physical impacts and energy market transition risks.

Although the primary focus of this assessment is the evaluation of physical climate risks under the RCP4.5 and RCP8.5 climate scenarios, the Project may also be exposed to transition-related climate risks arising from changes in climate policy, legislation, market expectations and greenhouse gas regulation over the 17-year operational life of the proposed Jelani underground mine.

Transition risks are expected to evolve as South Africa continues implementing the Climate Change Act, 2024 (Act No. 22 of 2024), strengthening the Carbon Tax Act, 2019 (Act No. 15 of 2019), and progressively introducing sector-specific mitigation measures, emissions reporting requirements and carbon budgeting mechanisms. These regulatory developments have the potential to influence mining projects through increased compliance obligations, higher operating costs associated with carbon pricing, and evolving investor and stakeholder expectations regarding climate performance.

The Project is also exposed to transition pressure through its joint venture partner. Harmony has an approved 1.5 °C science-based target to reduce absolute Scope 1 and Scope 2 emissions by 63 per cent by FY36 against an FY21 base year, as part of a longer-term ambition to reach net zero by 2045 (Harmony Gold Mining Company, 2025). This target period overlaps substantially with the Project's operational life, so new emission sources within Harmony's portfolio are likely to be assessed against that trajectory. Given that grid electricity dominates the Project's footprint, this pressure is most likely to take the form of an expectation that the Project procure renewable electricity or demonstrate a credible pathway to reduce its Scope 2 emissions. Harmony's existing renewable energy programme offers a potential route to meeting that expectation.

The magnitude of these transition risks differs between the climate scenarios assessed.

- Under the RCP4.5 scenario, which assumes greater global and national climate mitigation efforts, transition risks are expected to be comparatively higher. Continued implementation of South Africa's climate policy framework could result in progressively stricter greenhouse gas reporting requirements, increases in the effective carbon price, expanded emissions management obligations and greater scrutiny of climate-related disclosures. Mining operations may also experience indirect impacts through increasing electricity costs associated with decarbonisation of the national

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electricity system, evolving procurement requirements and growing investor expectations regarding emissions reduction and climate governance.

- Under the RCP8.5 scenario, global mitigation efforts are assumed to be less effective, resulting in a slower transition towards a low-carbon economy. Consequently, the pace of new climate-related regulatory requirements may be slower than under the RCP4.5 scenario, reducing the likelihood of significant transition-related regulatory changes during the Project life. However, existing South African climate legislation, including the Carbon Tax Act and the Climate Change Act, will continue to apply, and incremental strengthening of regulatory requirements remains likely irrespective of the global emissions pathway.

Notwithstanding these potential developments, the overall transition risk to the Jelani Project is considered to be moderate to low. The proposed underground mine has a relatively short operational life of approximately 17 years, including a 14-year full-production period, limiting its exposure to the longer-term policy and market changes that are expected to emerge towards mid-century. In addition, the Project is not anticipated to rely on emerging low-carbon technologies or significant long-term capital reinvestment that could become vulnerable to technology transition risks. The principal exposure is therefore expected to arise from evolving regulatory compliance requirements, carbon pricing mechanisms and greenhouse gas reporting obligations rather than fundamental changes to the Project's operational viability.

Accordingly, it is recommended that climate-related legislative and policy developments continue to be monitored throughout the Project lifecycle. Periodic review of applicable carbon pricing mechanisms, greenhouse gas reporting requirements, emissions management obligations and relevant mining sector regulations will enable the Project to identify emerging compliance requirements at an early stage and maintain alignment with South Africa's evolving climate policy framework.

8.5 Qualitative Climate Change Risk Register

The Climate Change Risk Register provides a structured summary of identified risks, associated receptors, potential impacts, and proposed mitigation and monitoring measures for the Project. Each risk is characterised in terms of its climatic driver, exposure and vulnerability, and is assigned a pre- and post-mitigation risk rating, together with clearly defined responsibilities and monitoring requirements as seen in Table 8-4. Each rating is shown as a composite score together with its probability (P) and consequence (C) scores, for example 16 (P4 × C4). The basis for each score is set out in the Vulnerability / Exposure column, drawing on the hazard analysis in Sections 7 and 8.1.

Risk significance is determined by combining probability and consequence ratings as described in Section 4, using the risk matrix as seen in Table 4-1, resulting in a composite score that is categorised into defined risk bands to guide management response. Higher-rated risks (moderate to very high) are prioritised for targeted mitigation and active management, while lower-rated risks are addressed through standard controls and routine monitoring. The risk scores are summarised below:

- **1: Insignificant** (negligible impact; no specific mitigation required beyond standard controls).
- **2-4: Low Risk** (minor impact; manageable with routine mitigation measures).
- **5-9: Medium Risk** (moderate impact; requires targeted mitigation and monitoring).
- **10-16: High Risk** (significant impact; requires detailed mitigation and active management).
- **17-20: Very High Risk** (critical impact; requires immediate intervention and may necessitate reconsideration of the activity).
- **25: Extreme Risk** (intolerable impact; represents a severe and potentially irreversible risk with widespread or long-term consequences.)

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Table 8-4: Qualitative Climate Change Risk Register.

Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
Construction Phase								
Extreme Rainfall and Flooding	Construction Areas, Surface Infrastructure	• Flooding of active work area • Disruption to construction • Erosion of exposed surface • Damage to material stockpiles • Sediment-laden runoff to adjacent watercourses/ wetlands • Potential compromise of partially constructed surface infrastructure	• Incomplete stormwater controls • Active earthworks • Exposed/uncompacted soils • Surface infrastructure under construction with limited structural integrity until complete • Existing flooding of the return water dam complex confirmed by site inspection • Stormwater designs derived from historical rainfall statistics with no allowance for projected intensity increases • Limited margin between design channel velocity (2.44 m/s at 1:100) and scour tolerance of the proposed lining (2.5 m/s) (Kongiwe Environmental, 2026)	**16** (P4 × C4)	• Surface Water Management Plan and stormwater controls • Erosion protection measures (berms, silt fencing, sediment traps) • Schedule earthworks around rainfall forecasts where feasible • Progressive rehabilitation of disturbed/exposed areas • Implement the stormwater separation measures recommended in the hydrological assessment • Operate the return water dam complex at a level retaining capacity for the 1:50-year event • Review channel and containment sizing against projected rainfall intensity at detailed design	**8** (P2 × C4)	Contractor	• Site inspections after rainfall events • Erosion incident logs • Return water dam freeboard and operating levels • Bypass channel condition inspections • Post-storm scour inspection of the lined channel
	Overlying Farms & Landowners	• Exacerbation of existing farmer-reported flooding, standing water and runoff onto overlying farmland, with cumulative farmer concern arising from proximity to the existing TSF (not a Jelani facility, but within the same JV)	• Farms situated above underground workings with an existing history of flooding/runoff complaints • Limited farmer confidence in current water management, raising sensitivity to any additional (even indirect/cumulative) contribution	**16** (P4 × C4)	• Proactive engagement with overlying farmers on stormwater management and cumulative concerns (distinguishing Jelani-specific from existing TSF-related impacts) • Maintain and communicate a clear grievance mechanism • Priority stormwater controls in areas draining toward farmland through the Stormwater Management Plan	**8** (P2 × C4)	Contractor; Community Liaison Officer (CLO)	• Number and nature of farmer complaints (flooding/runoff/standing water) • Grievance register (log, response time, resolution status)
Heatwaves & High Temperatures	Construction Workforce & Equipment	• Worker health issues (heat stress, sunstroke, sunburn) • Reduced productivity • Heat damage to electronic systems • Machinery overheating • Increased risk of work stoppages during peak heat periods.	• Construction workers • Outdoor staff • Machinery	**12** (P4 × C3)	• Shaded rest areas, scheduled breaks and hydration plans • Adjust work schedules during extreme heat (e.g. early start times) • Provision of appropriate PPE to reduce sunstroke/sunburn risk • Heat-resilient materials/equipment specifications where feasible • Heat stress awareness training	**8** (P4 × C2)	Contractor; Health & Safety Officers	• Heat stress incidents recorded • Daily temperature logs • Worker health & incident reports
Drought / Water Scarcity	Construction Activities	• Reduced availability of water for dust suppression, earthworks, concrete works and other construction activities, resulting in increased dust generation and potential disruption to construction activities.	• Dependence on reliable water supplies during construction • Increased water demand during prolonged dry periods	**9** (P3 × C3)	• Implement a dust suppression programme, prioritising water use during prolonged dry and windy conditions • Monitor construction water consumption and identify opportunities for water efficiency and reuse • Establish contingency arrangements for supplementary water supply during periods of water scarcity • Implement reduced vehicle speed limits on unpaved roads to reduce dust generation and associated water demand	**6** (P3 × C2)	Contractor; Health & Safety Officers	• Water consumption records • Records of water supply interruptions or shortages • Dust suppression records, including frequency and volume of water applied • Number of dust-related complaints and incidents per reporting period

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Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
					• Provide appropriate PPE for workers in high-exposure areas			
	Construction Workforce	• Insufficient water availability for drinking, sanitation and other domestic requirements, potentially affecting worker health, hygiene and welfare.	• Dependence on reliable potable water supplies • Increased demand during prolonged hot and dry conditions	**8** (P2 × C4)	• Provide adequate potable water storage and supply capacity • Ensure sufficient sanitation facilities are maintained throughout construction • Monitor potable water availability against workforce requirements • Establish contingency arrangements for supplementary potable water supply • Conduct toolbox talks on water conservation and responsible water use	**4** (P1 × C4)	Contractor; Health & Safety Officers	• Daily potable water availability and consumption records • Number of water supply interruptions or shortages • Number of water-related welfare or sanitation incidents per reporting period
	Overlying Farms & Local Communities	• Heightened potential for conflict with farmers/communities over shared/scarce water resources, compounding existing grievances about groundwater pollution • Wildlife/livestock attraction to on-site water infrastructure creating safety risks	• Standing water/leaks from temporary infrastructure • Communities and farmers already sensitised by existing groundwater pollution concerns, increasing likelihood that water scarcity is perceived/reported as project-related even where attribution is unclear	**9** (P3 × C3)	• Repair leaks/faulty water infrastructure promptly • Controlled access routes/gates to limit uncontrolled animal entry • Engage with overlying farmers on grazing patterns, water use, and existing groundwater pollution concerns	**3** (P1 × C3)	Contractor; Health & Safety Officers; CLO	• Number of water leaks identified/rectified within response time • Number of wildlife/livestock entry incidents • Number of farmer/community complaints logged in grievance register
Strong Winds	Construction Site & Overlying Farms/Adjacent Communities	• Dust generation, reduced visibility, instability of temporary structures and materials • Exacerbation of existing farmer complaints about dust blowing onto their properties • Potential injury from wind-displaced materials	• Exposed soils, stockpiles and temporary works • Lightweight/unsecured construction materials and site hoarding • Farms situated downwind of construction activities with an existing history of dust-related complaints	**9** (P3 × C3)	• Dust suppression on exposed soils and stockpiles • Secure temporary structures, materials and site hoarding • Wind speed monitoring with thresholds to pause dust-generating activities • Engagement with downwind farmers on dust management measures	**6** (P3 × C2)	Contractor; CLO	• Dust monitoring data • Wind speed/weather logs • Number of dust-related complaints from farmers/community recorded in grievance register
Wildfire/veld fire	Construction Site & Adjacent Infrastructure/Farms	• Fire damage to construction equipment, temporary facilities and materials • Injury or smoke exposure to personnel • Disruption or suspension of construction activities • Potential spread of fire beyond the Project boundary to adjacent farmland or communities	• Dry vegetation and seasonal fire conditions • Temporary fuel and hazardous substance storage areas • Mobile plant and temporary electrical infrastructure • Exposed construction areas during early works • Temporary storage areas and timber/material stockpiles	**12** (P4 × C3)	• Fire management plan • Maintain firebreaks around the site • Firefighting equipment and adequate water supply for fire response • Fire awareness and emergency response training • Spill Response Plan/Hazardous Substances Management Plan for flammable materials	**6** (P2 × C3)	Contractor; Health & Safety Officers	• Monitoring of weather conditions and fire danger indices • Inspection of fuel storage and housekeeping practices • Maintenance checks of firefighting equipment • Recording of fire incidents, near-misses and training activities
Lightning Strikes	Construction Site & Adjacent Infrastructure	• Injury or fatality to personnel • Damage to temporary electrical and control systems	• Personnel working in open or elevated areas • Temporary electrical installations and connections • Mobile plant and equipment operating in exposed areas	**10** (P2 × C5)	• Lightning detection system with audible warning (siren) • Designated safe shelter areas for personnel • Proper grounding/earthing of temporary works • Surge protection where required	**5** (P1 × C5)	Contractor; Health & Safety Officers	• Daily monitoring of weather forecasts and lightning alerts • Verification of lightning detection system functionality

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Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
		• Damage to construction equipment • Potential fire ignition • Suspension or disruption of construction activities	• Construction activities undertaken during thunderstorms		• Lightning safety included in HSE training • Site-specific emergency response procedure			• Routine inspection of grounding/earthing and surge protection • Recording of lightning events and related incidents
Hailstorms	Construction Workforce & Equipment	• Injury to personnel • Damage to vehicles, mobile plant and temporary structures • Damage to exposed construction materials and equipment • Damage to vulnerable or unfinished construction works • Temporary disruption to construction activities	• Personnel and equipment operating in open areas • Exposed vehicles, mobile plant and construction materials • Temporary structures and facilities with limited protection from severe storms	**8** (P4 × C2)	• Monitor weather forecasts and suspend outdoor activities during hail events • Covered/protected storage for equipment and materials • Designated safe shelter areas for personnel • Hail awareness in HSE training • Post-storm inspection protocols for damage assessment	**4** (P2 × C2)	Contractor; Health & Safety Officers	• Daily monitoring of weather forecasts • Visual inspection of exposed equipment and materials • Recording of hail events and any damage or incidents
Solar ultraviolet radiation	Surface workforce	• Acute effects including sunburn and photokeratitis • Cumulative effects including skin cancer and cataract • Compounding of heat strain where UV exposure coincides with high ambient temperature	• Surface personnel working in open areas with limited natural shade • UV Index reaching 13 in summer, classified as extreme • Personal exposure among South African outdoor workers already recorded above occupational threshold limit values • Exposure sustained across the full working year rather than confined to heatwave conditions	**12** (P4 × C3)	• Provision of shade at fixed outdoor work positions and rest areas • Long-sleeved workwear and wide-brim headwear as standard surface PPE • Provision of sunscreen at surface work areas • Scheduling of sustained outdoor tasks outside peak irradiance where operationally feasible • UV awareness in HSE induction, covering cumulative as well as acute effects	**6** (P2 × C3)	Contractor; Health & Safety Officers	• UV Index monitoring during summer months • PPE compliance inspections at surface work areas
Operational Phase								
Extreme Rainfall and Flooding	Receiving tailings storage facility (Harmony-owned and operated) — critical Project dependency	• Loss or curtailment of available deposition capacity through consumption of freeboard during sustained or intense rainfall; prevention of adequate drying and consolidation of the tailings beach during prolonged wet periods, constraining the rate at which the facility can accept material; Storm damage to delivery pipelines, pump stations, penstocks or return-water infrastructure. Any of these conditions interrupts the tailings stream, requiring processing to be curtailed or halted, with consequent suspension of mining. Where tailings are hydraulically placed,	• Project has no operational control over the receiving facility, so exposure cannot be managed through direct design intervention. Continuity of mining depends entirely on continuity of access to deposition capacity, with no alternative destination for tailings identified. Water-related processes are consistently identified as the dominant contributor to tailings facility failures globally, acting on precisely the mechanism projected to intensify in the Welkom area.	16 (P4 × C4)	• Secure contractual arrangements governing access to deposition capacity, including provisions addressing interruption of availability • Obtain visibility of the operator's monitoring data, water-balance management and design criteria, consistent with GISTM Principles 2, 3 and 4 • Confirm that the facility design incorporates current climate projections for extreme rainfall, rather than historical rainfall statistics alone • Identify contingency arrangements in advance of an interruption to deposition • Establish a defined escalation and notification protocol between Jelani and the facility operator	**8** (P2 × C4)	Harmony Gold (facility operator); Jelani (assurance, contractual and contingency arrangements)	• Freeboard and pond level records obtained from the operator • Advance notice of deposition constraints or planned suspensions • Number and duration of deposition interruptions per reporting period • Confirmation of facility design rainfall criteria against current projections

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Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
		saturation may additionally elevate the risk of liquefaction-related failure.						
	Farm portions along dewatering pipeline servitude	• Increased runoff/drainage disruption where the 20 km excess water pipeline crosses farm portions and property boundaries	• Route and number of affected properties not yet finalised at the time of assessment. Servitude crosses farmland with an existing history of flooding, standing water and runoff complaints, raising sensitivity to any additional drainage alteration. Trenching and reinstatement create linear disturbed corridors susceptible to erosion until vegetation re-establishes.	**12** (P4 × C3)	• Route selection to avoid drainage lines, pans and areas of existing waterlogging where practicable • Cross-drainage provision at natural flow paths to preserve existing surface drainage patterns • Erosion protection and progressive reinstatement of the servitude corridor • Engagement with affected landowners on routing prior to finalisation • Post-storm inspection of the servitude during the first two wet seasons following construction	**6** (P2 × C3)	Contractor; CLO	• Servitude condition inspections after rainfall events • Vegetation re-establishment along the corridor • Landowner complaints relating to drainage or standing water along the route
	Note: A provisional rating has been provided for pipeline servitude. It is recommended that this rating be re-evaluated once the route is finalised.							
	Farms above underground workings; adjacent landowner in TSF Zone of Influence	• Exacerbation of existing farmer-reported flooding, standing water and runoff onto overlying farmland, with cumulative farmer concern arising due to proximity to the existing TSF (not a Jelani facility, but within the same JV) and now compounded by increased loading on the existing TSF plus construction of the new TSF during this phase	•TSF Zone of Influence extends into adjacent property (Medium Hazard per SANS 10286) • Limited farmer confidence in current water management	**16** (P4 × C4)	• Proactive engagement with overlying farmers on stormwater management and cumulative concerns (distinguishing Jelani-specific from existing TSF-related impacts) • Maintain and communicate a clear grievance mechanism • Priority stormwater controls in areas draining toward farmland	**8** (P2 × C4)	Contractor; CLO	• Number and nature of farmer complaints re: flooding/runoff/standing water • Grievance register (log, response time, resolution status)
Heatwaves & High Temperatures	Project / Site Infrastructure (Ventilation & Cooling Infrastructure Bulk Air Cooler (BAC), surface ice plant, cooling cars, main fans)	Reduced cooling capacity margin as surface ambient temperatures approach/exceed design criteria (summer surface temperature 18.0/25.0°C wb/db); risk of underground conditions nearing heat-stroke threshold (>32.5°C wb); thermal strain on main fans	• Fixed-design cooling system with limited headroom; long shaft-to-workings distances; No.4/No.5 Shaft fans operating with reduced redundancy	**20** (P4 × C5)	• Review design for summer surface temperature and air reject temperature assumptions against updated climate projections • Progressive condition monitoring by the Ventilation/Operations manager.	**10** (P2 × C5)	Engineer/Contractor	• BAC/ice plant/cooling car performance tracking against design criteria • Underground wet-bulb temperature monitoring in return airway areas
	Workforce (Underground and Surface)	• Worker health issues (heat stress, sunstroke, sunburn) • Reduced productivity • Increased risk of work stoppages if safety thresholds breached	• Workers in stoping and decline development areas dependent on cooling infrastructure performance • Physically demanding work in confined, heat-affected areas	**20** (P4 × C5)	• Shaded rest areas, scheduled breaks and hydration plans • Mandatory PPE to reduce sunstroke/sunburn risk • Heat stress awareness training	**10** (P2 × C5)	Contractor; Health & Safety Officers	• Heat stress incidents recorded • Daily temperature logs • Worker health & incident reports

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Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
Drought / Water Scarcity	Project / Site Infrastructure; Local Ecosystems & Local Communities	• Increased dust generation	• Workers, site users & nearby communities exposed to reduced air quality and visibility, increasing health and operational safety risks as well as community complaints	**9** (P3 × C3)	• Implement a dust suppression programme (regular water spraying of haul roads, stockpiles, and exposed surfaces, particularly during dry and windy conditions) • Enforce reduced vehicle speed limits on all unpaved site roads to minimise dust generation • Ensure provision and mandatory use of appropriate PPE (e.g. dust masks/respirators) for workers in high-exposure areas.	**6** (P3 × C2)	Contractor, Health & Safety Officers	• Dust suppression logbook/register capturing scheduled activities, frequency, and volume of water applied (e.g. litres/day or m³/week) • Number of dust-related community complaints recorded in the complaints register per reporting period
		• Water shortages on site	• Workforce exposed to inadequate water supply for drinking, sanitation, and operational needs, reducing productivity and hygiene standards	**8** (P2 × C4)	• Provide adequate on-site potable water storage and supply infrastructure (e.g. tanks, dispensers) to prevent shortages. • Ensure provision of sufficient sanitation facilities (e.g. portable toilets) with regular servicing and water supply management • Monitor water consumption to identify inefficiencies and trigger corrective actions during shortages • Develop contingency arrangements (e.g. emergency water supply contracts) for periods of acute scarcity • Conduct toolbox talks to promote water conservation awareness among workers and reduce wastage.	**4** (P1 × C4)	Contractor, Health & Safety Officers	• Water supply log/register documenting daily water availability (e.g. litres/day) against estimated site demand, including any recorded shortages or supply interruptions • Number of water shortage incidents or sanitation service disruptions recorded per reporting period
		• Wildlife and livestock may enter the site in search of water, creating vehicle safety risks and potential conflict with local communities due to competition for scarce water resources or standing water on site.	• Livestock and wildlife attracted to on-site water sources (e.g., standing water or leaks), increasing exposure to hazardous construction zones.	**8** (P4 × C2)	• Repair leaks and faulty water infrastructure promptly to prevent unintended water availability • Use designated controlled access routes and gates to limit uncontrolled animal entry points • Engage with nearby communities to manage livestock grazing patterns and discourage entry into construction areas.	**2** (P1 × C2)	Contractor, Health & Safety Officers, CLO	• Number of reported water leaks or uncontrolled water discharges identified and rectified within specified response time (e.g. 24–48 hours), recorded in maintenance logbook • Number of incidents of wildlife or livestock entry into construction areas recorded in site safety or incident register per reporting period
		• Reduced water availability to overlying farms and surrounding communities dependent on wetland or river water resources for agricultural and domestic use • Heightened potential for competition and conflict over water use between the Project and surrounding farms/communities during periods of water scarcity • Compounding of existing community grievances	• Overlying farms and surrounding communities within the mine complex area dependent on wetland or river water resources for agricultural and domestic use • Reduced baseline water availability during drought periods coinciding with ongoing operational water demand • Existing sensitivities around water access and groundwater pollution complaints increasing the likelihood that any perceived reduction in water availability is attributed to the Project	**4** (P2 × C2)	• Establish structured engagement with affected communities • Maintain an effective grievance mechanism for water-related concerns, with clear reporting and response procedures.	**1** (P1 × C1)	CLO	• Community Compliance Register

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		regarding water access and groundwater pollution						
Strong Winds	Project / Site Infrastructure & Community	• Dust generation, reduced visibility, instability of surface structures and materials • Exacerbation of existing farmer complaints about dust blowing onto their properties	• Exposed surfaces, stockpiles and laydown areas • Lightweight/unsecured surface materials and equipment • Farms and communities situated downwind of operations	**8** (P4 × C2)	• Dust Suppression • Secure structures	**4** (P4 × C1)	Contractor	• Dust monitoring data
Wildfire/veld fire	Project / Site Infrastructure & Community	• Injury or fatality to personnel due to fire or smoke inhalation • Damage to operational equipment, facilities and materials • Damage to surface ventilation and cooling infrastructure (e.g. main fan installations, Bulk Air Cooler, surface ice plant) if affected by fire • Smoke and combustion gases drawn into the underground ventilation system via intake shafts (No. 2/No. 3 Shaft) if a fire occurs near shaft surface infrastructure, degrading underground air quality and potentially triggering evacuation or production stoppage • Disruption to mining operations • Reduced visibility affecting safe operations • Potential spread of fire beyond site boundaries impacting adjacent farmland/communities	• Workforce operating in open/exposed surface areas • Surface infrastructure including fuel storage areas, laydown areas, mobile plant and electrical equipment • Surface ventilation and cooling infrastructure (main fans at No. 4/No. 5 Shafts, BAC, ice plant) exposed to fire risk from surrounding vegetation • Intake (downcast) shafts draw surface air directly into the underground workings with no mechanism to exclude smoke, meaning a nearby fire's smoke plume could be circulated throughout the ventilation system rather than remaining at surface • Exposed vegetation within and around the site	**12** (P4 × C3)	• Implement a fire management plan • Maintain a firebreak around the site • Provide firefighting equipment and ensure adequate water supply for fire response • Train personnel in fire awareness and emergency response • Develop and implement a Spill Response Plan and/or Hazardous Substances Management Plan to ensure the proper handling, storage, and containment of flammable and hazardous materials. • Integrate fire/smoke detection with the existing underground smoke and carbon monoxide detection system, with a procedure to curtail or redirect intake airflow and evacuate affected areas if smoke ingestion is detected	**6** (P2 × C3)	Contractor, Health & Safety Officers	• Monitoring of weather conditions and fire danger indices • Inspection of fuel storage and housekeeping practices • Maintenance checks of firefighting equipment • Recording of fire incidents, near-misses and training activities • Smoke/CO detector readings at intake shafts during fire events

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Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
Lightning Strike	Project / Site Infrastructure & Community	• Injury or fatality to personnel due to direct or indirect lightning strikes • Damage to electrical equipment, control systems and power supply • Fire ignition risk • Disruption to operations and potential downtime	• Workforce operating in open and elevated surface areas • Mobile plant and equipment exposed in open areas • Electrical installations and overhead connections • Fuel storage and laydown areas • Exposed surface work areas with limited shelter	**10** (P2 × C5)	• Install lightning protection systems (e.g. lightning rods) on site • Implement a lightning detection system with audible warning (siren) triggered within a defined radius • Provide designated safe shelter areas for personnel • Ensure proper grounding and earthing of all permanent works • Install surge protection where required • Include lightning safety in HSE training • Establish and maintain a site-specific emergency response procedure.	**5** (P1 × C5)	Contractor, Health & Safety Officers	• Daily monitoring of weather forecasts and lightning alerts • Verification of lightning detection system functionality • Routine inspection of grounding/earthing systems and surge protection • Recording of lightning events and related incidents.
Hailstorms	Project / Site Infrastructure	• Injury to personnel • Damage to vehicles, equipment, and exposed materials • Disruption to surface operations	• Workforce operating in open areas • Vehicles and mobile plant • Exposed materials, equipment, and temporary structures (e.g. laydown areas)	**8** (P4 × C2)	• Monitor weather forecasts and suspend outdoor activities during hail events • Provide covered or protected storage for equipment and materials where feasible • Designate safe shelter areas for personnel • Secure or protect sensitive equipment • Include hail awareness in HSE training • Design and size stormwater infrastructure (channels, culverts, attenuation features) to accommodate high-intensity hail and rainfall events, including allowance for partial blockage by hail accumulation. • Implement post-storm inspection protocols to assess drainage systems for blockages, sediment build-up, structural damage, and to verify functionality.	**4** (P2 × C2)	Contractor, Health & Safety Officers	• Daily monitoring of weather forecasts • Visual inspection of exposed equipment and materials •Recording of hail events and any damage or incidents.
Solar ultraviolet radiation	Surface workforce	• Acute effects including sunburn and photokeratitis • Cumulative effects including skin cancer and cataract • Compounding of heat strain where UV exposure coincides with high ambient temperature	• Surface personnel working in open areas with limited natural shade • UV Index reaching 13 in summer, classified as extreme • Personal exposure among South African outdoor workers already recorded above occupational threshold limit values • Exposure sustained across the full working year rather than confined to heatwave conditions	**12** (P4 × C3)	• Provision of shade at fixed outdoor work positions and rest areas • Long-sleeved workwear and wide-brim headwear as standard surface PPE • Provision of sunscreen at surface work areas • Scheduling of sustained outdoor tasks outside peak irradiance where operationally feasible • UV awareness in HSE induction, covering cumulative as well as acute effects	**6** (P2 × C3)	Contractor; Health & Safety Officers	• UV Index monitoring during summer months • PPE compliance inspections at surface work areas
Decommissioning and Rehabilitation Phase								
Note: The decommissioning and rehabilitation phase for the Jelani mining right area has been assessed using the RCP8.5 climate projection as a conservative, upper-bound scenario, consistent with the approach adopted elsewhere in this register. Unlike conventional mine closure, this assessment does not involve the decommissioning of major surface infrastructure, shafts, processing facilities, tailings storage facilities, or waste rock dumps, as no such infrastructure is proposed within the Jelani mining right boundary. All primary surface-related activities, including hoisting, ore transport, processing (toll treatment), and tailings deposition, will continue to be undertaken on the adjacent, existing Loraine/Target Mining Right operated by Harmony Gold Mining Company Limited, with underground access achieved via the existing Target No. 2 and No. 3 Shaft infrastructure. The only new surface disturbance within the Jelani mining right comprises four seismographic monitoring stations installed along the shared boundary with Harmony's operations, each consisting of a small sensor pad/housing (approximately 5–10 m²), basic power/communications infrastructure, perimeter fencing, and short gravel access tracks. Decommissioning and rehabilitation on the Jelani mining right is accordingly limited to the removal of these stations, fencing and access tracks, and revegetation of the resulting disturbed areas (estimated rehabilitation cost: R1,480,314.57), rather than large-scale landform, TSF, or processing infrastructure closure.							

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Extreme Rainfall and Flooding	• Rehabilitation of gravel access roads • Revegetation of station footprints	• Erosion of revegetated station footprints (0.04 ha) and access track surfaces • Sediment runoff from disturbed/regrading areas	• Small, recently disturbed and revegetating footprints with limited established ground cover • Unpaved gravel access tracks (approx. 1 km, 4 m wide) susceptible to washout	**8** (P4 × C2)	• Post-storm inspection of station footprints and access tracks • Erosion protection at station pads and track crossings (e.g. camber, cut-off drains) • Progressive revegetation monitoring and reseeding where erosion occurs	**4** (P2 × C2)	Rehabilitation Contractor	• Post-rainfall inspection records • Erosion incident log for station footprints and access tracks
Heatwaves & High Temperatures	• Rehabilitation of gravel access roads • Revegetation of station footprints	• Vegetation stress or establishment failure on the grassed/revegetated area, delaying rehabilitation sign-off • Increased dust from any areas where revegetation fails to establish • Workforce undertaking removal/rehabilitation	• Small, newly established vegetation with limited root development • No irrigation infrastructure planned for this limited footprint • Worker heat stress during decommissioning/removal activities	**10** (P5 × C2)	• Use of drought-tolerant indigenous grass species • Monitor vegetation establishment and reseed as needed • Temporary watering during establishment if feasible, given small area involved • Shaded rest areas, hydration and scheduled breaks for removal crews	**5** (P5 × C1)	Rehabilitation Contractor	• Vegetation establishment/survival monitoring • Visual condition assessments of grassed areas • Heat stress incidents recorded during removal works
Drought / Water Scarcity	• Rehabilitation of gravel access roads • Revegetation of station footprints	• Poor vegetation establishment on the grassed area, prolonging exposed/bare soil and associated dust and erosion risk	• Dependence on rainfall for establishment	**8** (P4 × C2)	• Species selection suited to local rainfall conditions • Soil conditioning/mulching on the small footprint • Monitoring with contingency reseeding if establishment fails	**4** (P4 × C1)	Rehabilitation Contractor	• Vegetation cover monitoring • Rainfall records against establishment progress
Strong Winds	• Rehabilitation of gravel access roads • Revegetation of station footprints	• Dust generation from disturbed footprints and access tracks during and after removal works	• Small exposed/disturbed areas at station sites and along access tracks pending revegetation	**6** (P3 × C2)	• Progressive revegetation to stabilise exposed surfaces	**3** (P3 × C1)	Rehabilitation Contractor	• Visual inspection of rehabilitated areas • Dust observation at footprint/track areas
Wildfire/veld fire	• Rehabilitation of gravel access roads • Revegetation of station footprints • Workforce undertaking removal/rehabilitation	• Injury risk to personnel from fire while undertaking decommissioning and rehabilitation work in open veld • Disruption/delay to removal and rehabilitation schedule • Fire damage to rehabilitated areas	• Workforce operating in open, vegetated terrain during removal and rehabilitation activities • Rehabilitated access roads and station footprints	**6** (P2 × C3)	• Monitor regional fire danger conditions before/during removal works • Basic firefighting equipment on hand during site works	**3** (P1 × C3)	Rehabilitation Contractor	• Fire danger index monitoring • Incident recording during removal/rehabilitation period
Lightning	• Workforce undertaking removal/rehabilitation	• Injury or fatality risk to personnel from lightning while working in open, exposed terrain during station removal and site rehabilitation • Disruption/delay to removal and rehabilitation schedule	• Workforce operating in open and exposed boundary areas with limited shelter during removal activities	**10** (P2 × C5)	• Suspend outdoor removal/rehabilitation work during lightning activity • Designated safe shelter areas • Lightning safety included in HSE briefing for removal works	**5** (P1 × C5)	Rehabilitation Contractor	• Daily monitoring of weather forecasts and lightning alerts • Incident recording during removal/rehabilitation period

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Climatic Related Hazards	Risk Receptor	Potential Impact / Issue	Vulnerability / Exposure	Risk Rating Pre Mitigation (P × C)	Recommended Adaptation / Mitigation Measures	Risk Rating Post Mitigation (P × C)	Responsible Party	Monitoring and Monitoring Indicators
Hailstorms	• Newly established revegetation areas • Workforce undertaking removal/rehabilitation	• Injury risk to personnel during outdoor removal/rehabilitation work • Disruption/delay to removal and rehabilitation schedule • Damage to newly established vegetation	• Workforce and equipment operating in open areas during removal activities • Areas under rehabilitation	**6** (P2 × C3)	• Monitor weather forecasts and suspend outdoor work during hail events • Safe shelter areas	**3** (P1 × C3)	Rehabilitation Contractor	• Daily monitoring of weather forecasts • Incident recording during removal/rehabilitation period
Note: The climatic drivers identified in this assessment may not occur in isolation throughout the lifecycle of the Jelani JV Project. Climate hazards may interact or coincide, resulting in cascading and compounding effects. For example, prolonged drought conditions increasing the likelihood and severity of wildfires, or extended dry periods followed by intense rainfall events leading to enhanced erosion, runoff and increased loading on the Project's stormwater and tailings management infrastructure, with corresponding implications for overlying farms and surrounding communities. These interactions may amplify overall risk levels across all Project phases and should therefore be considered in an integrated manner within ongoing risk management, monitoring, and adaptive planning.								

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9. Assumptions/Limitations and Exclusions

This Assessment has been prepared using the information available at the time of writing and the level of Project definition reached at that stage. The assumptions, limitations and exclusions described below establish the basis on which the findings and risk ratings should be interpreted. They reflect the current stage of Project development and the availability and resolution of climate and Project-specific information, rather than deficiencies in the Assessment. The data assumptions adopted in the quantification of the greenhouse gas inventory are detailed separately in Section 4.3, together with the limitations attaching to them, and are not repeated here. The findings should therefore be regarded as proportionate to the current level of Project definition and reviewed as the Project progresses through detailed design and operation.

Climate projections for the Project area are based on the South African GreenBook and associated CSIR high-resolution municipal-scale projections, which remain based on CMIP5 simulations under the RCP 4.5 and RCP 8.5 pathways. Although CMIP6 represents the latest generation of global climate models, equivalent downscaled municipal-scale projections were not available for the Project area at the time of the Assessment. The CMIP5 projections therefore represent the most appropriate high-resolution dataset currently available for the Project. RCP 8.5 is considered a high-end scenario rather than a central representation of future emissions trajectories; accordingly, results under this pathway are interpreted as an upper-bound risk scenario rather than a prediction of the most likely future. The GreenBook modelled baseline also exhibits a pronounced wet bias relative to observed rainfall in the Project area. Its rainfall outputs have consequently been used primarily to assess the direction and relative magnitude of projected change rather than absolute rainfall totals. Confidence in projections of localised convective hazards, including hail and lightning, and extreme wind is lower than for temperature and mean rainfall. These hazards have therefore been assessed primarily using present-day exposure and regional hazard characterisation.

The 2050 projection horizon extends beyond the anticipated fourteen-year full-production life of the Project. This horizon has nevertheless been retained as it provides the most appropriate available municipal-scale projection period for assessing climate risks across the Project lifecycle, including construction and operation. The *ThinkHazard!* outputs presented in Section 8.1 have been used for regional hazard screening and contextualisation only. As these datasets are based on globally standardised information and generic thresholds, they do not constitute project-level risk assessments. Where regional screening results differ from the site-specific assessment, the site-specific ratings presented in Section 8.5 govern.

The Assessment relies on Project information available at prefeasibility level, including engineering parameters, infrastructure layouts, power demand estimates, ventilation and refrigeration requirements and stormwater design criteria. These parameters remain subject to change during detailed design and any risk arising from a material design assumption should be reassessed once the relevant design has been confirmed. Site-specific hydrological modelling has been undertaken separately for the Project (Kongiwe Environmental, 2026) and its findings are relied upon in this Assessment. Storm rainfall depths in that study derive from historical rainfall statistics and incorporate no allowance for projected changes in intensity. The design outputs should accordingly be understood as representing present-day conditions, with Section 8.3 addressing the implications of projected intensity increases for the operating margins those designs carry.

The Assessment also considers the Project's dependence on infrastructure and systems outside Jelani's operational control, including the receiving tailings storage facility, Target No. 1 metallurgical plant, shared ventilation and cooling infrastructure at the Target No. 4 and No. 5 Shafts, and the Eskom bulk electricity supply. These dependencies have been assessed in terms of the Project's exposure and the assurance required to manage that exposure; the design adequacy, condition and climate resilience of the underlying assets have not been independently assessed where the necessary information was unavailable or responsibility rests with another operator. Facility-level greenhouse gas emissions data for Harmony's existing Target operations were not available, so the combined emissions footprint of the shared mining complex has not been quantified.

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International literature has been used primarily to establish climate-risk mechanisms and pathways where South African evidence is limited, particularly for pumping, dewatering, hoisting and water supply. Such evidence has not been directly transferred to the Project as a measure of impact magnitude; hazard characterisation and significance have instead been informed by South African, provincial and site-specific information. Coastal flooding, storm surge, sea-level rise, tsunami and volcanic activity have been excluded as non-credible hazards at the Project location. Tropical cyclones have similarly been excluded as a direct hazard due to the inland location, while the potential for remnant tropical systems to contribute to extreme rainfall has been retained within the assessment of that hazard. Fugitive emissions of refrigerant gases from the Project's refrigeration and ice plant have been excluded from the greenhouse gas inventory due to data limitations, as the refrigerant type, charge and leakage rate had not been confirmed at the time of the Assessment. Transition risks have been considered at a strategic level, but no quantitative modelling of carbon prices, electricity tariffs or commodity market scenarios has been undertaken.

Finally, this Assessment represents the climate risk position at the date of issue. Climate projections, regulatory requirements, engineering designs and operational conditions will continue to evolve. The findings should therefore be incorporated into ongoing environmental and operational risk management and periodically reviewed as updated climate information becomes available, the regulatory framework under the Climate Change Act is implemented, and detailed design and operational information are confirmed. Where material changes to Project design, operating conditions or the underlying climate evidence occur, the relevant risk assessments should be revisited.

10. Conclusions and Recommendations

This Assessment has quantified the greenhouse gas emissions attributable to the proposed Jelani underground mining project and evaluated the Project's exposure to projected changes in the local climate over its operational life. The following conclusions are drawn.

- The Project will generate approximately 47 715 tCO_2e during construction and approximately 2 958 538 tCO_2e over the 15-year operational phase. Purchased grid electricity accounts for approximately 98 per cent of operational emissions, making energy consumption and grid carbon intensity the determining factors in the Project's footprint.
- The Project's contribution to climate change cannot be eliminated, as emissions are inherent to the proposed mining activities. The mitigation measures identified reduce the magnitude of the impact from Major to Moderate. Because the impact is long term and national to international in extent, its significance remains High after mitigation. The re-use of existing shafts and processing infrastructure avoids a substantial quantum of embodied emissions that a greenfield development would incur.
- Heat presents the most significant physical climate risk. The ventilation and cooling system is engineered around a fixed design summer surface condition, and projected warming erodes the operating margin that design carries. Existing constraints, including conditions in the No. 5 Shaft return airway and limited main fan redundancy, compound this exposure for both infrastructure and the workforce.
- Extreme rainfall and flooding present a significant risk to surface infrastructure, to the receiving tailings storage facility and to overlying landowners. The site already floods under present-day conditions, and the stormwater designs derive from historical rainfall statistics with no allowance for projected increases in intensity.
- The Project is materially exposed through infrastructure outside its operational control. The receiving tailings storage facility is the most significant of these dependencies, as a climate-related loss of deposition capacity would prevent ore processing and halt mining.

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- Transition risk is moderate to low over the Project life, with the principal exposure arising from carbon pricing and greenhouse gas reporting obligations rather than from fundamental threats to operational viability.
- The inventory is an indicative estimate prepared at prefeasibility level. It establishes the order of magnitude of the footprint and identifies the sources that dominate it, and it provides a defensible basis for assessing significance at this stage.

Recommendations:

It is recommended that the following measures be implemented and that they be incorporated into the Environmental Management Programme and the Project's operational risk management processes.

- Energy and emissions management. Implement ventilation-on-demand, high-efficiency motors and pumps, efficient lighting and optimised compressed-air systems. Investigate renewable energy supply, wheeling arrangements and power purchase agreements, given that grid electricity governs the footprint. Develop a progressive emissions reduction plan with defined targets and establish greenhouse gas monitoring and reporting aligned to the Carbon Tax Act and to future carbon budget requirements.
- Confirm the generating plant. Confirm the fuel type, rated capacity and expected duty of the proposed on-site generating plant. At 5 MVA the implied rated thermal input exceeds the 10 MW(th) threshold for IPCC category 1A2i, which is assessed on rated capacity irrespective of utilisation, and may attract carbon tax liability.
- Heat and ventilation resilience. Reassess the ventilation and cooling design against projected surface temperatures rather than historical design conditions, and confirm that sufficient margin and redundancy exist at the No. 4 and No. 5 Shaft fan installations. Implement thermal work limits, acclimatisation protocols, hydration provision and heat-stress monitoring for underground and surface personnel.
- Stormwater and flood management. Verify the stormwater and dirty water containment designs against short-duration rainfall intensities that incorporate a climate change allowance, and implement the separation measures recommended in the hydrological assessment. Operate the return water dam complex at a level that retains capacity for the design event, and undertake post-storm inspection of the bypass channel and lined works.
- Tailings deposition assurance. Formalise assurance over the receiving tailings storage facility through the agreements governing access to it. Obtain visibility of the operator's monitoring data and management systems, confirm that the facility is designed and operated in accordance with the Global Industry Standard on Tailings Management, and identify contingency measures to be applied should deposition be curtailed.
- Occupational solar ultraviolet exposure. Implement a solar ultraviolet exposure control programme for surface personnel, including shade provision at fixed work positions, appropriate personal protective equipment and scheduling of outdoor work away from peak irradiance periods.
- Wildfire and severe weather preparedness. Maintain firebreaks and manage vegetation around the shaft and ventilation infrastructure and establish coordination protocols with local emergency services and with the Nyakallong community. Confirm lightning protection, surge protection and post-storm inspection protocols for surface electrical and control systems.
- Inventory refinement. Refine the greenhouse gas inventory as Project-specific information becomes available, in particular measured fuel consumption, the confirmed electrical load schedule, refrigerant type and charge for the quantification of fugitive emissions, and finalised design parameters. The inventory should be recalculated using the applicable emission factors for each future reporting year.

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- Monitoring and periodic review. Monitor climate indicators, infrastructure performance and critical dependencies as part of the Project's environmental and operational risk management processes. Review this Assessment where material changes occur to Project design, operating conditions, the underlying climate evidence or the regulatory framework, and in any event periodically over the life of mine.

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12.Appendices (As Indicated on the Next Page/s)

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Appendix A: Specialist Team CV



BENJAMIN DUNN

Environmental Consultant
Kongiwe Environmental

BDUNN@KONGIWE.COM

+27 (10) 140 6508

150 BRYANSTON DRIVE
BRYANSTON, SANDTON, 2191
SOUTH AFRICA

PROFESSIONAL REGISTRATIONS

Candidate Environmental Assessment Practitioners Association of South Africa (EAPASA)

KEY SKILLS

- Environmental Assessment & Compliance
- Permitting & Regulatory Applications
- Climate Change Risk Assessments
- Stakeholder Engagement & Public Participation
- Project Support & Reporting

EDUCATION

2024 - Master of Science Environmental Sciences, University of Witwatersrand

2021 - B.A Honours Geography, University of Witwatersrand

2020 - B.A. Geography and Sociology, University of Witwatersrand

LANGUAGES

English – Fluent Afrikaans – Average

KONGIWE

IMPACT

Benjamin is an Environmental Consultant experienced in delivering environmental and social advisory services for mining, renewable energy and infrastructure projects across Southern Africa. His expertise includes climate risk assessments, GHG reporting, environmental due diligence, permitting, and environmental and social management plans.

He has supported projects in South Africa, Zimbabwe, Zambia and the DRC, addressing national legislation and international lender requirements, including the IFC Performance Standards, Equator Principles and IFRS S2.

Benjamin holds an MSc in Environmental Sciences from the University of the Witwatersrand, with research focused on climate change adaptation in commercial agriculture. He combines strong analytical and technical writing skills with practical expertise in environmental assessment, ESG and climate resilience.

SELECTED PROJECT EXPERIENCE

Environmental Authorisation Applications – Gauteng & Limpopo, South Africa (2025–Current)

Environmental Consultant
Assisted with Basic Assessment Reports (BARs), EMPrs, and S&EIRs for multiple mining-related projects, including site notice placement and document logistics.

Climate Change Risk Assessments and Greenhouse Gas Reporting – South Africa & Democratic Republic of the Congo (2026–Present)

Environmental Consultant
Undertakes climate change risk assessments and greenhouse gas (GHG) inventories for mining, renewable energy and cross-border infrastructure projects in accordance with international lender requirements and recognised good practice. Responsibilities include assessing physical climate risks, developing climate adaptation and mitigation measures, preparing GHG inventories and emissions assessments, and supporting climate-related disclosures aligned with IFRS S2, the IFC Performance Standards, and the Equator Principles.

Environmental Due Diligence – Southern Africa (2025–Present)

Environmental Consultant
Supports environmental and social due diligence assignments for mining and infrastructure developments across Southern Africa. Responsibilities include reviewing environmental authorisations and permitting requirements, assessing environmental and social risks and liabilities, evaluating compliance with national legislation and international lender standards, identifying permitting gaps, and contributing to technical due diligence reports for investment and project financing purposes.



CHELSEA STROOH

Junior Geospatial Consultant
Kongiwe Environmental

CSTROOH@KONGIWE.COM

+27 (10) 140 6508

150 BRYANSTON DRIVE
BRYANSTON, SANDTON, 2191
SOUTH AFRICA

KEY SKILLS

- Geospatial Analysis & Remote Sensing
- Programming & Data Science
- Research & Scientific Communication
- Environmental Science & Applied Ecology

EDUCATION

Current - B.Sc. Computer Science , University of the People

2024 - Google Data Analytics Course, Coursera

2021 - B.Sc. Honours Environmental Science, University of the Witwatersrand

2020 - B.Sc. Life and Environmental Science in Geography and Zoology , University of Johannesburg

LANGUAGES

English – Fluent

IMPACT

Chelsea is a Junior Geospatial Consultant with a strong foundation in GIS and Remote Sensing, holding a BSc (Hons) in Environmental Science and currently pursuing a second degree in Computer Science. She brings a multidisciplinary skill set that combines environmental science with spatial data technologies and programming.

Her expertise includes geospatial analysis, remote sensing, and data visualisation, with practical experience in agricultural data analysis, burn scar mapping, and spatial modelling. Chelsea is proficient in Python for spatial analysis and automation, with hands-on experience working with APIs and data processing libraries such as pandas and openpyxl.

Chelsea's academic and research background has refined her communication, time management, and scientific writing skills.

With a solid grounding in environmental science and ecology, Chelsea brings a systems-based approach to problem-solving and is committed to applying her diverse technical skills in support of high-quality, data-driven environmental solutions.

SELECTED PROJECT EXPERIENCE

Mining, Infrastructure & Utility Mapping – South Africa (2024–Current)

Junior Geospatial Consultant

Supported the development of spatial products and GIS databases for mining, infrastructure, and municipal planning projects. Assisted in the preparation of spatial deliverables for Environmental Impact Assessments (EIAs) and Water Use Licence Applications (WULAs). Contributed to corporate GIS mapping, including utility and pipeline layouts, and gained experience in spatial data quality control and digital map production.

Tailings Facility Knowledge Base Update – National, South Africa (2024)

Junior Geospatial Consultant

Assisted in the spatial categorisation and integration of environmental and social datasets into a geodatabase for GIS representation, supporting compliance with the Global Industry Standard on Tailings Management (GISTM). Conducted data reviews, supported gap analysis processes, and contributed to the accurate digitisation and alignment of spatial information for enterprise-level GIS systems.



ROBIN BOLTON

Strategic Sustainability & Stewardship Independent Consultant

Kongiwe Environmental Associate

ROBIN@ELEMENTSSTEWARDSHIP.CO.ZA

+27 (10) 140 6508

150 BRYANSTON DRIVE
BRYANSTON, SANDTON, 2191
SOUTH AFRICA

PROFESSIONAL REGISTRATIONS

-Future of Sustainability Certificate of Attendance, Topco Media – 2022

-Principal Environmental Auditor, Institute of Sustainability and Environmental Professionals (ISEP) - 2016

-Registered EMS Auditor, Institute of Sustainability and Environmental Professionals (ISEP) - 2015

-ISO14001 Certified Auditor, Crystal Clear- 2003

GEOGRAPHICAL EXPERIENCE

Africa, the Middle East, and North America

EDUCATION

2008 - Program for Management Development, Gordon Institute of Business Science

2003 - Hons Water Utilisation, Water Management, Quality & Treatment, University of Pretoria

1997 - Hons Microbiology, University of Kwa Zulu Natal

1996 - Bsc Microbiology & Biochemistry, University of Kwa Zulu Natal

KONGIWE

STEWARDSHIP SPECIALIST

Robin is a sustainability specialist with over 25 years of experience across Africa, the Middle East, and North America. His expertise spans strategic stewardship, ESG integration, climate and nature risk management, and impact measurement. He helps organisations unlock value by reducing risk, meeting regulatory requirements, improving efficiency, and identifying growth opportunities. Robin integrates sustainability into core business strategy through a data-led, commercially grounded approach that delivers measurable environmental and social outcomes. With experience in mining, auditing, ESG systems, and global reporting frameworks, he brings practical insight to emerging climate and nature risks, enabling organisations to build resilience and long-term value.

KEY SKILLS

- Strategic Sustainability & ESG Advisory: Strategy development, governance, compliance, and resilience.
- Sustainability Data & Systems: Material data identification, data processes, and ESG system implementation.
- Climate & Nature Programmes: Climate and nature roadmaps aligned with TCFD, TNFD, SBTi.
- Carbon Accounting & Management: Footprint assessments, mitigation planning, net-zero strategies.
- Impact Measurement: Metrics and indicators to track meaningful sustainability outcomes.
- Resource Efficiency: Identifying inefficiencies to reduce impact and improve performance.
- Environmental & Social Management: E&S due diligence, auditing, and compliance support.
- Capacity Building: ESG training, awareness, leadership development, and change management.

SELECTED PROJECT EXPERIENCE

ESG assessment, strategy development and implementation – South Africa (2017 – 2025)

Review, develop and implement ESG strategies across industries, parastatals and financial institutions, inclusive of maturity analysis, materiality assessments, data management, governance systems, training and reporting aligned with local and global standards.

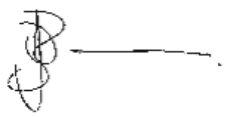
Sustainability and Financial Institutions – South Africa (2023 – 2025)

Develop and implement a Purpose / Sustainability program for a large financial institution to drive and track sustainable development finance, gauge and report on impact, manage ESG risks and embed sustainability awareness, systems and practices.

Appendix D11 - Blasting and Vibrations

Blast Management and Consulting

Quality Service on Time

Report: Blast Impact Assessment Proposed: Jelani Resources Ltd. - Jelani Joint Venture Project		
Report Date:	15 September 2026	
BMC Ref No:	BMC_Kongiwe_JelaniJV Project_EIAReport_260914_V01	
Clienf Ref No:	N/A	
DMR Ref No:	FS30/5/1/2/3/2/1(10098) MR	
Document Authorised:	JD Zeeman	

i. Document Prepared and Authorised by:

JD Zeeman
Blast Management & Consulting (2015/061002/07)
61 Sovereign Drive
Route 21 Corporate Park
Irene
South Africa

PO Box 61538
Pierre van Ryneveld
Centurion
0045

Cell: +27 82 854 2725 Tel: +27 (0)12 345 1445 Fax: +27 (0)12 345 1443

i. Independence Declaration

A declaration that the specialist is independent in a form as may be specified by the competent authority.

I, JD Zeeman, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct.



Signature of the Specialist

ii. Legal Requirements

In terms of the NEMA 2014 EIA Regulations contained in GN R982 of 04 December 2014 (as amended by Government Notice 1816 in Government Gazette 45999 dated 3 March 2022, with retrospective effect from 11 June 2021), all specialist studies must comply with Appendix 6 of the NEMA EIA Regulations, 2014 (as amended). **Table 1** shows the requirements as indicated above.

Table 1: Legal Requirements for All Specialist Studies Conducted

Legal Requirement	Relevant Section in Specialist study
(1)A specialist report prepared in terms of these Regulations must contain-	
(a) details of -	
(i) (i) the specialist who prepared the report; and	i
(ii) (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 26
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section iii
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 4
(cA) an indication of the quality and age of base data used for the specialist report;	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 18
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 8
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 6
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives;	Section 11
(g) an identification of any areas to be avoided, including buffers;	Section 11
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 11
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 9
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 17
(k) any mitigation measures for inclusion in the EMPr;	Section 18.4
(I) any conditions for inclusion in the environmental authorisation;	Section 22
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 21
(n) a reasoned opinion -	Section 24

Legal Requirement	Relevant Section in Specialist study
(i) whether the proposed activity, activities or portions thereof should be authorised; and	Section 24
(iA) regarding the acceptability of the proposed activity or activities; and	Section 24
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and the closure plan in the case of a closure activity;	Section 12
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 12
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	None

iii. Document Control:

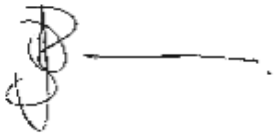
Name & Company	Responsibility	Action	Date	Signature
H Eksteen Blast Management and Consulting	Document Preparation	Report Prepared	2026/09/15	
JD Zeeman Blast Management and Consulting	Consultant	Report Finalised	2026/09/18	

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List of Acronyms used in this Report

a and b	Site Constant
APP	Air Pressure Pulse
BMC	Blast Management & Consulting
D	Distance (m)
E	Explosive Mass (kg)
EIA	Environmental Impact Assessment
Freq.	Frequency
GRP	Gas Release Pulse
I&AP	Interested and Affected Parties
k	Factor value
L	Maximum Throw (m)
Lat/Lon hddd°mm'ss.s"	Latitude/Longitude Hours/degrees/minutes/seconds
M	Charge Height
m (SH)	Stemming height
M/S	Magnitude/Severity
Mc	Charge mass per metre column.
P	Probability
POI	Points of Interest
PPV	Peak Particle Velocity
RPP	Rock Pressure Pulse
USBM	United States Bureau of Mine
WGS 84	Coordinates (South African)
WM	With Mitigation Measures
WOM	Without Mitigation Measures

List of Units used in this Report

%	percentage
cm	centimetre
dB	decibel
dBL	linear decibel
g/cm^3	gram per cubic centimetre
Hz	frequency
kg	kilogram
km	kilometre
kPa	kilopascal
m	metre
m^2	metre squared
mm/s	millimetres per second
ms	milliseconds

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1 Executive Summary

Blast Management and Consulting (BMC) was contracted to perform an initial review of possible impacts with regard to blasting operations for the proposed underground mining operations at the Jelani Resources Ltd. - Joint Venture Project. Ground vibration, air blast, fly rock, and fumes are some of the aspects that result from blasting operations. This report evaluates the effects of ground vibration from the underground mining operation and intends to provide information, calculations, predictions, possible influences, and mitigations of blasting operations for this project.

The evaluation of effects yielded by blasting operations was conducted over an area as wide as 100 m horizontally from the mining area considered. The range of structures observed is Powerlines / Pylons, Industrial structures / Buildings, Houses, Public Buildings, Gravel roads, Dams, farmlands, Tailings Storage Facilities, etc.

Blasting operations from the mining area are located such that specific impacts were investigated and addressed in the report.

The evaluation mainly considered structures located within a horizontal distance of up to 100 m from the footprint on the surface of the mining area. The distance between the structures and the roof elevation of the mining area is a contributing factor to the levels of ground vibration expected at the surface and the subsequent possible influences. The ground vibration levels predicted for all POIs evaluated ranged between 0.50 mm/s and 0.55 mm/s for structures surrounding the mining area. The predicted ground vibration levels associated with private structures and houses were also within the mentioned range. These buildings are located such that the predicted levels of ground vibration from the assumed charge may not even be perceivable.

Based on the predicted ground vibration levels, no specific mitigation measures are considered necessary at this stage. The predicted levels at surface are below those expected to result in damage to surrounding structures and significant impacts on neighbouring communities. As mining progresses deeper, ground vibration levels at surface are expected to reduce further. Blasting activities should, however, be monitored during the mining process to confirm that actual levels remain in line with the predictions.

This concludes this investigation for the proposed Jelani Resources - Joint Venture Project. There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.

2 Introduction

Jelani Resources (Pty) Ltd is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

Jelani Resources Ltd. holds a Prospecting Rights (PR) for various minerals within the JV area. This PR (Ref: (FS) 30/5/1/1/2/10350 PR) was notarially executed on 21 June 2017 and registered in the Mineral and Petroleum Titles Registration Office (MPTRO) on 11 December 2017 under registration number 95/2017. The rights entitles Jelani to prospect for Silver ore, Gold ore, Uranium ore, Sulphur, Platinum Group Metals, Rare earths, Alluvial diamonds, Copper ore, Cobalt ore, Manganese ore, Molybdenum ore, Nickel ore, Lead ore, Tungsten ore, Zinc ore, and Iron ore occurring in, on, and under various farms situated in the District of Odendaalsrus.

The Jelani tenement is immediately adjacent to and to the west of the Harmony Gold Mining Company Ltd (Harmony) Target Gold Mine, which is a fully permitted and operating mine. The gold deposits of interest cross the boundary between the two properties, and this has resulted in the formation of the joint venture company with a goal of evaluating the mineral resource and mineral reserve potential of the combined properties.

The JV Project area is located 270 km southwest of Johannesburg in the Free State Province of South Africa. The project area is located around the small town of Allanridge just off the R30 national road between the towns of Bothaville (approximately 42 kilometres to the north) and Welkom (30 km to the south).

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage). Where the orebody dips below 55°, conventional breast mining will be used.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mines life, be used for the movement of men, material and rock depending on which phase the mine is in.

Based on the calculated mining productivities, a mining schedule was generated, with the estimated life of mine of 14 Years.

Blast Management and Consulting (BMC) was contracted to perform a review of possible impacts from blasting operations, specifically for the Jelani JV Project area. Ground vibration is one of the aspects that result from blasting operations, and this study considers the possible influences that blasting may have on the surrounding area in this respect. This report concentrates on ground vibration only and intends to provide information, calculations, predictions, possible influences, and mitigating aspects of blasting operations for the project. Underground blasting will produce mainly ground vibration on the surface. The effects of air blast and fly rock are contained underground.

3 Objectives

The objectives of this document are to outline the expected environmental effects that blasting operations could have on the surrounding environment and, if needed, propose the specific mitigation measures that will be required. This study investigates the related influences of the expected ground vibration. These effects are investigated in relation to the mining area and surrounds and the possible influence on nearby private houses, public installations/structures and the owners or occupants thereof.

The objectives were dealt with whilst taking specific protocols into consideration. The protocols applied in this document are based on the author's experience, guidelines taken from literature research, client requirements and general indicators in the various appropriate pieces of South African legislation.

The following South African Acts were considered:

- National Environmental Management Act No. 107 of 1998;
- Mineral and Petroleum Resources Development Act No. 28 of 2002;
- Explosives Act No. 15 of 2003.
- Mine Health and Safety Act No. 29 of 1996;

  Under the Mine Health and Safety Act, the following was published in the Government Gazette and used in the report.No. 5097 on 2 August 2024: Guideline For A Mandatory Code Of Practice For Minimum Standards On Ground Vibrations, Noise, Air-Blast And Flyrock Near Surface Structures And Communities To Be Protected.

4 Scope of Blast Impact Study

The scope of the study is determined by the terms of reference to achieve the objectives. The terms of reference can be summarised according to the following steps taken as part of the proposed Project Environmental Impact Assessment (EIA) with regard to ground vibration due to blasting operations.

- Background information on the proposed site.
- Blasting Operation Requirements.
- Site-specific evaluation of blasting operations according to the following:

- Evaluation of expected ground vibration levels from blasting operations at specific distances and on structures in surrounding areas;
- Evaluation of expected ground vibration influence on neighbouring communities;
- Evaluation of expected blasting influence on national and provincial roads surrounding the blasting operations if present;
- Evaluation of expected ground vibration levels on water boreholes if present within a horizontal surface boundary of 100 m from blasting operations/project area.

- Impact Assessment.
- Mitigations.
- Recommendations.
- Conclusion.

5 Study Area

The JV Project area is located 270 km southwest of Johannesburg in the Free State Province of South Africa. The project area is located around the small town of Allanridge just off the R30 national road between the towns of Bothaville (approximately 42 kilometres to the north) and Welkom (30 km to the south). The centre point of the site is situated at S 25.66506, E 27.26714 (WGS 84, Lat/Lon Deg.).

Figure 1 Shows the Regional Locality of the Jelani JV Project Area and Figure 2 the JV Project Area.



Figure 1: Locality of the Project Area



Figure 2: JV Project Area

6 Methodology

The detailed plan of study consists of the following sections:

- Identifying surface structures/installations that are found within a reasonable distance from the project site. A list of Points of Interest (POI's) is created that will be used for evaluation.
- Baseline influence: The project is evaluated as a new operation with no blasting activities currently being done in the project area specifically. Information from similar type operations adjacent to the project area was considered.
- Site evaluation: This consists of an evaluation of the mining operations and the possible influences from blasting operations. The methodology is modelling the expected impact based on the expected drilling and blasting information provided for the project. Various accepted mathematical equations are applied to determine the attenuation of ground vibration. These values are then calculated over the distance investigated from the site and shown as amplitude level contours. Overlaying these contours on the location of the various receptors then gives an indication of the possible impacts and the expected results of potential impacts. Evaluation of each receptor according to the predicted levels then gives an indication of the possible mitigation measures to be applied. The possible environmental or social impacts are then addressed in the detailed EIA phase investigation.

- Reporting: All data is prepared in a single report and provided for review.

7 Site Investigation

No site visit was done at the time of the report.

8 Season Applicable to the Investigation

The drilling and blasting operations are not season-dependent. The investigation into the possible effects from blasting operations is not season-bound.

9 Assumptions and Limitations

The following assumptions have been made:

- The project will use existing Harmony Target Mine infrastructure to access the mining area, with no new surface mining infrastructure developments required.
- The blast impact is calculated from the cumulative charge mass per delay determined by the three most likely blast design parameters to be blasted simultaneously.
- It is assumed that no more than one (1) stoping panel, one (1) development end, and one (1) decline development panel will be blasted simultaneously without any time delays between them.
- The anticipated levels of influence estimated in this report are calculated using standard accepted methodology according to international and local regulations.
- The assumption is made that the predictions are a good estimate with significant safety factors to ensure that expected levels are based on worst-case scenarios. These will have to be confirmed with actual measurements once the operation is active.
- The work done is based on the author's knowledge and information provided by the project applicant.

10 Legal Requirements

The protocols applied in this document are based on the author's experience, guidelines elicited by the literature research, client requirements, and general indicators provided in the various applicable South African acts. There are specific requirements and regulations concerning blasting operations and the effects of ground vibration, air blast, and fly rock aspects that are addressed in this report. The acts consulted are: National Environmental Management Act No. 107 of 1998; Mineral and Petroleum Resources Development Act No. 28 of 2002; Explosives Act No. 15 of 2003; and the Mine Health and Safety Act No. 29 of 1996 Guideline For A Mandatory Code of Practice for Minimum Standards on Ground Vibrations, Noise, Air-Blast and Flyrock Near Surface Structures and Communities to Be Protected is applied.

In view of the acts consulted, the following guidelines and regulations are also noted to be considered: (where possible, detail was omitted and only information directly applicable was indicated)

- MINE HEALTH AND SAFETY ACT 29 OF 1996

(Gazette No.17242, Notice No. 967 dated 14 June 1996. Commencement date: 15 January 1997 for all sections with the exception of sections 86(2) and (3), which came into operation on 15 January 1998, [Proc.No.4, Gazette No. 17725])

MINE HEALTH AND SAFETY REGULATIONS

CHAPTER 4 EXPLOSIVES

Precautionary measures before initiating explosive charges:

4.7 The employer must take reasonable measures to ensure that when blasting takes place, air and ground vibrations, shock waves and fly material are limited to such an extent and at such a distance from any building, public thoroughfare, railway, power line or any place where persons congregate to ensure that there is no significant risk to the health or safety of persons.

General precautions

4.16 The employer must take reasonable measures to ensure that:

4.16(1) in any mine other than a coal mine, no explosive charges are initiated during the shift unless –

(a) such explosive charges are necessary for the purpose of secondary blasting or reinitiating the misfired holes in development faces;

(b) written permission for such initiation has been granted by a person authorised to do so by the employer; and

(c) reasonable precautions have been taken to prevent, as far as possible, any person from being exposed to smoke or fumes from such initiation of explosive charges;

4.16(2) no blasting operations are carried out within a horizontal distance of 500 metres of any public building, public thoroughfare, railway line, power line, any place where people congregate or any other structure, which it may be necessary to protect in order to prevent any significant risk, unless:

(a) a risk assessment has identified a lesser safe distance and any restrictions and conditions to be complied with;

(b) a copy of the risk assessment, restrictions and conditions contemplated in paragraph (a) has been provided for approval to the Principal Inspector of Mines;

(c) written permission has been granted by the Principal Inspector of Mines; and

(d) any restrictions and conditions determined by the Principal Inspector of Mines are complied with.

CHAPTER 17 SURVEYING, MAPPING AND MINE PLANS

Safety Precautions

Responsibilities regarding safety precautions

17(5) The employer must take reasonable measures to ensure that the competent person referred to in regulation 17(2)(a) is at all times aware of-

(a) workings which are being advanced;

(b) surface structures or objects which may be affected by mining;

(c) workings which are being abandoned or closed down, in order to allow the final surveying thereof;

(d) all workings or any place on surface where there is, or is likely to be, a dangerous accumulation of fluid material, noxious or flammable gas; and

(e) safety pillars that are being, or have been, removed.

17(6) The employer must take reasonable measures to ensure that the competent person referred to in regulation 17(2)(a) in writing notifies the employer, which notification must be dated, of any workings being advanced to come within:

(a) a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps or any other structure whatsoever including structures beyond the mining boundaries, or from any surface, which it may be necessary to protect in order to prevent any significant risk.

(b) 50 (fifty) metres from any excavation, workings, restricted area or any other place where there is, or is likely to be a dangerous accumulation of fluid material, noxious or flammable gas. Such notification must include a sketch plan giving the distance to such place from the nearest survey station.

17(7) The employer must take reasonable measures to ensure that -

(a) no mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with;

(b) workings coming within 50 (fifty) metres from any other excavation, workings, restricted area or any other place where there is, or is likely to be, a dangerous accumulation of fluid material, noxious or flammable gas are mined subject to such restrictions and stopped at such positions as determined by risk assessment.

(c) where ground movement, as a result of mining operations, poses significant risk, an effective ground movement monitoring system is in place.

(d) survey records and plans relating to conditions described in paragraphs (a) and (b) above are made available to the persons doing the risk assessment.

17(8) No person may erect, establish or construct any buildings, roads, railways, dams, waste dumps, reserve land, excavations or any other structures whatsoever within a horizontal distance of 100 (one hundred) metres from workings, unless a lesser distance has been determined safe -

(a) in the case of the employer, by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with; or

(b) in the case of any other person, by a professional geotechnical specialist and all restrictions and conditions determined by him or her or by the Chief Inspector of Mines are complied with;

17(9) The person(s) responsible for activities in terms of regulations 17(7)(a) and 17(8) must –

(a) in the case of an employer, provide the Chief Inspector of Mines with the distance and accompanying restrictions and conditions for comment, and;

(b) in the case of other persons, provide the Chief Inspector of Mines with the distance and accompanying restrictions and conditions for approval.

17(10) No mining operations, erecting, establishment, or construction, as contemplated in regulations 17(7)(a) and 17(8) respectively, may take place until such written comment or approval, as referred to in 17(9)(a) and 17(9)(b), has been obtained.

- MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT 28 OF 2002

(Gazette No. 23922, Notice No. 1273 dated 10 October 2002. Commencement date: 1 May 2004 [Proc. No. R25, Gazette No. 26264])

MINERAL AND PETROLEUM RESOURCES DEVELOPMENT REGULATIONS

67. Blasting, vibration and shock management and control

(1) A holder of a right or permit in terms of the Act must comply with the provisions of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996), as well as other applicable law regarding blasting, vibration and shock management and control.

(2) An assessment of impacts relating to blasting, vibration and shock management and control, where applicable, must form part of the environmental impact assessment report and environmental management programme or the environmental management plan, as the case may be.

11 Sensitivity of Project

A review of the project and the surrounding areas is done before any specific analysis is undertaken, and sensitivity mapping is done based on typical areas and distance from the proposed mining area.

This sensitivity map uses distances within which possible influences may normally occur and where influence is expected to be very low or none. Only one area was identified in this regard:

- A highly sensitive area from within the proposed mining area up to 100 m horizontally around the mining area. Levels of ground vibration are expected to be higher in this area, as well as at the closest expected distance from the surface to the mining area.
- An area greater than 100 m horizontally is considered a low-sensitivity area. In this area, it is relatively certain that influences will be low, with a low possibility of damage and limited possibility to upset people.

Figure 3 Shows the sensitivity mapping with the identified points of interest (POI) in the surrounding areas for the proposed JV Project area. The specific influences will be determined through the work done for this project in this report. A surface view of the area was considered.

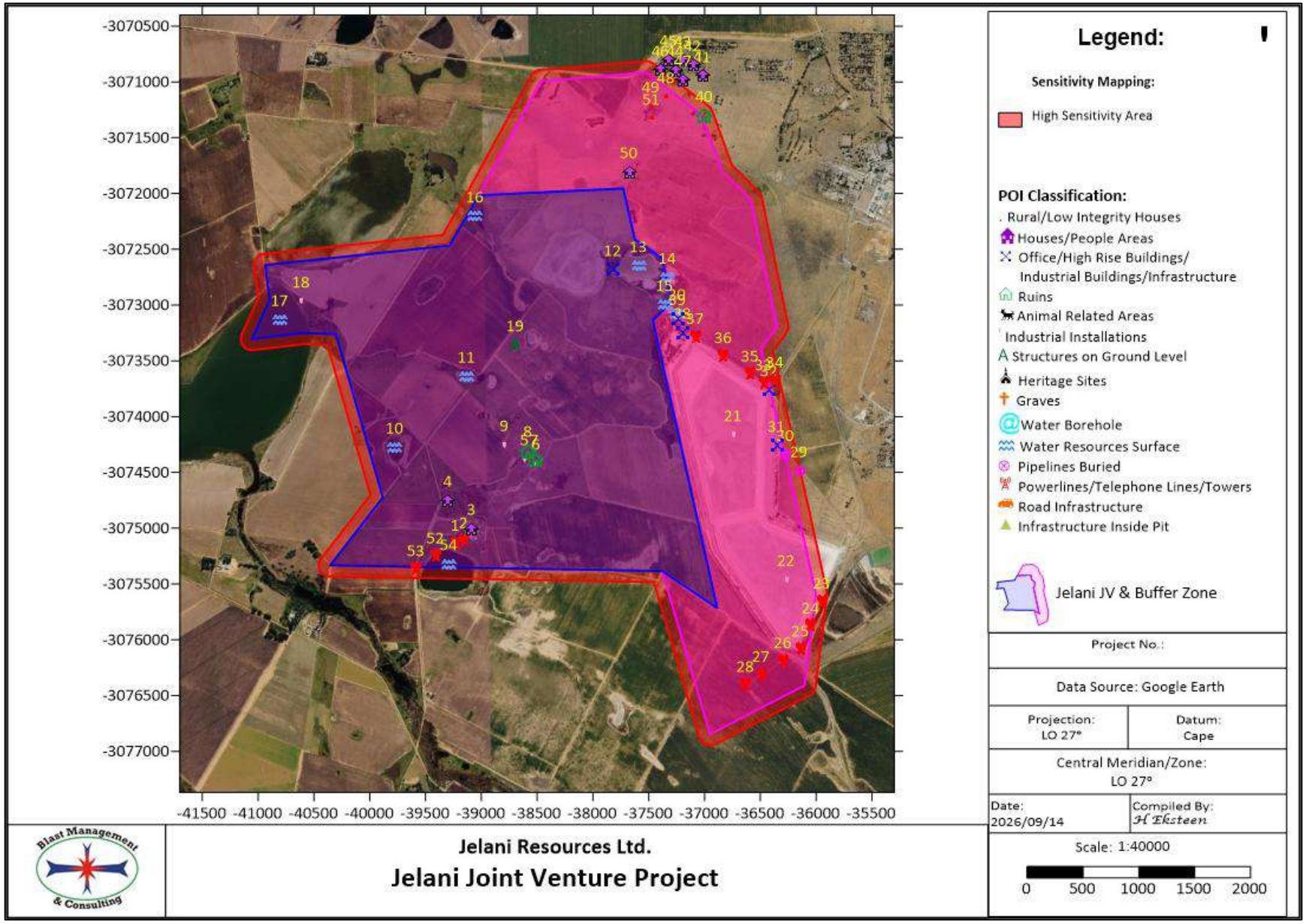


Figure 3: Identified Sensitive Areas for the JV Project Area

12 Consultation Process

No specific consultation with external parties was utilised. The work done is based on the author's knowledge and information provided by the client.

13 Influence from Blasting Operations

Blasting operations are required to break rock and/or ore for mining purposes. Explosives in blast holes provide the required energy to conduct the work. On the surface, ground vibration is a result of the blasting process. Based on the regulations of the different acts consulted and internationally accepted standards, these effects are required to be within certain limits. The following sections provide guidelines on these limits.

13.1 Ground Vibration Limitations on Structures

Ground vibration is measured in velocity with units of millimetres per second (mm/s). Ground vibration can also be reported in units of acceleration or displacement if required. Different types of structures have different tolerances to ground vibration. A steel structure or a concrete structure will have a higher resistance to vibrations than a well-built brick and mortar house. A brick-and-mortar house will be more resistant to vibrations than a poorly constructed or a traditionally built mud house. Different limits are then applicable to the different types of structures. Limitations on ground vibration take the form of maximum allowable levels or intensity for different installations or structures. Ground vibration limits are also dependent on the frequency of the ground vibration. Frequency is the rate at which the vibration oscillates. Faster oscillation is synonymous with higher frequency, and lower oscillation is synonymous with lower frequency. Lower frequencies are less acceptable than higher frequencies because structures have a low natural frequency. Significant ground vibration at low frequencies could cause increased structure vibrations due to the structure's natural low frequency, and this may lead to crack formation or damage.

The following limitations were used by BMC, that is inclusive of the Mine Health and Safety Act No. 29 of 1996, Guideline For A Mandatory Code Of Practice For Minimum Standards On Ground Vibrations, Noise, Air-Blast And Fly rock Near Surface Structures And Communities To Be Protected.

Table 2: Recommended Ground Vibration Levels

Structure Description	Peak Particle Velocity (mm/S)
National roads/tar roads	150
Electrical lines (pylons)	75
Railway	150
Transformers	25
Waters wells	50
Telecoms tower	50

Structure Description	Peak Particle Velocity (mm/S)
General houses of proper construction	USBM criteria or 25 mm/s
Houses of lesser proper construction	12.5
Rural building – mud houses	6

The following additional limitations used by BMC in general and that should be considered were determined through research and prescribed by the various institutions; these are as follows:

- Steel pipelines: 50 mm/s (Rand Water Board).
- Sasol Pipelines: 25 mms/s (Sasol).
- Concrete less than 3 days old: 5 mm/s [1].
- Concrete after 10 days: 200 mm/s [2].
- Sensitive plant equipment: 12 mm/s or 25 mm/s, depending on type. (Some switches could trip at levels of less than 25 mm/s.)[2].
- Waterwells or Boreholes: 50 mm/s [3].

Considering the above limitations, BMC work is based on the following:

- The limits provided in the Mine Health and Safety Act
- The additional limits provided above.
- Consideration of private and public structures and infrastructure in the area of influence.

[1] Chiapetta F., Van Vreden A., 2000. Vibration/Air blast Controls, Damage Criteria, Record Keeping and Dealing with Complaints. 9th Annual BME Conference on Explosives, Drilling and Blasting Technology, CSIR Conference Centre, Pretoria, 2000.

[2] Chiapetta F., Van Vreden A., 2000. Vibration/Air blast Controls, Damage Criteria, Record Keeping and Dealing with Complaints. 9th Annual BME Conference on Explosives, Drilling and Blasting Technology, CSIR Conference Centre, Pretoria, 2000.

[3] Berger P. R., & Associates Inc., Bradfordwoods, Pennsylvania, 15015, Nov 1980, Survey of Blasting Effects on Ground Water Supplies in Appalachia., Prepared for United States Department of Interior Bureau of Mines.

13.2 Ground Vibration Limitations and Human Perceptions

A further aspect of ground vibration and frequency of vibration that must be considered is human perception. It should be realized that the legal limit set for structures is significantly greater than the comfort zone of human beings. Humans and animals are sensitive to ground vibration and the vibration of structures. Research has shown that humans will respond to different levels of ground vibration at different frequencies.

Ground vibration is experienced at different levels; BMC considers only the levels that are experienced as “Perceptible”, “Unpleasant” and “Intolerable”. This is indicative of the human being’s perceptions of ground vibration and clearly indicates that humans are sensitive to ground vibration and humans perceive ground vibration levels of 0.9 mm/s as perceptible (See Figure 4). This guideline helps with managing ground vibration and the complaints that could be received due to blast-induced ground vibration.

Indicated on Figure 4 is a blue solid line that indicates a ground vibration level of 12.5 mm/s and a green dotted line that indicates a ground vibration level of 6 mm/s. These are levels that are used in the evaluation.

Generally, people also assume that any vibration of a structure - windows or roofs rattling - will cause damage to the structure.

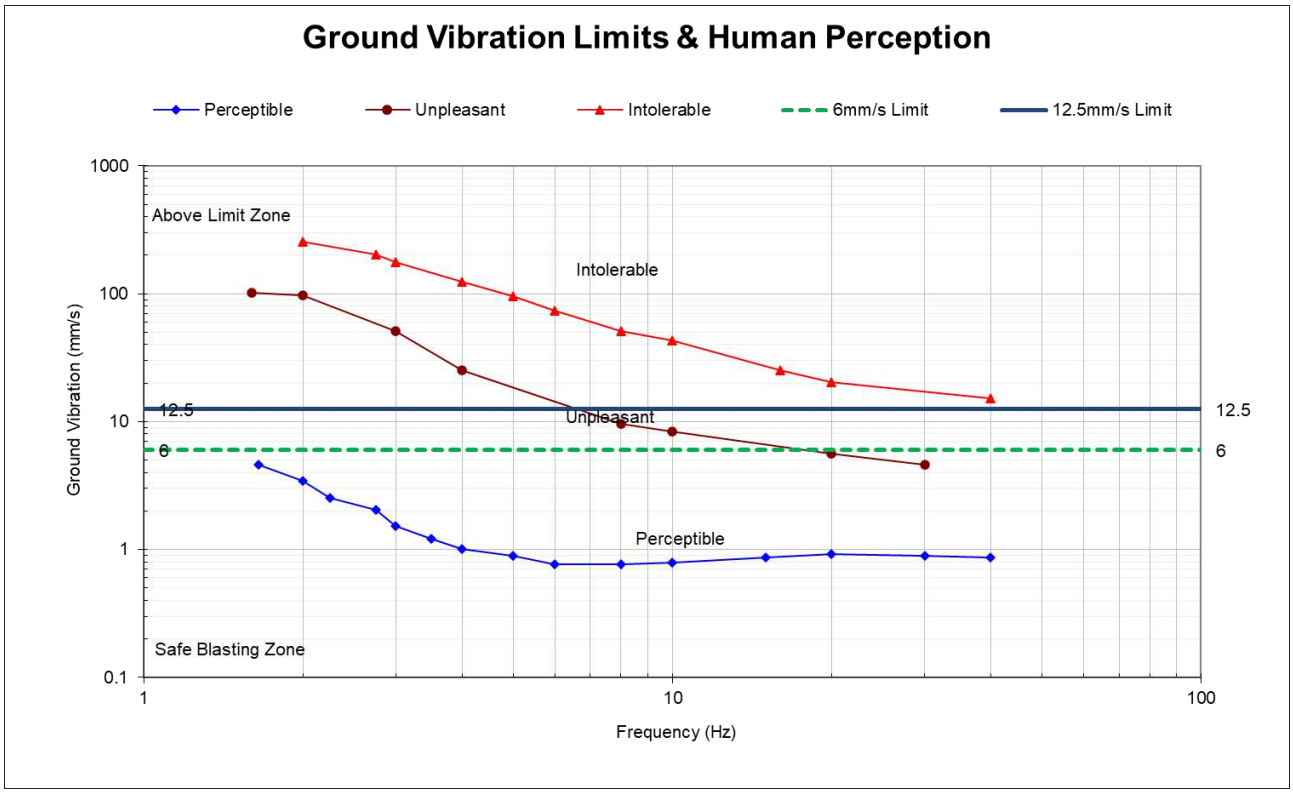


Figure 4: USBM Analysis with Human Perception

13.3 Vibration Impact on Adjacent Communities

The effects of ground vibration will influence people. These effects tend to create noise in structures in various forms, and people react to these occurrences even at low levels. As with human perception given above, people will experience ground vibration at very low levels. These levels are well below the damage capability for most structures.

Much work has also been done in the field of public relations in the mining industry. Most probably one aspect that stands out is “Promote good neighbourliness”. This is achieved through communication and more communication with the neighbours. Considering their concerns and address it in a proper manner.

The first level of good practice is to avoid unnecessary problems. One problem that can be reduced is the public's reaction to blasting. Concern for a person's home, particularly where they own it, could be reduced by a scheme of precautionary, compensatory and other measures which offer guaranteed remedies without undue argument or excuse.

In general, it is also in an operation's financial interest not to blast where there is a viable alternative. Where there is a possibility of avoiding blasting, perhaps through new technology, this should be carefully considered in the light of environmental pressures. Historical precedent may not be a helpful guide to an appropriate decision.

Independent structural surveys are one way of ensuring good neighbourship. There is a part of inherent difficulty in using surveys, as the interpretation of changes in crack patterns that occur may be misunderstood. Cracks open and close with the seasonal changes of temperature, humidity and drainage, and numbers increase as buildings age. Additional actions need to be done in order to supplement the surveys as well.

13.4 Cracking of Houses

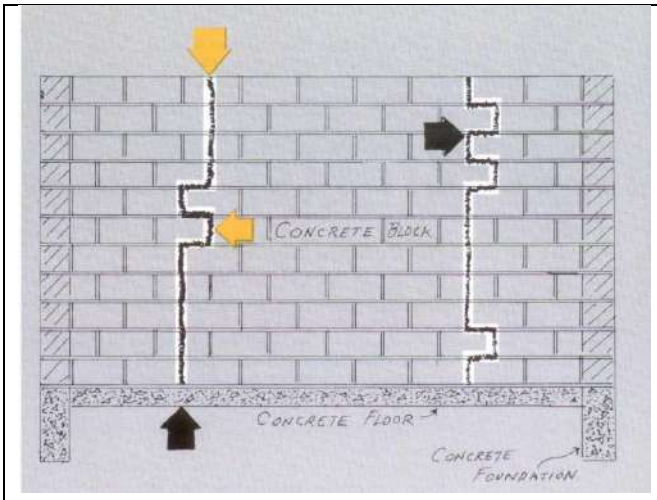
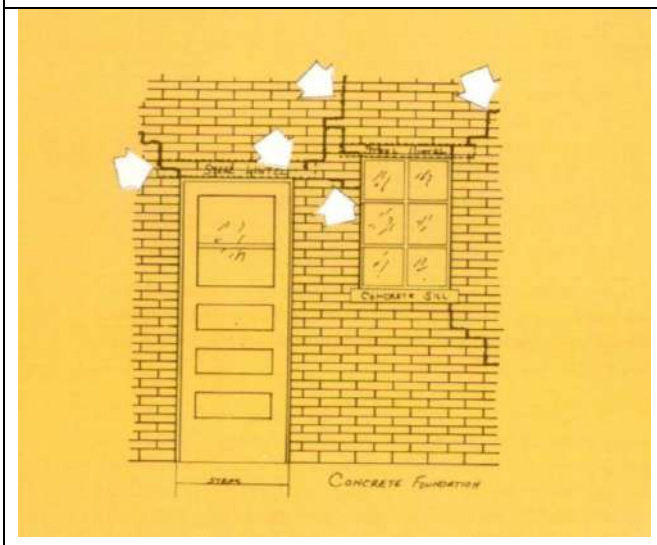
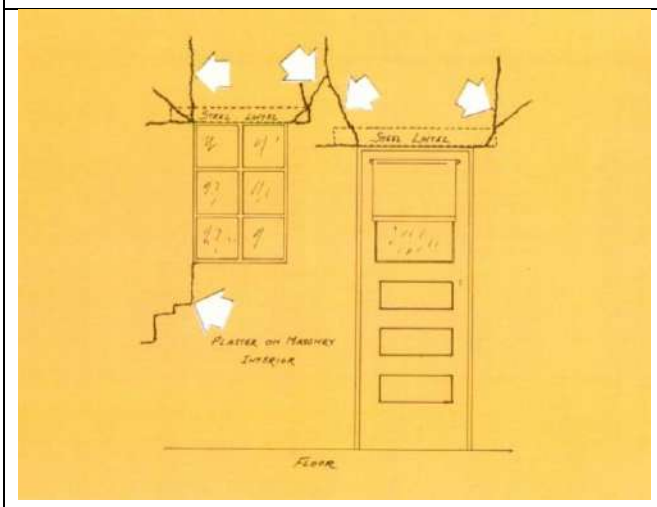
Houses in general have cracks. It is reported that a house could develop up to 15 non-blasting cracks a year. Ground vibration will be mostly responsible for cracks in structures if high enough and at continued high levels. The influences of environmental forces such as temperature, water, wind, etc. are more likely to cause cracks that have developed. Visual results of actual damage due to blasting operations are limited. There are cases where it did occur, and a result is shown. Figure 5 below. A typical X-crack formation is observed.

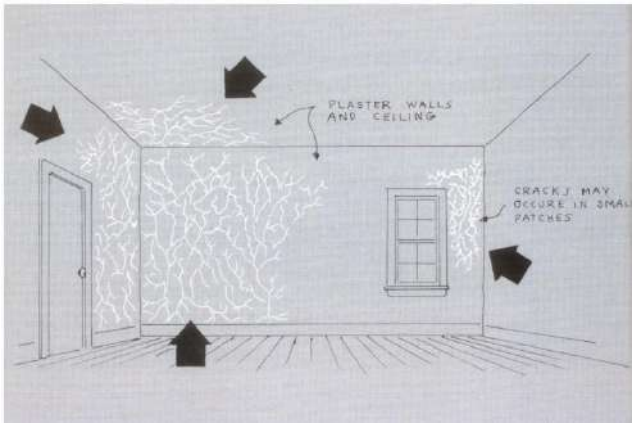
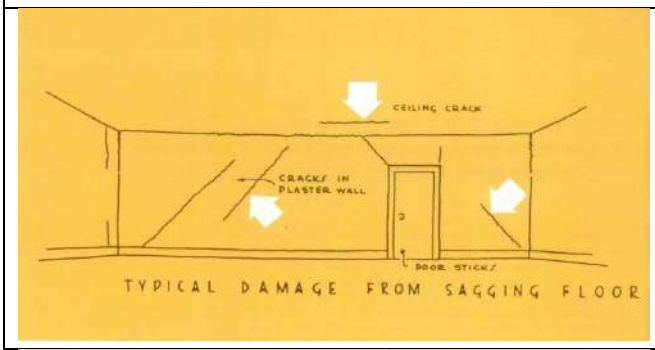
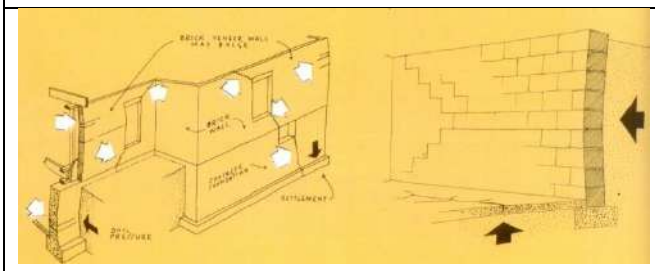


Figure 5: Example of blast-induced damage.

The table below, with figures, shows illustrations of non-blasting damage that could be found.

Table 3: Examples of typical non-blasting cracks

	Cracks Resulting from Shrinkage of Concrete Blocks
	Typical Lintel Cracks
	Typical Lintel Cracks

	"Crazing" Cracks on Plaster
	Plaster Cracks Caused by Sagging Floors
	Cracks Resulting from Foundational Failure

14 Baseline Results

Baseline work for this report normally consists of two parts. The first part is monitoring of blasting operations if the mine is operational. The second part of baseline work done is familiarising oneself with the surroundings and the typical structures that are found in the area of the project. The information for this is presented below.

14.1 Baseline Influence

The project is evaluated as a new area next to existing mining operations that are currently operational. The existing underground infrastructure and shafts will be used for the JV Project area, with no new mining infrastructure required.

14.2 Structure Profile

As part of the baseline, all possible structures in a possible influence area are identified. The site was reviewed using Google Earth imagery. Information sought during the review was to identify surface structures present in a 100 m radius horizontally from the proposed underground mining

area, which will require consideration during modelling of blasting operations, e.g. houses, general structures, power lines, pipelines, reservoirs, mining activity, roads, shops, schools, gathering places, possible historical sites, Hydrocensus boreholes, etc. A list was prepared of all structures in the vicinity of the underground area. The list includes POI's within the 100 m boundary – see Table 5 below. A list of structure locations was required to determine the allowable ground vibration limits. Figure 3 shows an aerial view of the planned underground mining area and surroundings with POI's. The type of POI's identified is grouped into different classes. These classes are indicated as "Classification" in Table 4. The classification used is a BMC classification and does not relate to any standard or national or international code or practice. Table 4 shows the descriptions for the classifications used.

Table 4: POI Classification Used

Class	Description
1	Rural buildings and structures of poor construction
2	Private Houses and people's sensitive areas
3	Office, High-rise buildings, and Industrial buildings / Infrastructure
4	Ruins
5	Animal-related installations and animal-sensitive areas
6	Industrial Installations
7	Earth-like structures – no surface structure
8	Heritage sites (buildings, infrastructure, activity)
9	Graves
10	Water Borehole
11	Water Resources Surface
12	Pipelines Buried
13	Powerlines / Telephone Lines / Towers
14	Road Infrastructure
15	Infrastructure Inside Pit

Table 5: List of Points of Interest Identified (Cape – LO 27°)

Tag	Description	Classification	Y	X
1	Power Lines/Pylons	13	39230.907	3075131.78
2	Power Lines/Pylons	13	39152.809	3075108.13
3	Farmstead	2	39083.376	3075004.04
4	Farmhouses	2	39295.769	3074753.67
5	Cement Dam	6	38608.11	3074380.7
6	Cement Dam	6	38507.785	3074420.95
7	Ruins	4	38519.524	3074383.06
8	Ruins	4	38578.705	3074305.83
9	Cement Dam	6	38790.702	3074255.54
10	Dam	11	39772.858	3074274.75
11	Dam	11	39129.773	3073639.4
12	Pump House	3	37818.809	3072683.34
13	Dam	11	37588.371	3072649.15
14	Dam	11	37329.667	3072753.52
15	Dam	11	37354.434	3072999
16	Dam	11	39052.322	3072206.61

Tag	Description	Classification	Y	X
17	Dam	11	40804.351	3073131.27
18	Cement Dam	6	40612.427	3072968.39
19	Cultivated Fields	7	38692.038	3073360.97
20	Dam	11	37242.246	3073075.71
21	Tailings Dam	6	36741.588	3074164.45
22	Tailings Dam	6	36265.489	3075461.52
23	Power Lines/Pylons	13	35945.732	3075650.34
24	Power Lines/Pylons	13	36045.357	3075871.07
25	Power Lines/Pylons	13	36137.854	3076078.81
26	Power Lines/Pylons	13	36293.916	3076181.04
27	Power Lines/Pylons	13	36489.173	3076306.9
28	Power Lines/Pylons	13	36629.885	3076397.6
29	Pipeline	12	36149.591	3074487.46
30	Pipeline	12	36273.452	3074343.3
31	Mine Building/Structure	3	36350.547	3074260.35
32	Mine Building/Structure	3	36418.595	3073762.16
33	Power Lines/Pylons	13	36467.397	3073693.67
34	Power Lines/Pylons	13	36364.982	3073669.95
35	Power Lines/Pylons	13	36587.29	3073613.24
36	Power Lines/Pylons	13	36829.317	3073450.19
37	Power Lines/Pylons	13	37080.9	3073277.43
38	Mine Building/Structure	3	37193.522	3073245.37
39	Mine Building/Structure	3	37239.896	3073124.62
40	Ruins	4	36999.331	3071302.29
41	Houses	2	37015.969	3070946.64
42	Houses	2	37101.364	3070850
43	Houses	2	37190.276	3070808.32
44	Houses	2	37259.215	3070898.12
45	Houses	2	37318.434	3070801.1
46	Houses	2	37391.449	3070893.51
47	Structure	2	37188.854	3070985.08
48	Informal Housing	1	37342.942	3071134.91
49	Informal Housing	1	37477.482	3071219.65
50	Structure	2	37672.756	3071807.82
51	Informal Housing	1	37473.499	3071328.09
52	Power Lines/Pylons	13	39407.802	3075245.42
53	Power Lines/Pylons	13	39582.495	3075358.13
54	Dam	11	39287.909	3075321.15

15 Blasting Operations

In order to evaluate the possible influence of blasting operations with regard to ground vibration, a proposed blast design is required to determine possible influences.

The JV Project will entail conventional breast mining at dips of less than 55 degrees and shrinkage stoping at dips greater than 55 degrees, all of which will require drilling and blasting, as well as the advancing of development ends and the construction of the service and chair-lift declines. Currently, final blast designs for the various blasting activities expected during the mining process are not available. Therefore, typical blast designs for development end blasting and decline development

were adopted to determine the charge mass per delay for each scenario. The stoping charges were calculated from the number of holes on average per stope panel and the expected hole lengths with estimated charges normally used in stope blasting. These were then taken as a cumulative charge mass per delay for calculation purposes.

Although multiple panels may be blasted during a shift, it is assumed that no more than one stope panel, one development end panel, and one decline development panel will be fired simultaneously without any time delays between them. On this basis, a total charge mass per delay of 343 kg was adopted for the ground vibration prediction modelling as a worst-case scenario.

15.1 Technical Blast Design Data

The typical blast designs for development end blasting and decline development were replicated and simulated using JKSimBlast, with the relevant blast data extracted to determine the maximum charge mass per delay for each blasting scenario. Stope blasting charges were assumed from the data given and as per industry practices. The maximum charge mass per delay for each scenario was then used to determine the cumulative charge mass per delay for the assumed simultaneous blasting of one stope panel, one development end panel, and one decline development panel. Table 6 and Table 7 below shows the technical data from the blast designs, and Figure 6 to Figure 11 shows the blast layout with blast hole depth, as well as the maximum charge mass per delay and number of blast holes detonating per delay.

Table 6: Development End Blast Data Summary

Blast Design Name:	Jelani_DevEnd3
CURRENT DRIVE	
Name:	Drive #1
Geology:	waste
Circumference (m):	13.01
Area (m^2):	11.15
Rock SG:	3
Approx. Powder Factor (kg/t):	1.668
HOLES	
Number of Holes:	75
Total length of all holes (m):	240
Minimum hole length (m):	3.2
Maximum hole length (m):	3.2
CHARGE DECKS	
Number of charge decks:	74
Length of all charges (m):	131.18
Mass of all charges (Kg):	178.53

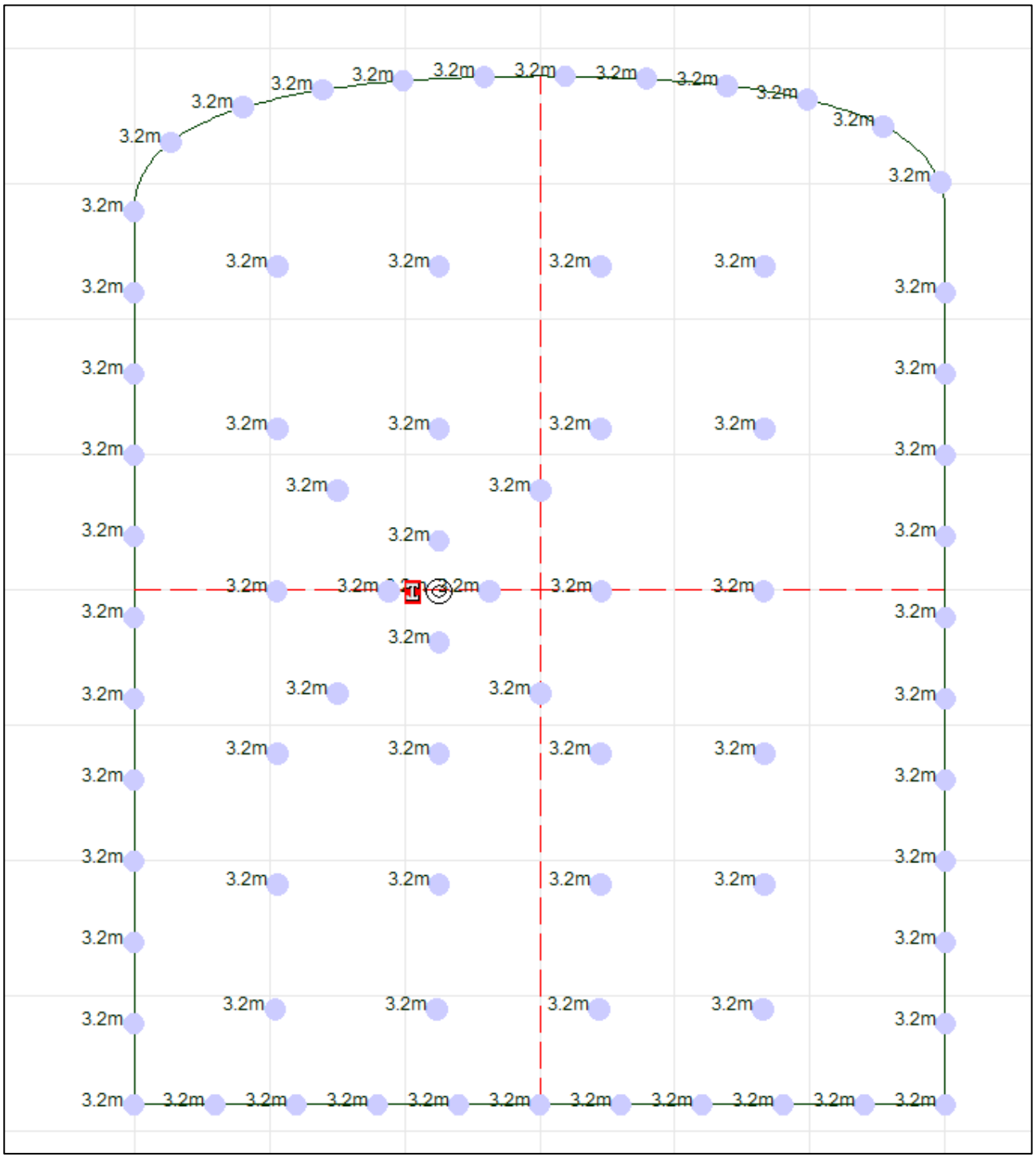


Figure 6: Design Layout with Blasthole Depth – Development End

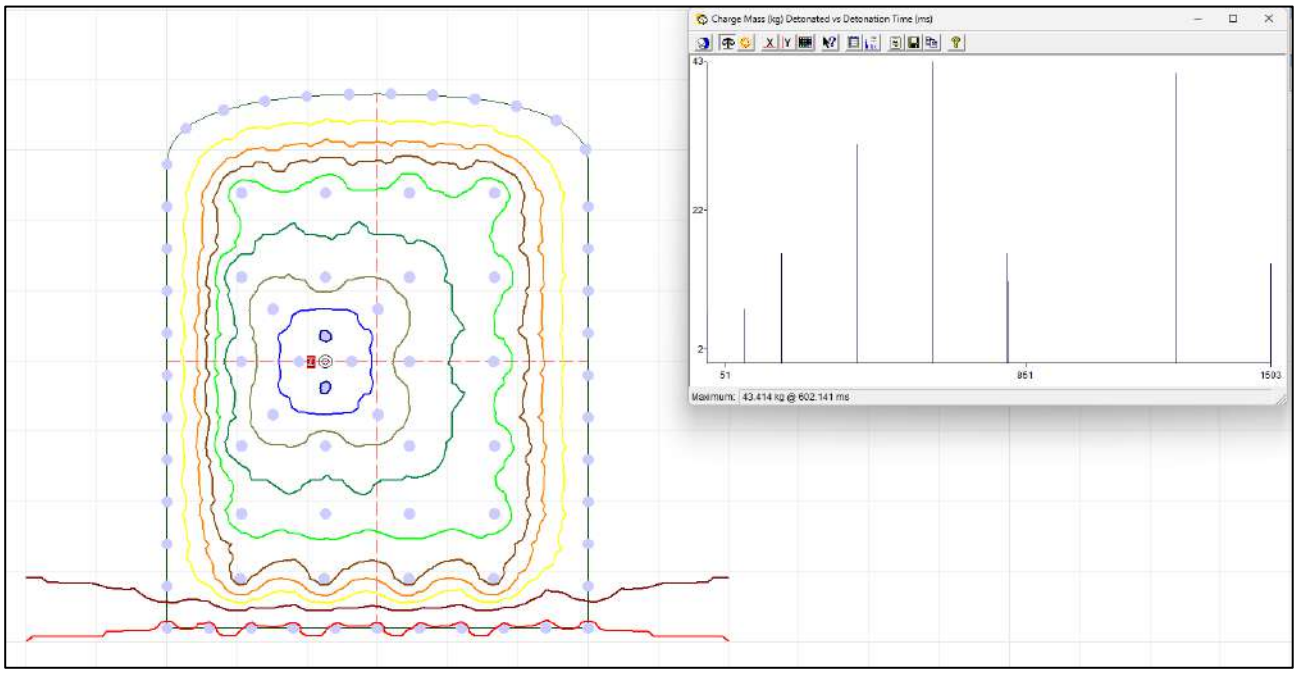


Figure 7: Blast Simulation showing Maximum Charge per Delay – Development End

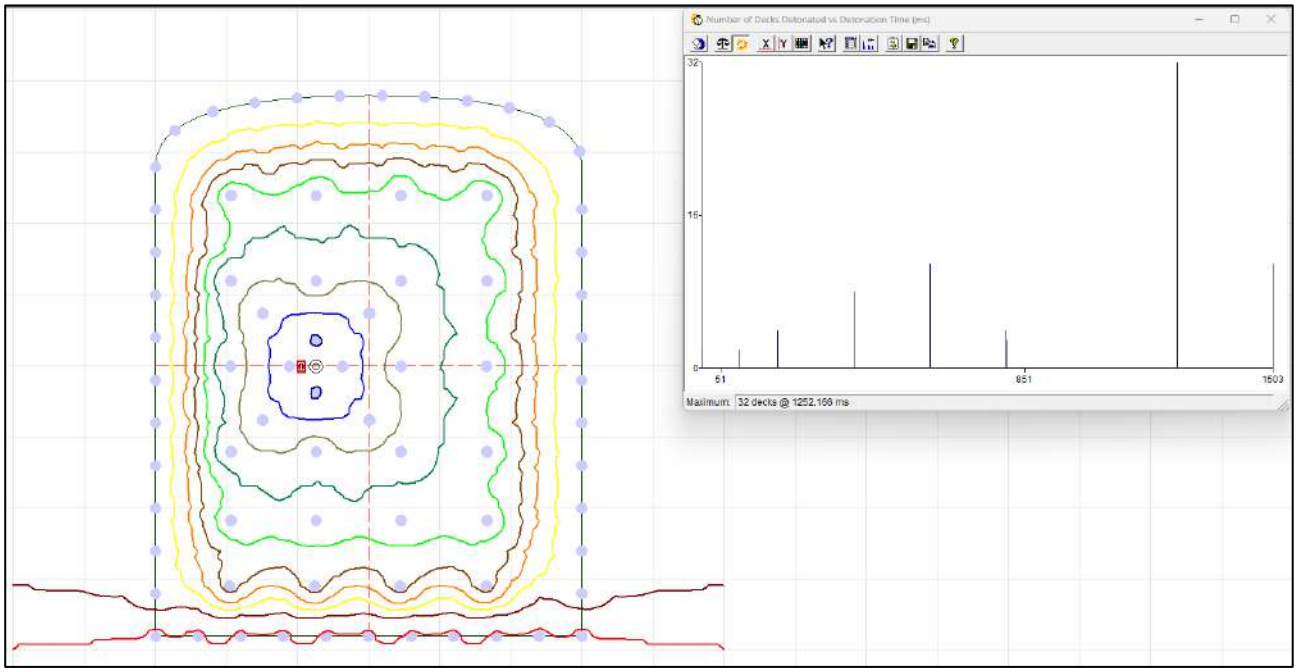


Figure 8: Blast Simulation showing Maximum Blastholes per Delay – Development End

Table 7: Decline Development Blast Data Summary

Blast Design Name:	Jelani_DeclineDev2
CURRENT DRIVE	
Name:	Drive #1
Geology:	
Circumference (m):	24.19
Area (m²):	36.81
Rock SG:	3
Approx. Powder Factor (kg/t):	1.133

HOLES	
Number of Holes:	91
Total length of all holes (m):	391.3
Minimum hole length (m):	4.3
Maximum hole length (m):	4.3
CHARGE DECKS	
Number of charge decks:	90
Length of all charges (m):	271.2
Mass of all charges (Kg):	538.11

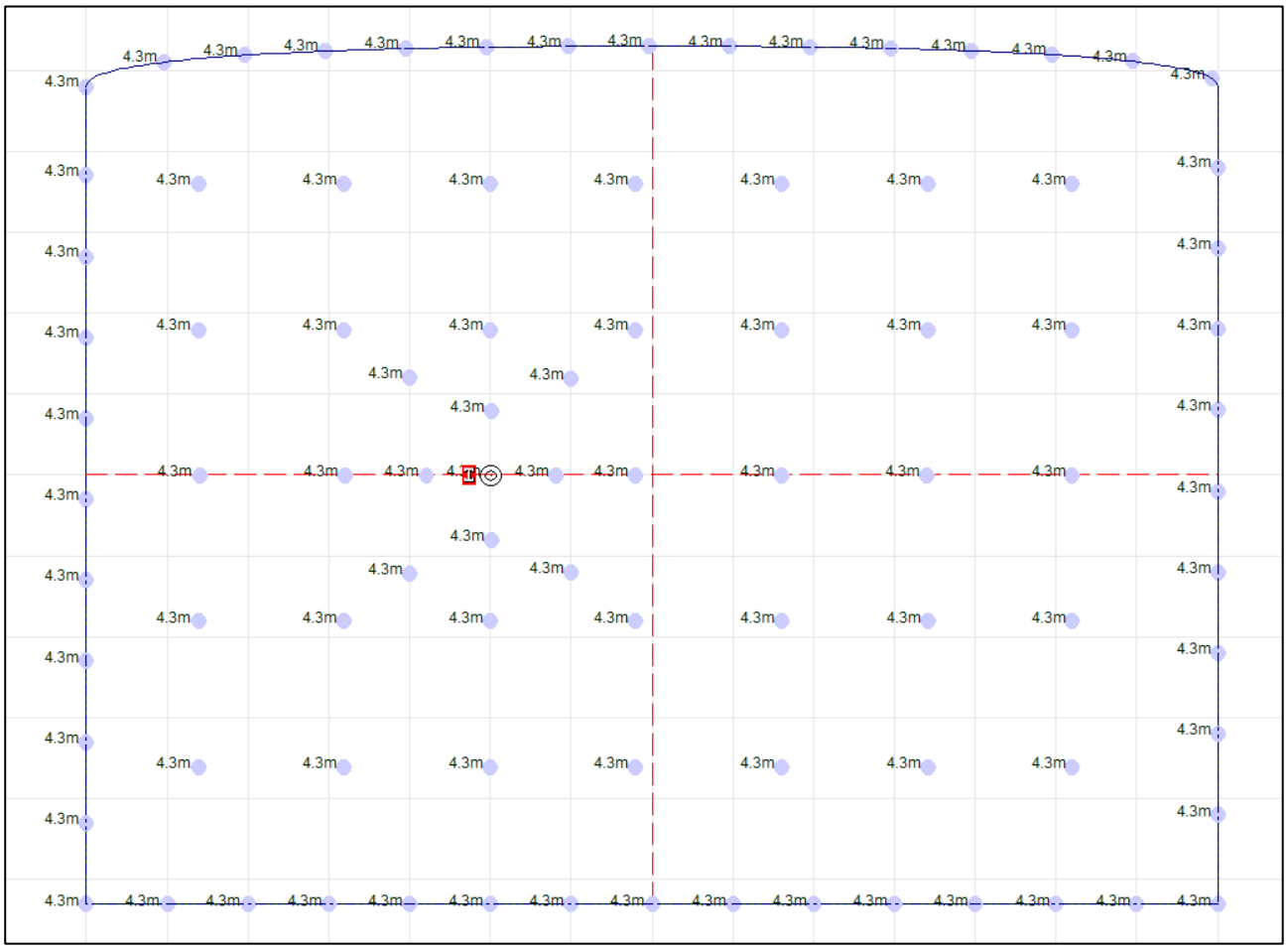


Figure 9: Design Layout with Blasthole Depth – Decline Development

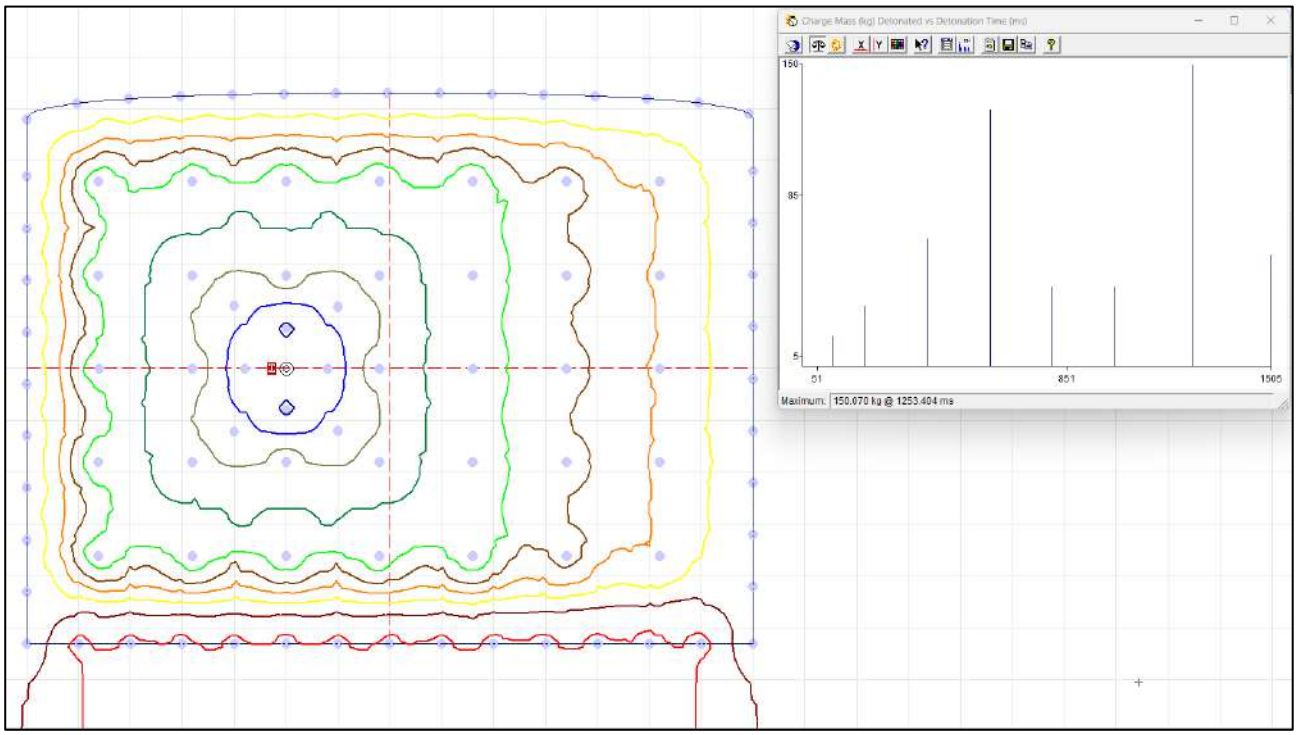


Figure 10: Blast Simulation showing Maximum Charge per Delay – Decline Development

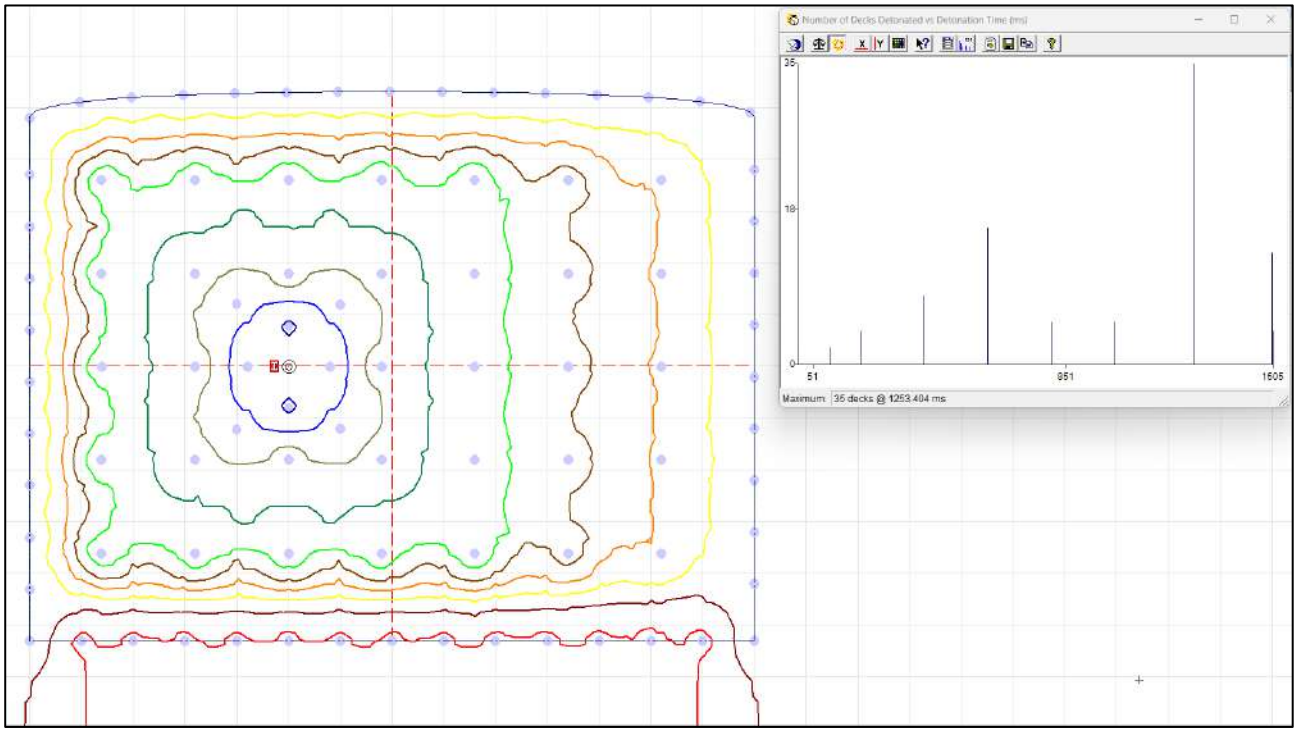


Figure 11: Blast Simulation showing Maximum Blastholes per Delay – Decline Development

The maximum charge mass per delay associated with the typical blast designs for stoping, development end blasting and decline development was determined from the respective blast simulations and assumptions. Although multiple panels may be blasted during a shift, it is assumed that no more than one stope panel, one development end panel, and one decline development panel will be fired simultaneously, without any delay between them. On this basis, a cumulative charge mass per delay of 343 kg (150 Kg per stope panel, 43 Kg per development end, and 150 Kg

per decline development) was adopted for the ground vibration prediction modelling as a worst-case scenario, and this value has been applied in the impact evaluation.

15.2 Ground Vibration

To predict ground vibration and possible decay, a standard accepted mathematical process of scaled distance is used. The equation applied (Equation 1) uses the charge mass and distance with two site constants. The site constants are specific to a site where blasting is to be done. In the absence of measured values, an acceptable standard set of constants is applied.

Equation 1:

$$PPV = a(\frac{D}{\sqrt{E}})^{-b}/2$$

Where:

PPV = Predicted ground vibration (mm/s)

a = Site constant

b = Site constant

D = Distance (m)

E = Explosive Mass (kg)

Applicable and accepted factors a and b for new operations is as follows:

Factors:

a = 1143

b = -1.65

Utilizing the abovementioned equation and the given factors, allowable levels for specific limits and expected ground vibration levels can then be calculated for various distances.

Review of the type of structures that are found within the possible influence zones of the proposed mining area and the limitations that may be applicable, different limiting levels of ground vibration will be required. This is due to the typical structures and installations observed surrounding the site and location of the project area. Structure types and qualities vary greatly, and this calls for limits to be considered as follows: 6 mm/s, 12.5 mm/s, 25 mm/s and 50 mm/s at least.

Based on the expected drilling and blasting parameters, the following Table 8 shows expected ground vibration levels (PPV) for various distances from underground to surface, calculated at the total charge mass anticipated.

Table 8: Expected Ground Vibration at Various Distances

No.	Distance (m)	Expected PPV (mm/s) for 343 kg Charge
1	500.0	2.5
2	600.0	1.8
3	700.0	1.4

No.	Distance (m)	Expected PPV (mm/s) for 343 kg Charge
4	800.0	1.1
5	900.0	0.9
6	1000.0	0.8
7	1250.0	0.5
8	1500.0	0.4
9	1750.0	0.3
10	2000.0	0.3
11	2500.0	0.2
12	3000.0	0.1
13	3500.0	0.1

16 Construction Phase: Impact Assessment and Mitigation Measures

There will be no construction phase as existing Harmony Shafts will be utilised for access to the JV project and buffer mining areas. The existing infrastructure associated with the Harmony Shafts, such as ventilation shafts, transportation routes, stockpile areas and concentrators, will be used for the mining of the JV Project.

17 Operational Phase: Impact Assessment and Mitigation Measures

The underground mining operations is the main objective of the JV project and is considered the operational phase of the project.

The following aspects, with comments, are addressed for each of the evaluations done:

- Ground Vibration modelling results
- Ground Vibration and human perception
- Vibration impact on adjacent communities
- Cracking of houses and consequent devaluation

Please note that this analysis does not take geology, topography, or the actual final drill and blast pattern into account. The data is based on good practice applied internationally and considered very good estimates based on the information provided and supplied in this document.

17.1 Review of Expected Ground Vibration

The area surrounding the proposed JV Project and buffer mining areas were reviewed for structures, traffic, roads, human interface, animals' interface, industrial structures, etc. Various installations and structures were observed. These are listed in Table 5. Ground vibration on the surface is the only expected impact associated with the underground operations. This section concentrates on the outcome of modelling the possible effects of ground vibration on these points of interest or possible

interfaces. In the evaluation, the charge mass scenario selected as indicated in section 15.1 is considered regarding ground vibration.

Underground blasting will produce mainly ground vibration on the surface. The effects of air blast and fly rock are contained underground. The actual blast may be heard depending on the depth below the surface. Analysis of impacts from blasting is based on the distance from the POI to the roof elevation of the mining area. Thus, the assessment is based on a distance of 1250 m from surface, representing the closest point at which mining will occur relative to surface. As explained previously, reference is only made to selected structures, as these are considered representative of the extent of all structures surrounding the mining area.

Tables are provided for the maximum charge model concerning:

- "Tag" No. is the number corresponding to the POI figures.
- "Description" indicates the type of the structure.
- "Distance" is the distance between the structure and the roof elevation of the mining area.
- "Specific Limit" is the maximum limit for ground vibration at the specific structure or installation.
- "Predicted PPV (mm/s)" is the calculated ground vibration at the structure.
- The "Structure Response @ 10Hz and Human Tolerance @ 30Hz" indicates the possible concern and if there is any concern for structural damage or potential negative human perception, respectively. Indicators used are "perceptible"," unpleasant", "intolerable", which stem from the human perception of information given and indicators such as "high" or "low" are given for the possibility of damage to a structure. Levels below 0.76 mm/s could be considered to have a negligible possibility of influence.

The simulations for the underground workings on expected ground vibration levels from maximum charge mass are presented in Figure 12 and Figure 13 below. The charge mass applied is according to blast design discussed in Section 15.1. These levels are then plotted and overlaid with the proposed mining area to observe possible influences at structures identified. Structures or POI's for consideration are also plotted in this model. Ground vibration predictions were done considering a distance of 1250 m from the mining area to surface.

The simulation provided shows ground vibration contours only for a limited number of levels. The levels shown are from the calculated minimum and maximum ground vibration predictions. This enables immediate review of possible impacts that may be applicable to any of the privately or publicly owned structures, social gathering areas or sensitive installations.

Data is provided as follows: Vibration contours; a table with predicted ground vibration values and evaluation for each POI. Additional colour codes used in the tables are as follows:

Table 9: Colour coding assessment

Structure Evaluations:
Vibration levels higher than the proposed limit applicable to Structures / Installations is coloured "Red"
People's Perception Evaluation:
Vibration levels indicated as Intolerable on the human perception scale is coloured "Red"
Vibration levels indicated as Unpleasant on the human perception scale is coloured "Mustard"
Vibration levels indicated as Perceptible on the human perception scale is coloured "Light Green"
POI's that are found inside the shaft area are coloured "Olive Green"

Simulations for expected ground vibration levels from maximum charge mass are presented below.

17.1.1 **Ground Vibration Maximum Charge Mass per Delay – 343 kg**

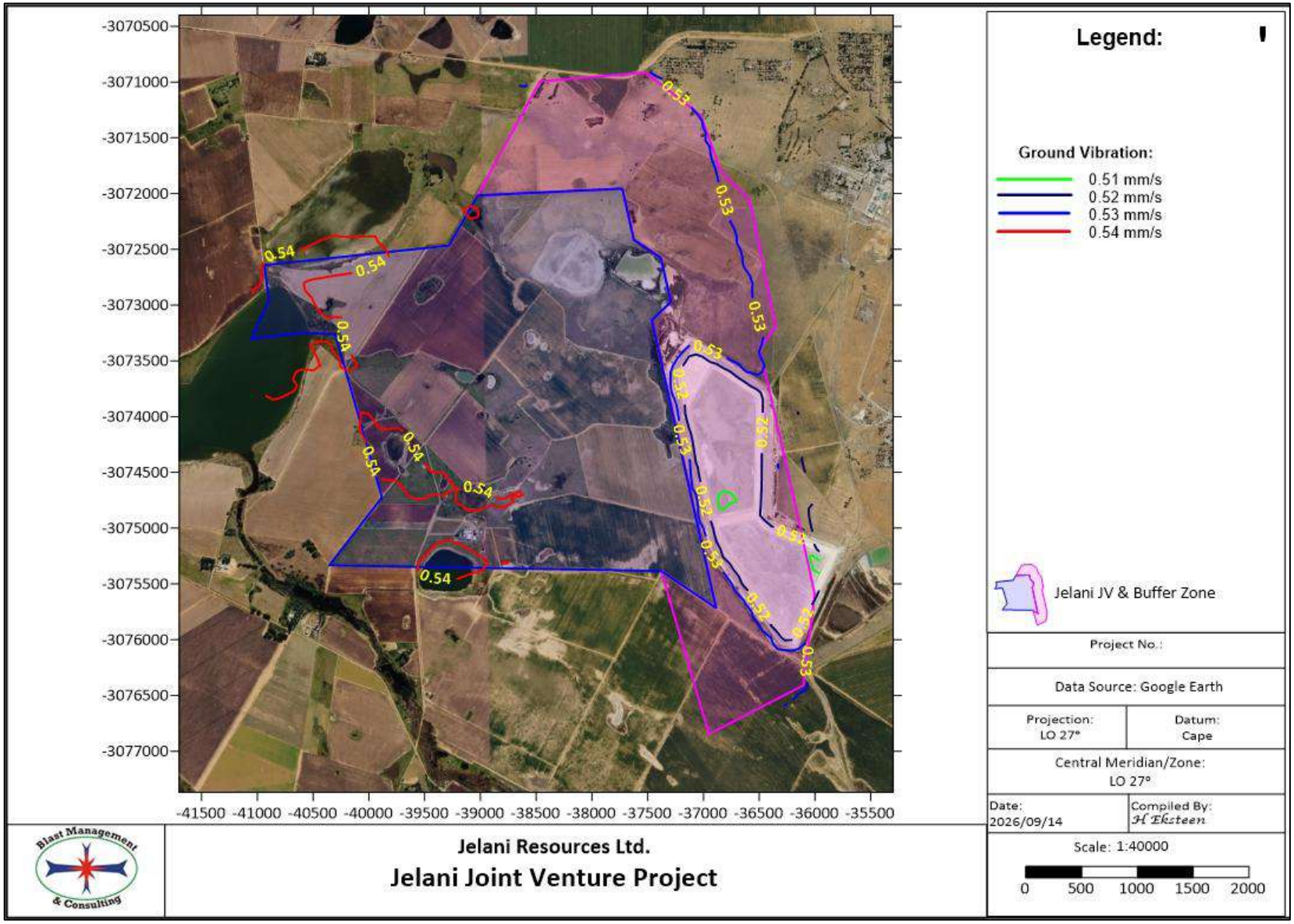


Figure 12: Ground Vibration Influence from Maximum Charge per Delay – Contours

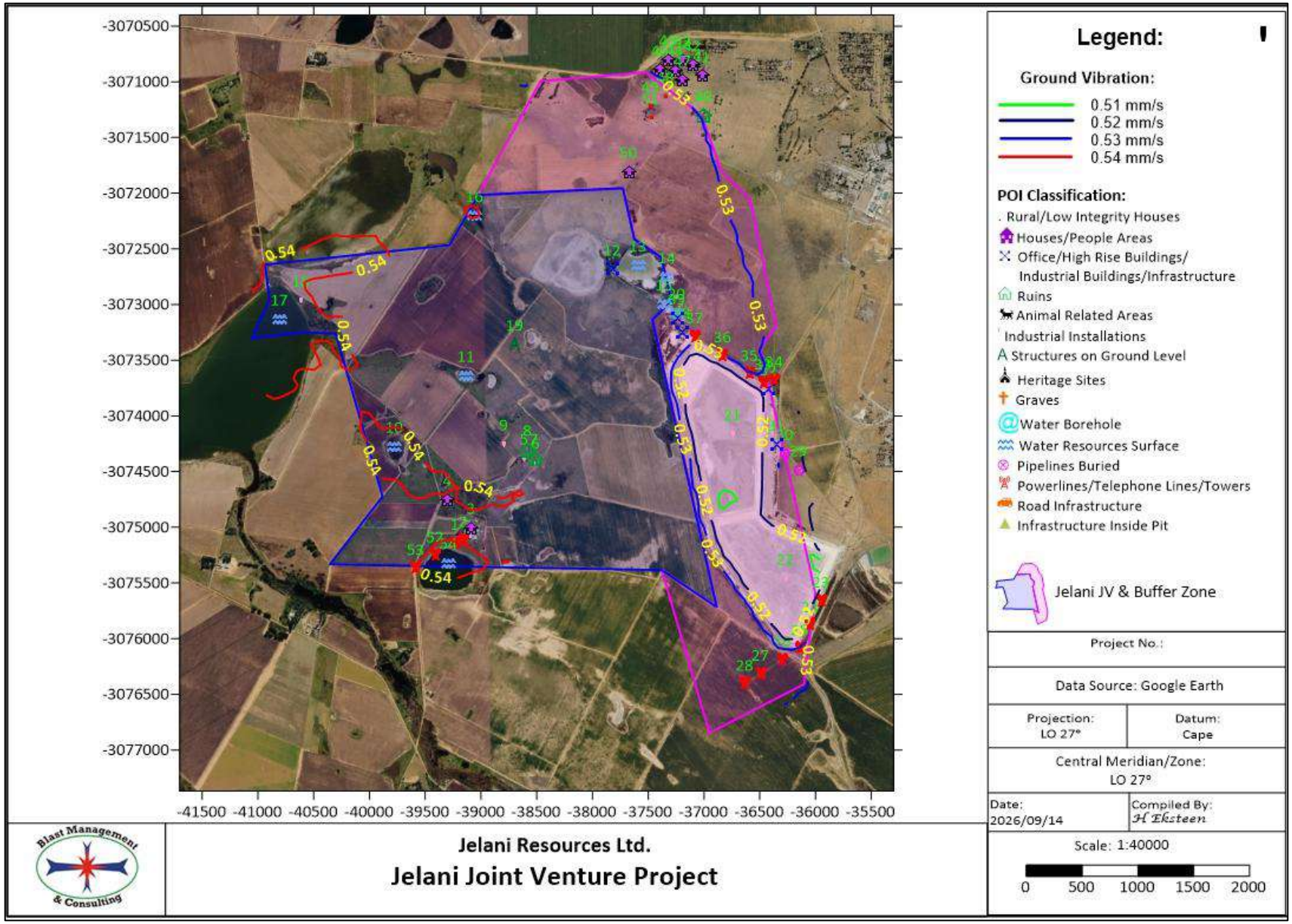


Figure 13: Ground Vibration Influence from Maximum Charge per Delay – Contours with POI's

Table 10: Ground Vibration Evaluation for Maximum Charge – 343 Kg

Tag	Description	Ground Vibration Limit (mm/s)	Distance (m)	Total Mass/Delay (kg)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
1	Power Lines/Pylons	75	1262	343	0.54	Acceptable	N/A
2	Power Lines/Pylons	75	1263	343	0.54	Acceptable	N/A
3	Farmstead	12.5	1263	343	0.54	Acceptable	Too Low
4	Farmhouses	12.5	1262	343	0.54	Acceptable	Too Low
5	Cement Dam	50	1267	343	0.54	Acceptable	N/A
6	Cement Dam	50	1265	343	0.54	Acceptable	N/A
7	Ruins	6	1266	343	0.54	Acceptable	N/A
8	Ruins	6	1266	343	0.54	Acceptable	N/A
9	Cement Dam	50	1266	343	0.54	Acceptable	N/A
10	Dam	50	1258	343	0.54	Acceptable	N/A
11	Dam	50	1263	343	0.54	Acceptable	N/A
12	Pump House	50	1266	343	0.54	Acceptable	Too Low
13	Dam	50	1267	343	0.54	Acceptable	N/A
14	Dam	50	1267	343	0.54	Acceptable	N/A
15	Dam	50	1269	343	0.53	Acceptable	N/A
16	Dam	50	1261	343	0.54	Acceptable	N/A
17	Dam	50	1250	343	0.55	Acceptable	N/A
18	Cement Dam	50	1257	343	0.54	Acceptable	N/A
19	Cultivated Fields	200	1266	343	0.54	Acceptable	N/A
20	Dam	50	1269	343	0.53	Acceptable	N/A
21	Tailings Dam	12.5	1304	343	0.51	Acceptable	N/A
22	Tailings Dam	12.5	1303	343	0.51	Acceptable	N/A
23	Power Lines/Pylons	75	1280	343	0.53	Acceptable	N/A
24	Power Lines/Pylons	75	1278	343	0.53	Acceptable	N/A
25	Power Lines/Pylons	75	1275	343	0.53	Acceptable	N/A
26	Power Lines/Pylons	75	1273	343	0.53	Acceptable	N/A
27	Power Lines/Pylons	75	1272	343	0.53	Acceptable	N/A
28	Power Lines/Pylons	75	1271	343	0.53	Acceptable	N/A
29	Pipeline	50	1282	343	0.53	Acceptable	N/A
30	Pipeline	50	1277	343	0.53	Acceptable	N/A
31	Mine Building/Structure	25	1276	343	0.53	Acceptable	Too Low

Tag	Description	Ground Vibration Limit (mm/s)	Distance (m)	Total Mass/Delay (kg)	Predicted PPV (mm/s)	Structure Response @ 10Hz	Human Tolerance @ 30Hz
32	Mine Building/Structure	25	1281	343	0.53	Acceptable	Too Low
33	Power Lines/Pylons	75	1276	343	0.53	Acceptable	N/A
34	Power Lines/Pylons	75	1278	343	0.53	Acceptable	N/A
35	Power Lines/Pylons	75	1275	343	0.53	Acceptable	N/A
36	Power Lines/Pylons	75	1275	343	0.53	Acceptable	N/A
37	Power Lines/Pylons	75	1270	343	0.53	Acceptable	N/A
38	Mine Building/Structure	25	1270	343	0.53	Acceptable	Too Low
39	Mine Building/Structure	25	1269	343	0.53	Acceptable	Too Low
40	Ruins	6	1276	343	0.53	Acceptable	N/A
41	Houses	12.5	1309	343	0.51	Acceptable	Too Low
42	Houses	12.5	1317	343	0.50	Acceptable	Too Low
43	Houses	12.5	1312	343	0.51	Acceptable	Too Low
44	Houses	12.5	1289	343	0.52	Acceptable	Too Low
45	Houses	12.5	1295	343	0.52	Acceptable	Too Low
46	Houses	12.5	1279	343	0.53	Acceptable	Too Low
47	Structure	12.5	1286	343	0.52	Acceptable	Too Low
48	Informal Housing	6	1274	343	0.53	Acceptable	Too Low
49	Informal Housing	6	1274	343	0.53	Acceptable	Too Low
50	Structure	12.5	1271	343	0.53	Acceptable	Too Low
51	Informal Housing	6	1274	343	0.53	Acceptable	Too Low
52	Power Lines/Pylons	75	1257	343	0.54	Acceptable	N/A
53	Power Lines/Pylons	75	1262	343	0.54	Acceptable	N/A
54	Dam	50	1255	343	0.54	Acceptable	N/A

17.2 Summary of Ground Vibration Levels

The mining area was evaluated for expected levels of ground vibration from future blasting operations. A review of the site and the surrounding installations, houses and buildings showed that the distances between the structures and the minimum mining area elevation do not vary significantly. The influences will also vary with distance from the area. The model used for evaluation indicates minor levels. It will, however, be imperative to ensure that a monitoring program is conducted to confirm levels of ground vibration induced and to ensure that ground vibration limits are not exceeded.

The evaluation mainly considered a distance up to 100 m horizontally from the surface area of the JV Project and Buffer mining areas. The closest structures to the mining area observed are Power lines, Buildings/Structures, Houses, Industrial buildings, gravel roads, Tailings Storage Facility, Dams, farmlands, etc. The distances between structures and the roof elevation of the mining area are a contributing factor to the levels of ground vibration expected and the subsequent possible influences. The ground vibration levels predicted for all POI's evaluated ranged between 0.50 mm/s and 0.55 mm/s for structures surrounding the mining area. The nearest structure is located 1250 m (POI17 - Dam) from the roof of the mining area. All structures/POIs are located such that the levels of ground vibration predicted from the charge will be acceptable regarding structure response.

17.3 Ground Vibration and human perception

Ground vibration is expected to be perceivable at a level of 0.9 mm/s at 30 Hz. The calculations and predictions show the maximum level of ground vibration at the POIs to be 0.55 mm/s, which is lower than the perceivable level and is shown in Table 10 as "Too Low". It can therefore be assumed that ground vibration generated from a maximum instantaneous charge mass of 343 kg at a minimum distance of 1250 m from the surface would not be perceivable by people.

17.4 Potential that Vibration will Impact Adjacent Communities

Current predictions show that the expected ground vibration levels from the underground mining areas are below the perceivable level for humans. However, the importance of good public relations cannot be overemphasised. People may react negatively when experiencing the effects of blasting, such as ground vibration. Even at low levels, where damage to structures is not expected, it may still cause concern or upset among neighbouring communities. Proper and appropriate communication with neighbours regarding blasting, monitoring, and the actions taken to ensure proper control will therefore be required.

17.5 Cracking of houses

The structures found in the areas of concern range from poorly to properly built brick-and-mortar structures, as well as industrial buildings and structures. There are various buildings found within the 100 m horizontal range from the mining area. Building style, materials, and soil conditions will certainly contribute to additional cracking apart from influences such as blasting operations.

The proposed limits as applied in this document, i.e. 6 mm/s, 12.5 mm/s and 25 mm/s, are considered sufficient to ensure that additional damage is not introduced to the different categories of structures. It is expected that, should levels of ground vibration be maintained within these limits, the possibility of inducing damage is limited.

17.6 Regulatory requirements

Regulatory requirements such as the Mine Health and Safety Act Reg 4.16(2) and Mine Health and Safety Act regulation 17.6(a) will not be applicable due to the depth below the surface of blasting operations.

18 Potential Environmental Impact Assessment: Operational Phase

The following is the impact assessment of the concerns covered by this report. Please note that this is a one-sided evaluation with no input from the client or details about changes in operations that may be applied due to the outcome from this report. Blast Management and Consulting consider any one POI indicated as problematic as guideline for basis of ranking. The method of assessing is used as prescribed but ranked as best possible according to the evaluation done.

18.1 Assessment Description

This part of the document focuses on the identification of the major potential impacts the activities, processes and actions may have on the surrounding environment. The criteria and rating parameters used to assess the significance of these impacts are presented in Table 14, which reflects compliance with the EIA Regulations of 2014 for evaluating direct, indirect, cumulative and residual impacts.

Potential environmental impacts (physical, biological, social and economic) associated with the Proposed Project are listed in Table 14. The significance of these impacts will be systematically assessed and rated using the assessment mythology described in this section. The EIA will include a full risk assessment of all environmental impacts. The EIA/EMPr Report will set out mitigation measures to be implemented during the Construction, Operational, Decommissioning and Closure, as well as Post-Closure Phases in accordance with NEMA requirements.

18.2 Assessment Criteria

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance.
The impact significance rating system is presented in Table 11, Table 12, as well as Table 13 and it involves three parts:
Part A: Define impact consequence using the three primary impact characteristics of magnitude, spatial scale/ population and duration.
Part B: Use the matrix to determine a rating for impact consequence based on the definitions identified in Part A.
Part C: Use the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from Part B) and the probability of occurrence.

Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale
Use these definitions to define the consequence in Part B, as showcased below in Table 11.

Table 11: Consequence Rating Definitions

Impact Characteristics	Definition	Criteria
Magnitude	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
Spatial scale or population	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration, as showcased in Table 12.

Table 12: Consequence Rating Methodology

			Spatial Scale/ Population		
			Site or Local	Regional	National/ international
MAGNITUDE					
Minor	**Duration**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**Duration**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**Duration**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

Part C: Determining Significance Rating

Rate significance based on consequence and probability, as showcased in Table 13.

Table 13: Consequence Rating Methodology

Probability (of Exposure to Impacts)	**Consequence Negative**			**Consequence Positive**		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Definite	Medium	Medium	High	Medium	Medium	High
Possible	Low	Medium	High	Low	Medium	High
Unlikely	Low	Low	Medium	Low	Low	Medium

18.3 Assessment

The assessment done was based on evaluating the points of interest and the expected levels predicted. This is, however, based on the worst-case scenario where blasting is done at the shortest distance from the mining area to the point of interest. Consideration was also given to the fact that blasting will not be constantly at the short distance, and the period of time that the influence may be present is significantly reduced because only limited areas or blocks will be blasted at a time.

Table 14: Impact Assessment Criteria Used to Determine the Significance of Environmental Impacts

Nature of The Impact: ***Ground vibration generated by underground blasting may propagate through the surrounding rock mass to surface and potentially impact neighbouring structures, infrastructure and communities.***		
	Impact Rating Without Mitigation	***Impact Rating with Mitigation***
Impact Status: (*positive or negative*)	**Negative**	**Negative**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long Term	Long Term
Magnitude *(Major, Moderate, Minor)*	Minor	Minor
Probability *(Definite, Possible, Unlikely)*	Unlikely	Unlikely
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Residual impacts ❖ No significant residual impacts are anticipated. Ground vibration levels are expected to remain below the perceivable level for humans and are not expected to damage surrounding structures.		
Cumulative Impacts ❖ No significant cumulative impacts associated with ground vibration are anticipated. Although blasting will occur repeatedly during the mining process, the predicted ground vibration levels at surface are low. They are not expected to result in a significant cumulative impact on surrounding structures or neighbouring communities. As mining progresses deeper, the distance between the blasting activities and surface will increase, and the ground vibration levels experienced at surface are expected to reduce further.		
Mitigation measures ❖ No specific mitigation measures are considered necessary at this stage based on the predicted ground vibration levels. Blasting activities should, however, be monitored during the mining process, with appropriate action taken should actual ground vibration levels differ significantly from the predicted levels.		

18.4 Mitigations

Based on the predicted ground vibration levels, no specific mitigation measures are considered necessary at this stage. The predicted levels are below the perceivable level for humans and are not expected to result in impacts to surrounding structures or neighbouring communities. Blasting activities should, however, be monitored during the mining process, with appropriate action taken should actual ground vibration levels differ significantly from the predicted levels.

19 Closure Phase: Impact Assessment and Mitigation Measures

During the closure phase, no mining, drilling, and blasting operations are expected.

20 Alternatives (Comparison and Recommendation)

No specific alternative mining methods are currently under discussion or considered for drilling and blasting.

21 Monitoring

A continuous monitoring programme for recording blasting operations is recommended. The following elements should be part of such a monitoring program:

- Ground vibration results;
- Comprehensive blast information;

Ground vibration monitoring requires identified locations for monitoring. Monitoring of ground vibration is done to ensure that the generated levels of ground vibration comply with legislation and recommendations. It is recommended that a continuous monitoring program, in the manner of fixed seismograph stations, monitoring twenty-four (24) Hours a day, is used for the monitoring program.

Four monitoring positions were identified as possible locations that will need to be considered. Not all points will be required at once, but active monitoring and observation of where blasting is done will dictate the requirements for the areas around the mining area. Monitoring positions are indicated in Figure 14 and Table 15 lists the positions with coordinates. These points will need to be redefined after the first blasts are done and the monitoring programme defined.

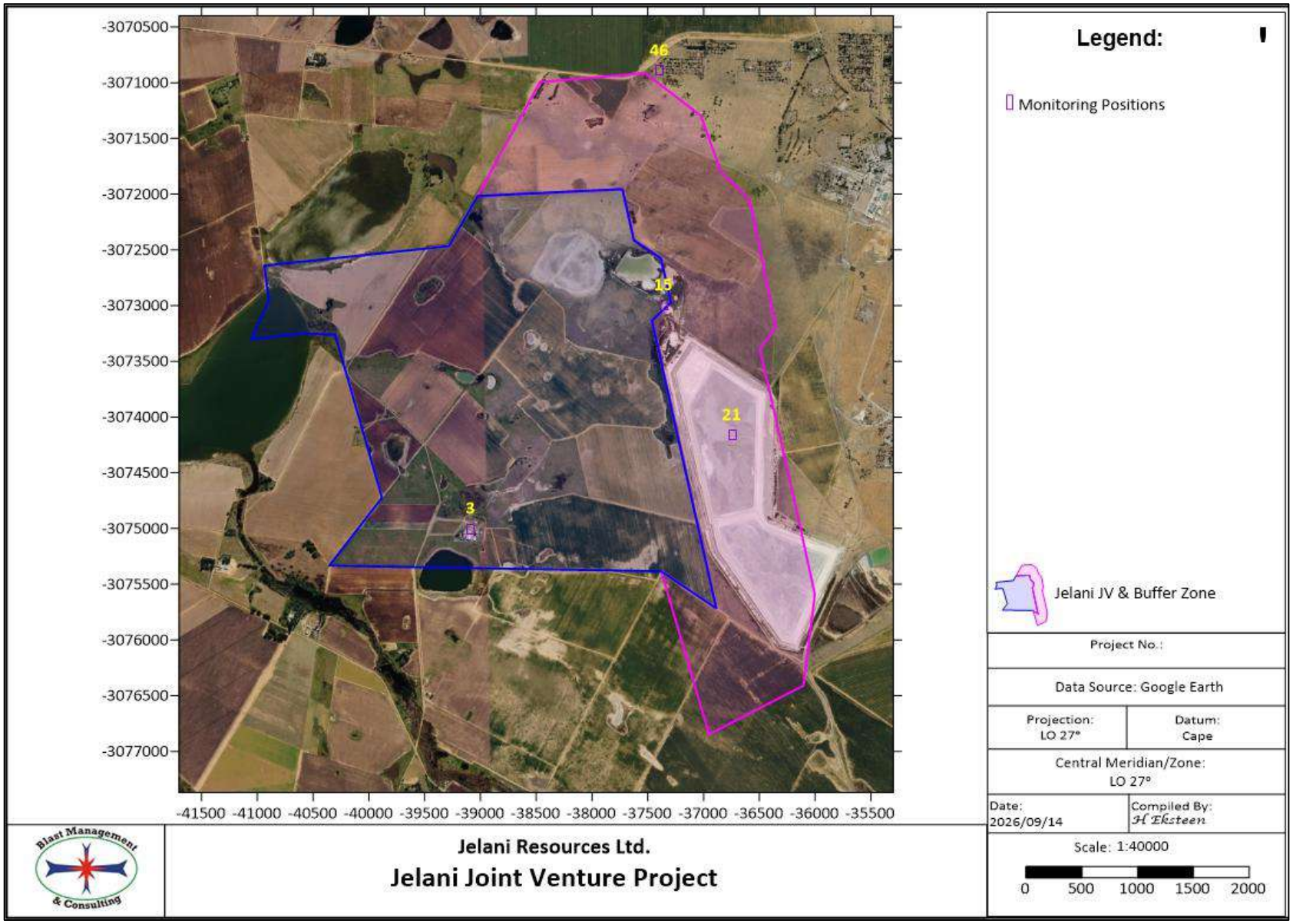


Figure 14: Suggested Monitoring Positions

Table 15: List of Possible Monitoring Positions

Tag	Description	Y	X
3	Farmstead	39083.38	3075004
15	Dam / JV Project Boundary	37354.43	3072999
21	Tailings Dam	36741.59	3074164.4
46	Houses	37391.45	3070893.5

22 Recommendations

The following recommendations are proposed.

22.1 Blast Monitoring on Surface

A ground vibration program as indicated above is recommended at least for the initial blasting to be done for confirmation of actual levels. A monitoring program to monitor the potential mining-induced seismicity and boundary interactions are planned, however, certain POIs will also need to be monitored to ensure compliance with regulations.

22.2 Blast Designs Review

Blast designs can be reviewed prior to the first blast being planned and done. Consideration should be given to the location of the blast in relation to the points of concern. The limits of the points of concern should be factored into such design.

23 Knowledge Gaps

The data provided by the client and information gathered were sufficient to conduct this study. Surface surroundings change continuously, and this should be considered prior to initial blasting operations. This report may need to be reviewed and updated if necessary. This report is based on data provided and internationally accepted methods and methodology used for calculations and predictions.

24 Project Result

The project was evaluated for possible impacts from blasting operations. The impacts observed is low and manageable. There is no reason to believe that this project cannot continue. It is the opinion of the author that the project can be executed successfully. Proper management and control on the aspects of ground vibration will be required.

25 Conclusion

Ground vibration is one aspect as a result from blasting operations in general. This report evaluates the effects of ground vibration from the underground mining operation and intends to provide information, calculations, predictions, possible influences and mitigations of blasting operations for this project.

The evaluation of effects yielded by blasting operations was evaluated over an area as wide as 100 m horizontally from the mining area considered. The range of structures observed are Powerlines / Pylons, Industrial structures / Buildings, Houses, Public Buildings, Gravel roads, Dams, farmlands, Tailings Storage Facilities, etc.

Blasting operations from the mining area are located such that specific impacts were investigated and addressed in the report.

The evaluation mainly considered structures located within a horizontal distance of up to 100 m from the surface footprint of the mining area. The distance between the structures and the roof elevation of the mining area is a contributing factor to the levels of ground vibration expected at surface and the subsequent possible influences. The ground vibration levels predicted for all POIs evaluated ranged between 0.50 mm/s and 0.55 mm/s for structures surrounding the mining area. The predicted ground vibration levels associated with private structures and houses were also within the mentioned range. These buildings are located such that the predicted levels of ground vibration from the assumed charge may not even be perceivable.

Based on the predicted ground vibration levels, no specific mitigation measures are considered necessary at this stage. The predicted levels at surface are below those expected to result in damage to surrounding structures and significant impacts on neighbouring communities. As mining progresses deeper, ground vibration levels at surface are expected to reduce further. Blasting activities should, however, be monitored during the mining process to confirm that actual levels remain in line with the predictions.

This concludes this investigation for the proposed Jelani Resources - Joint Venture Project. There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.

26 Curriculum Vitae of Author

J D Zeeman was a member of the Permanent Force - SA Ammunition Corps for the period January 1983 to January 1990. During this period, work involved testing at SANDF Ammunition Depots and Proofing ranges. Work entailed munitions maintenance, proofing, and lot acceptance of ammunition.

From July 1992 to December 1995, Mr Zeeman worked at AECI Explosives Ltd. Initial work involved testing science in a small-scale laboratory and large-scale field work. Later, work entailed managing various testing facilities and testing projects. Due to restructuring of the Technical Department, Mr Zeeman was retrenched but fortunately was able to take up an appointment with AECI Explosives Ltd.'s Pumpable Emulsion Explosives Group for underground applications.

From December 1995 to June 1997, Mr Zeeman provided technical support to the Underground Bulk Systems Technology business unit and performed project management on new products.

Mr Zeeman started Blast Management & Consulting in June 1997. The main areas of focus are Pre-blast monitoring, in-situ monitoring, Post-blast monitoring, and specialized projects.

Mr Zeeman holds the following qualifications:

1985 - 1987 Diploma: Explosives Technology, Technikon Pretoria
1990 - 1992 BA Degree, University of Pretoria
1994 National Higher Diploma: Explosives Technology, Technikon Pretoria
1997 Project Management Certificate: Damelin College
2000 Advanced Certificate in Blasting, Technikon SA
Member: International Society of Explosives Engineers

Blast Management & Consulting has been active in the mining industry since 1997, with work being done at various levels for all the major mining companies in South Africa. Some of the projects in which BMC has been involved include:

Iso-Seismic Surveys for Kriel Colliery in conjunction with Bauer & Crosby Pty Ltd.; Iso-Seismic surveys for Impala Platinum Limited; Iso-Seismic surveys for Kromdraai Opencast Mine; Photographic Surveys for Kriel Colliery; Photographic Surveys for Goedehoop Colliery; Photographic Surveys for Aquarius Kroondal Platinum – Klipfontein Village; Photographic Surveys for Aquarius – Everest South Project; Photographic Surveys for Kromdraai Opencast Mine; Photographic inspections for various other companies, including Landau Colliery, Platinum Joint Venture – three mini-pit areas; Continuous ground vibration and air blast monitoring for various coal mines; Full auditing and control with consultation on blast preparation, blasting and resultant effects for clients, e.g. Anglo Platinum Ltd, Kroondal Platinum Mine, Lonmin Platinum, Blast Monitoring Platinum Joint Venture – New Rustenburg N4 road; Monitoring of ground vibration induced on surface in underground mining environment; Monitoring and management of blasting in close relation to water pipelines in opencast mining environment; Specialized testing of explosives characteristics; Supply and service of seismographs and VOD measurement equipment and accessories; Assistance in protection of ancient mining works for Rhino Minerals (Pty) Ltd.; Planning, design, auditing and monitoring of

blasting in new quarry on new road project, Sterkspruit, with Africon, B&E International and Group 5 Roads; Structure Inspections and Reporting for Lonmin Platinum Mine Limpopo Pandora Joint Venture 180 houses – whole village; Structure Inspections and Reporting for Lonmin Platinum Mine Limpopo Section - 1000 houses / structures.

BMC has installed a world-class calibration facility for seismographs, which is accredited by Instantel, Ontario, Canada as an accredited Instantel facility. The projects listed above are only part of the capability and professional work that is done by BMC.

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Appendix D12 - Socio-Economic Impact Assessment



Jelani Resources (Pty) Ltd

Jelani Resources JV Project

Socio-Economic Impact Assessment Report

29 June 2026

JELA#001

Report Preparation By

Kongiwe Environmental (Pty) Ltd	
Registration Number	2016/135562/07
Telephone Number	+27 (10) 140 6508
Email	info@kongiwe.com
Registered Address	150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa
Mailing Address	PostNet Suite No 163, Private Bag X21, Bryanston, 2021, South Africa
Website	www.kongiwe.com

Report Information

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Approval

Verification	Capacity	Name	Signature	Date
By Author	Principal Social Consultant	Andrew Hamlet		29 June 2026

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Executive Summary

Kongiwe Environmental (Kongiwe) has been appointed by Jelani Resources (Pty) Ltd (Jelani) to compile this Social Impact Assessment (SIA) for their proposed mining Project, which is located adjacent to Harmony Gold Limited's Target Operation. The Project's centre point is approximately 3 km south-west of the small mining town of Allanridge, and 32 km north of Welkom in the Matjhabeng Local Municipality (MLM), Lejweleputswa District Municipality (LDM) in the Free State Province.

Jelani is an incorporated gold exploration Joint Venture (JV) company comprised of 65% held by White Rivers Exploration (a subsidiary of Lexington Gold) and 35% by subsidiaries of Harmony Gold (Lorraine Gold Mines Limited and Avgold Limited). The Project area (comprised of 957 hectares (ha)) has an estimated gold resource of approximately six million ounces, with potential for further resource upgrades through ongoing exploration.

Although the Project occurs in Ward 36, a major labour sending area is Ward 19. Ther latter ward experiences a much more pronounced level of poverty amongst its overall population, compared to Ward 36. The socio-economic baseline indicated that - between 2011 and 2022 - the Free State, MLM and Ward 36 had a very similar annual population growth rate (0.69-0.70%). In contrast, Ward 19 experienced a slight decline in its population, with an annual population growth rate of -0.08%. This may be attributed to population out-migration, as people leave the impoverished ward in search of better opportunities elsewhere. In 2011, only 11% of the population (aged 20 years and above) in Ward 19 had a Matric qualification or higher, compared to 25% in Ward 36.

As the Project entails an underground mining operation adjoining the existing Target Operation, social impacts will be minimal.

During the construction phase, the short term nature impacts of dust, noise, traffic, light spill and population influx were rated as having a low significance prior to mitigation. Through the application of mitigation measures, the magnitude and/ or probability of these impacts during the construction phases can be further reduced.

For the operational phase (which will occur over a much longer period than the construction phase), the above impacts were rated as having a medium significance level prior to mitigation. Through mitigation measures, the significance ratings of all of these impacts can be reduced to a low level.

All of the impacts described above had a low significance rating for the decommissioning phase, in regard to both pre- and most-mitigation scenarios.

Although the labour force will be sourced from the Harmony Target Operation, the Project's SLP will facilitate skills development opportunities for employees and the local community. A community project for the initial SLP cycle will also provide benefits to the community, through local procurement and improved facilities. This positive impact is applicable throughout the life of the Project. Through implementation of the SLP, the Project can maximise it's contributions to local community development.

The SLP will also be instrumental in providing opportunities for workers to progress their careers and diversify their skills, thereby increasing the likelihood of employment after the mine closes. Through the implementation of the SLP, the impact of retrenchment on mine employees can be reduced from a high significance level to a minimal (low) level.

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Abbreviations and Units

Abbreviation	Description
GDP	Gross Domestic Product
GMP	Grievance Management Procedure
GVA	Gross Value Added
ha	hectare
JV	Joint Venture
km	kilometre
LDM	Lejweleputswa District Municipality
MLM	Matjhabeng Local Municipality
MPTRO	Mineral and Petroleum Titles Registration Office
MR	Mining Right
PR	Prospecting Right
SLP	Social and Labour Plan

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1. Introduction

Kongiwe has been appointed by Jelani to compile this SIA for their proposed mining Project ('the Project'), which is located adjacent to Harmony Gold Limited's Target Operation. The Project is approximately 3 km south-west of the small mining town of Allanridge, and 32 km north of Welkom in the MLM.

1.1 Purpose

The purpose of the SIA is to compile a baseline of the socio-economic profile of the area around the Project area, and to assess the significance of Project-related risks on social and environmental aspects.

1.2 Project Description

Jelani is an incorporated gold exploration JV company comprised of 65% held by White Rivers Exploration (a subsidiary of Lexington Gold) and 35% by subsidiaries of Harmony Gold (Lorraine Gold Mines Limited and Avgold Limited). The JV agreement states that, when the Project is executed and becomes an operational mine, the ownership in the JV will change to 49% White River Exploration and 51% Harmony Gold. In addition, Harmony will take over operational management of the asset.

The Project area (comprised of 957 ha) has an estimated gold resource of approximately six million ounces, with potential for further resource upgrades through ongoing exploration.

The current Prospecting Right (PR) entitles Jelani to prospect for gold up to 29 May 2026 (executed on 5 March 2024 and registered by the Mineral and Petroleum Titles Registration Office (MPTRO) on 30 April 2024 under registration number 17/2024). A Mining Right (MR) application is now being made for the areas to which this PR applies.

The primary access and logistics system designed for the Jelani JV Project consists of the use of two existing vertical shafts at Harmony Gold Ltd.'s Target Operation as well as the development of a twin conveyor decline to access mineral resources lower than the shaft bottom. A design similar to this is currently in operation at the adjacent Target No. 1 Shaft.

Target No.3 Shaft will be used to support the initial Phase 1 mining of the shallow southern parts of the deposit. The shaft is currently in care and maintenance and is fully equipped although certain elements of the shaft system require repair and refurbishment. It is expected that this will take approximately 32 months to complete before the shaft can be used for hoisting activities. No. 3 Shaft can support mining down to 54 Level.

Target No.2 Shaft will be used to support Phase 2 mining and the twin conveyor decline will also be developed from the bottom of this shaft. This shaft will require complete refurbishment, and it is expected that 36 months will be required to complete this work before the shaft can be used for hoisting activities. No.2 Shaft can be used to support mining down to 52 Level.

The conveyor decline is a new installation and will be developed from the bottom of No.2 Shaft, the development of this infrastructure will be started early and supported from No.3 Shaft while No.2 Shaft is being refurbished. It is planned that on commissioning of No.2 Shaft that the conveyor decline will be operational, the conveyor decline will support mining from below 52 Level down to 73 Level. The twin decline system will be developed using a fully mechanised trackless development suite of equipment.

Mine Workers will be transported into the mine down one of the vertical shafts, once underground transport to the mining areas along horizontal excavations will be in track bound man carriages hauled by battery locomotives. A chairlift installation will be installed in the twin decline system for men travelling below 52 Level.

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1.3 Declaration

The following is the author's declaration that this report was prepared independently of any influence or prejudice - and free from any conflicting commercial or personal interests."

Details and Expertise of the Specialist

Andrew Hamlet is an Environmental and Social (E&S) specialist with over 20 years of multidisciplinary experience. In the context of E&S corporate performance, he is highly experienced in the preparation of SIAs and ESIAs.

Andrew also has extensive experience in resettlement and livelihood restoration planning, stakeholder engagement planning, socio-economic baseline data analysis, and Social & Labour Plans. He applies his comprehensive understanding of international best practice performance standards to the compilation of E&S corporate policy documentation and a wide range of management plans pertaining to, for example, community investment, gender equality, biodiversity, chemical contamination, wastewater and soils/ land capability. His early career in Australia covered catchment management, urban planning, sustainable agriculture, soil/ land capability assessments, and social impact analysis.

Andrew has lived in Johannesburg since 2012.

Qualifications of the Specialist

Andrew holds a Bachelor's degree in Agricultural Science from the University of Melbourne and a Master's degree in Forest Sciences from Stellenbosch University.

Past Experience of the Specialist

Andrew is has been preparing SIAs on a refular basis since 2019. South African clients have included Anglo American, Harmony, DRD Gold, Ndalamo Resources, Seriti and Sibanye.

CV of the Specialist

A Curriculum Vitae (CV) of the specialist is provided in Appendix A.

Declaration of Independence

This report has been prepared as per the requirements of Appendix 6 of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982 of 2014, as amended in June 2021). I, Andrew Hamlet declare that this report has been prepared independently of any influence or prejudice as may be specified by the Department of Forestry, Fisheries and the Environment (DFFE).

Andrew Hamlet

Signature of the specialist:



Date: 29 June 2026.

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2. Socio-economic Baseline

The following socio-economic baseline outlines various aspects of the socio-economic profile of various administrative levels relevant to the Project, including the Provincial level, the MLM level, and the Ward Level.

There are three wards that are relevant to the Project. The Project is in Ward 36, which comprises 413 km^2. The main town in the ward is Allanridge, which adjoins the Harmony Target Operation to the west. The smaller town of Odendaalrus is located in the southern-most section of Ward 36.

Comprising the urban settlement of Nyakallong located to the south of Allanridge, Ward 19 is only 2.4 km^2. Ward 35 adjoins the southern boundary of the Project site and covers an area of 229 km^2.

As the population of the MLM makes up approximately 65% of the LDM population, the large overlap justified the exclusion of the LDM from the analysis.

This baseline assessment investigates trends of the socio-economic profile at the three administrative levels, specifically concerning population, number of households, number of informal households, gender, ethnicity, youth population, language, education, unemployment, household income, key industries and access to services (including piped water, electricity, sanitation facilities and refuse disposal).

Unless otherwise specified, data were derived from Statistics South Africa (StatsSA) in relation to their 2011 Census and 2022 Census.

Ward data following the 2011 Census is very limited. The only data available subsequent to 2011 was some 2022 Census data for population, age distribution and ethnicity.

2.1 Population

Table 2-1 presents available data regarding population, from 2011 to 2022. Ward 19 was the most populous of the three local wards, with 14,138 people (compared to 10,888 and 10,366 people in Wards 35 and 36 respectively). With an area of only 2.4 km^2, population density in Ward 19 was extremely high (5,890 people per km^2). Ward 35 and Ward 36 had much lower population densities of 48 and 25 persons/km^2 respectively, which were reflective of the predominantly rural profiles of these wards.

Between 2011 and 2022, the Free State, MLM and Ward 36 had very similar annual population growth rate (0.69-0.70%). In contrast, Ward 19 has experienced a slight decline in its population – with an annual population growth rate of -0.08%. This may be attributed to population out-migration, as people leave the to impoverished ward in search of better opportunities elsewhere.

Table 2-1: Population

	Population (2011)	Population (2022)	Average Population Growth Rate (%) between 2011 and 2022
Free State	2,745,590	2,964,412	0.70
MLM	407,020	439,034	0.69
Ward 19	14,259	14,138	-0.08
Ward 36	9,605	10,366	0.69

2.2 Number of Households

Table 2-2 summarises the number of households, from 2011 to 2022. At the MLM level, the number of households decreased marginally from 2011 to 2022, despite an increase in the total population.

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Household size is an indicator of the level of wealth among households. A higher numbers of members per household indicate increased levels of poverty, due to a strain on housing resources within a community. In In 2011, Wards 19 and 35 recorded that the number of household members per household was 3.6 and 4.0 persons, compared to 2.8 members per household in Ward 36.

Table 2-2: Number of Households

Administrative Level	Number of Households (2011)	Number of Households (2022)
Free State	838,877	845,250
MLM	127,547	126,068
Ward 19	3,961	Not available
Ward 35	2,980	Not available
Ward 36	3,371	Not available

2.3 Informal Households

Table 2-3 shows that the proportion of households that lived in informal dwellings (shacks) was 7% in Ward 19 and 5% in Ward 36. Only 1% of households in Ward 35% were informal. The extent of informal dwellings among households at the MLM level was much higher, increasing marginally from 19% in 2011 to 20% in 2022.

Table 2-3: Proportion of Households Residing in Informal Dwellings

Administrative Level	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	15.4	9.7
MLM	19.1	19.9
Ward 19	6.6	Not available
Ward 35	0.8	Not available
Ward 36	4.8	Not available

2.4 Gender Ratio

Gender ratio is the proportional relationship between the number of males and females in a population. A ratio greater than 1.0 indicates that the population has more males than females. A gender ratio of well over 1.0 can be indicative of population in-migration (influx), as unskilled job seekers moving into an area tend to be male. As Table 2-4 indicates, there is little indication of population influx at all administrative levels, in 2022. Gender ratios have decreased since 2011, indicating a trend of males migrating to other parts of South Africa, most likely in search of job opportunities for their families remaining in the local area.

Ward 35 had a gender ratio of 1.6 in 2011, which is indicative of population influx. However, significant population out-migration has occurred within this Ward since 2011.

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Table 2-4: Gender Ratio

Administrative Level	Gender Ratio (2011)	Gender Ratio (2022)
Free State	0.94	0.90
MLM	0.98	0.92
Ward 19	0.95	0.91
Ward 35	1.62	0.97
Ward 36	1.03	0.94

2.5 Age Distribution

Table 2-4 and Figure 2-1 shows the age distribution (by 10-year categories) for each of the three wards nearest the Project, in 2022. The proportion of the population in Ward 19 that is aged below 40 years of age is much higher in Ward 19 (71%), compared to Wards 35 and 36 (62-65%).

Table 2-5: Age Distribution per Ward in 2022

Ward	Age (Years)									
	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 & Over	Total
19	2,468	2,636	2,480	2,443	1,568	1,165	914	346	117	14,137
35	1,733	1,833	1,566	1,933	1,487	1,222	735	315	64	10,888
36	1,509	1,680	1,502	1,698	1,299	1,072	954	495	156	10,365

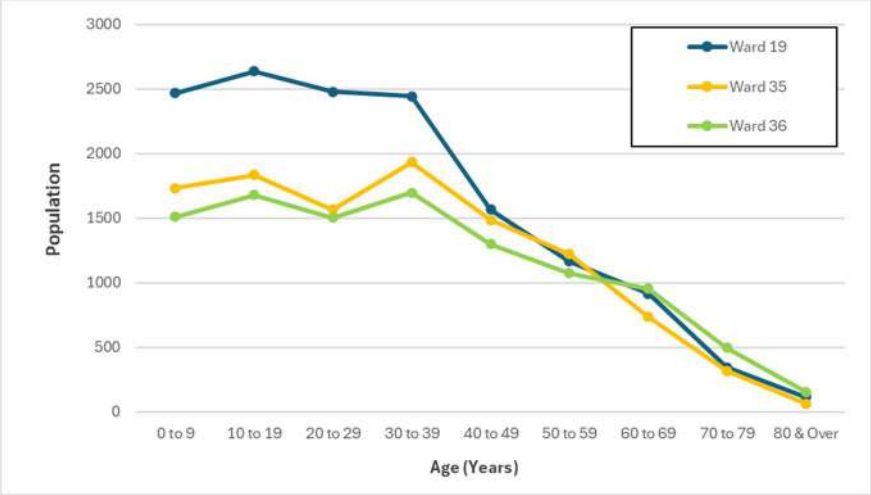


Figure 2-1: Age Distribution at Ward Level

Table 2-6 summaries the proportion of youth (aged 19 years or less) within each administrative level.

The proportion of youth in the population was highest in Ward 19, although decreasing from 44% in 2011 to 36% in 2022. At Ward 35, the proportion of youth in the population has increased significantly in recent years, from 22% in 2011 to 33% in 2022. In comparison, the proportion of youth in the population of Ward 36 decreased marginally, from 32% in 2011 to 31% in 2022.

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At the MLM level, the proportion of youth increased from 33% in in 2011 to 35% in 2022.

Table 2-6: Proportion of Youth (Aged 19 Years or Less)

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	34.7	35.4
MLM	32.7	35.2
Ward 19	43.9	36.1
Ward 35	22.3	32.8
Ward 36	31.7	30.7

2.6 Ethnicity

Table 2-7 summaries the proportion of the population of Black African ethnicity, for each administrative level. In 2022, almost the entire population in Ward 19 was Black African. The proportion of Black Africans in Wards 35 and 36 was 76 and 72% respectively. At the MLM and Provincial levels, Black Africans constituted about 88% of their respective populations in 2022. Among the Black African populations in each Ward, most were Sesotho (74-86%) or IsiXhosa (8-12%).

As Table 2-8 shows, the proportion of the White population at the MLM level had declined marginally, from 9.6% in 2011 to 9.0% in 2022. The proportion of the White population at the Provincial level declined from 8.7% in 2011 to 8.0% in 2022. In 2022, the proportion of the White population in Wards 35 and 36 was 22 and 27% respectively, whereas there were only 10 White persons in Ward 19. Most (86-88%) of the White population at Wards 35 and 36 were Afrikaans.

The proportion of the Coloured and Indian population in each ward was negligible, comprising approximately 1% at Wards 35 and 36 respectively – and almost none in Ward 19.

Table 2-7: Proportion of the Population of Black African Ethnicity

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	87.6	88.1
MLM	87.7	88.7
Ward 19	99.9	99.5
Ward 35	81.3	76.4
Ward 36	64.1	71.8

Table 2-8: Proportion of the Population of White Ethnicity

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	8.7	8.0
MLM	9.6	9.0
Ward 19	0.0	0.1
Ward 35	17.4	22.1
Ward 36	35.2	26.7

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2.7 Language

The most predominant languages spoken at each administrative level was Sesotho. Table 2-9 summarises the proportion of the population that speaks Sesotho, at each administrative level. In 2011, Sesotho was spoken by 76 and 61% of the populations in Wards 19 and 35 respectively. For Ward 36, 45% of the population spoke Sesotho. The proportion of the MLM and Provincial populations speaking Sesotho has increased from 62-63% in 2011 to 70-72% in 2022.

Another major language in the local area is Afrikaans. Table 2-10 summarises the proportion of the population that speak Afrikaans, at each administrative level. Approximately 25-34% of the population in Wards 35 and 36 spoke Afrikaans in 2011, compared to just 1% in Ward 19. The proportion of the MLM and Provincial populations speaking Afrikaans have been declining, from approximately 12% in 2011 to 10% in 2022.

Another popular language at the Ward level was IsiXhosa. This language was spoken by 11% in Ward 19, and 6-7% at Wards 35 and 36.

Table 2-9: Proportion of Population Speaking Sesotho

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	62.6	72.1
MLM	62.2	69.7
Ward 19	76.4	Not available
Ward 35	60.7	Not available
Ward 36	45.1	Not available

Table 2-10: Proportion of Population Speaking Afrikaans

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	12.4	10.0
MLM	11.9	9.7
Ward 19	1.2	Not available
Ward 35	25.3	Not available
Ward 36	34.4	Not available

2.8 Education

Table 2-11 shows, only 11% of the population (aged 20 years and above) in Ward 19 had a Matric qualification or higher, compared to 25% in Ward 36. There was a steady improvement in the proportion of the population having a matric qualification or higher at the MLM and Provincial levels.

Table 2-11: Proportion of Population (Aged 20 Years and Above) Attaining a Matric Qualification or Higher

Administrative Level	Proportion (%) of Population (2011)	Proportion (%) of Population (2022)
Free State	21.3	24.4
MLM	20.0	28.8
Ward 19	10.5	Not available
Ward 35	Not available	Not available
Ward 36	24.7	Not available

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2.9 Household Income

In 2011, the average monthly household income in the Ward 19 was R2500, almost half of that of Ward 36 (R4775). In 2022, the average monthly household income in the MLM was R 6725, which was marginally higher compared to that at the Provincial level of R6441 (Quantec, 2022).

2.10 Employment

StatsSA only has reliable employment data dating back to 2011. According to StatsSA, there were 2,166 and 2,850 people employed in Wards 19 and 36, in 2011. This translates to 25 and 42% of the population aged 20 years or more in Wards 19 and 36 respectively.

Unemployment rates were not available at the ward level. The unemployment rate is the proportion of the labour force that is unemployed, and includes only the unemployed who are actively searching for work, thus excluding the discouraged. In 2020, the unemployment rate in the MLM was 27.2%, which was slightly higher than that at the Provincial level of 26.7% (Quantec, 2022). Note that data from StatsSA, in their Quarterly Labour Force Survey reports, indicated a much higher unemployment rate of 33.4% in Free State, in 2020. The StatsSA reports also calculated that the expanded unemployment rate (which includes the unemployed who are actively searching for work and those who are not actively searching) was 39.9% in Free State, which has since increased to 43.8% in 2025. This implies that the unemployment rates calculated by Quantec are likely to be underestimating the extent of unemployment at the MLM level.

Table 2-12 shows the contribution of employment by industry sector in the MLM, based on Quantec (2022) data.

Table 2-12: Contribution to Employment by Industry Sector in the MLM, Between 2010 and 2020

Sector	Proportion (%) of Contribution to Employment (2010)	Proportion (%) of Contribution to Employment (2020)
Mining	32.2	22.8
Government and Community Services	25.7	27.4
Trade	17.3	19.6
Finance and business	9.7	11.8
Manufacturing	5.4	6.4
Agriculture	3.4	4.3
Construction	3.0	4.0
Transport and communication	3.0	3.4
Electricity and Water	0.3	0.4
Total	100.0	100.0

Source: Standardised regional data, Quantec (2022).

2.11 Access to Water

Table 2-13 shows that the proportion of households with access to tap water was highest in Ward 19 (99%), compared to 92% at both Ward 35 and Ward 36. The general downward trend in the level of access to tap water at the MLM and Provincial level, since 2011, is indicative of the decline of this service across Free State. The decline of water services and associated aging infrastructure are of particular concern in the MLM, as reported

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by the Select Committee on Cooperative Governance and Public Administration (Traditional Affairs, Human Settlements and Water and Sanitation) in March 2025[1].

In January 2025, *E. coli* contamination was confirmed in Allanridge's main water reservoir, constituting a severe health risk to local residents. As of August 2025, residents continue to rely on unsafe water sources[2].

Table 2-13: Proportion of Population with Access to Tap Water

Administrative Level	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	89.4	86.1
MLM	94.6	85.8
Ward 19	98.7	Not available
Ward 35	91.7	Not available
Ward 36	91.7	Not available

2.12 Access to Sanitation Facilities

Table 2-14 shows that, in 2011, the proportion of households with access to flush or chemical toilets was highest in Ward 19 (98%), compared to Wards 35 and 36 (92-93%). At the MLM level, the proportion of the population with access to flush/ chemical toilets is only 82%.

Since 2011, access to flush or chemical toilets has remained static at the MLM and Provincial levels. However, recent media reports indicate severely deteriorated sanitation infrastructure in Allanridge and Nyakallong[3].

Table 2-14: Proportion of Population with Access to Flush or Chemical Toilets

Administrative Level	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	67.2	69.5
MLM	81.7	79.7
Ward 19	97.8	Not available
Ward 35	92.4	Not available
Ward 36	93.4	Not available

2.13 Access to Refuse Disposal Services

Table 2-15 shows that, in 2011, the proportion of households having access to refuse disposal services was highest at Wards 19 and 35 (93-95%)., compared to 87% at Ward 36. The downward trends in the level of access to refuse disposal services at the MLM and Provincial level, since 2011, are indicative of the decline of this service across Free State.

[1] https://www.parliament.gov.za/press-releases/media-statement-non-revenue-water-losses-completely-undermine-matjhabengs-financial-recovery-plan-and-demands-urgent-attention.
[2] https://www.ofm.co.za/article/centralsa/338129/actionsa-calls-for-forensic-audit-into-r2-2-billion-infrastructure-budget-in-matjhabeng-

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Table 2-15: Proportion of Population with Access to Refuse Disposal Services

Administrative Level	Proportion (%) of Households (2011)	Proportion (%) of Households (2022)
Free State	70.7	57.4
MLM	87,1	56.3
Ward 19	95.3	Not available
Ward 35	93.1	Not available
Ward 36	87.1	Not available

2.14 Industry Sectors

Table 2-16 summarises the contribution to Gross Value Added (GVA) of various industry sectors to the MLM's Gross Domestic Product (GDP), between 2010 and 2020. Although being the largest contributor to the MLM's GVA, the mining sector's contribution to total GVA decreased from 36% in 2010 to 30% in 2020. The mining sector was the only sector that decreased its level of contribution to the MLM's GVA over the 10-year period. The manufacturing sector contributed 17% of the MLM's GVA in 2020. The finance and trade sectors were also major contributors to the MLM's GVA (13 and 11% respectively). The agricultural sector only contributed 2.3% of the MLM's GVA in 2020.

Table 2-16: Contribution to GVA by Industry Sector in the MLM, Between 2010 and 2020

	Proportion (%) of Contribution to GVA (2010)	Proportion (%) of Contribution to GVA (2020)
Mining	35.6	30.1
Manufacturing	16.2	17.2
Government and Community Services	12.6	14.3
Finance and business	10.8	12.8
Trade	10.7	11.1
Transport and communication	6.2	6.6
Construction	3.1	3.0
Electricity and Water	2.6	2.6
Agriculture	2.2	2.3
Total	100.0	100.0

Source: Standardised regional data, Quantec (2022)

2.15 Employment

StatsSA only has reliable employment data dating back to 2011. According to StatsSA, there were 2,166 and 2,850 people employed in Wards 19 and 36, in 2011. This translates to 25 and 42% of the population aged 20 years or more in Wards 19 and 36 respectively.

Unemployment rates were not available at the Ward level. The unemployment rate is the proportion of the labour force that is unemployed, and includes only the unemployed who are actively searching for work, thus excluding the discouraged. In 2020, the unemployment rate in the MLM was 27.2%, which was slightly higher than that at the Provincial level of 26.7% (Quantec, 2022). Note that data from StatsSA, in their Quarterly Labour Force Survey reports, indicated a much higher unemployment rate of 33.4% in Free State, in 2020. The StatsSA reports also calculated that the expanded unemployment rate (which includes the unemployed who are actively

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searching for work and those who are not actively searching) was 39.9% in Free State, which has since increased to 43.8% in 2025. This implies that the unemployment rates calculated by Quantec are likely to be undestimating the extent of unemployment at the MLM level.

As shown in Table 2-17, standardised regional data by Quantec (2022) indicates that mining is the largest employer in the MLM, but the its contribution to employment has decreased from 32% in 2010 to 23% in 2020. In contrast, all other sectors have had an increasing proportion of contribution to employment in the MLM, since 2010.

Table 2-17: Contribution to Employment by Industry Sector in the MLM, Between 2010 and 2020

	Proportion (%) of Contribution to Employment (2010)	Proportion (%) of Contribution to Employment (2020)
Mining	32.2	22.8
Government and Community Services	25.7	27.4
Trade	17.3	19.6
Finance and business	9.7	11.8
Manufacturing	5.4	6.4
Agriculture	3.4	4.3
Construction	3.0	4.0
Transport and communication	3.0	3.4
Electricity and Water	0.3	0.4
Total	100.0	100.0

Source: Standardised regional data, Quantec (2022)

3. Impact Assessment

This Chapter outlines the methodology of assessing the significance ratings of identified risks. Mitigation and monitoring measures are also presented for reducing the significance of each risk.

3.1 Impact Significance Rating Methodology

The impact significance rating process highlights the critical socio-economic impacts requiring consideration in the management and approval process.

Based on the assessment of the magnitude, duration and spatial extent of an impact (summarised in Table 3-1), an impact consequence rating can be determined, using the matrix shown in Table 3-2.

Table 3-3 shows the impact significance rating matrix, which is based on the consequence rating (derived from Table 3-2) and the probability of the impact occurring.

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Table 3-1: Assessment of the Magnitude, Duration and Extent of Impact

Impact Characteristic	Level of Impact	Impact Description
Magnitude and nature (negative)	Major	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded.
	Moderate	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded.
	Minor	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded.
Magnitude and nature (positive)	Minor	Minor improvement; change not measurable; or threshold never exceeded.
	Moderate	Moderate improvement; within or better than the threshold; or no observed reaction.
	Major	Substantial improvement; within or better than the threshold; or favourable publicity.
Duration	Short term	Up to 18 months.
	Medium term	18 months to 5 years.
	Long term	Longer than 5 years.
Scale	Local	Site specific or confined to the local area.
	Municipality	Affecting a large portion of the municipality.
	Regional	Affecting areas beyond the municipality.

Table 3-2: Consequence Rating Matrix

Magnitude	Duration	Scale		
		Local	Municipality	Regional
Minor	Short term	Low	Low	Medium
	Medium term	Low	Low	Medium
	Long term	Medium	Medium	High
Moderate	Short term	Low	Medium	Medium
	Medium term	Medium	Medium	High
	Long term	Medium	High	High
Major	Short term	Medium	Medium	High
	Medium term	Medium	Medium	High
	Long term	High	High	High

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Table 3-3: Significance Rating Matrix

Probability of Impact	Consequence Rating					
	Positive			Negative		
	High	Medium	Low	Low	Medium	High
Definite	High (+)	Medium (+)	Medium (+)	Medium (-)	Medium (-)	High (-)
Possible	High (+)	Medium (+)	Low (+)	Low (-)	Medium (-)	High (-)
Unlikely	Medium (+)	Low (+)	Low (+)	Low (-)	Low (-)	Medium (-)

Note: *(+)* refers to a positive magnitude rating and *(-)* refers to a negative magnitude rating.

3.2 Overview of Project Impacts

This Section outlines the social impacts associated with the Project. Impacts were assessed according to the methodology outlined in Section 3.1.

Potential negative impacts include the following:

- Dust emissions;
- Noise emissions;
- Light spill;
- Increased traffic;
- Population influx; and
- Retrenchments at decommissioning.

A potential positive impact of the Project relates to local community development.

Table 3-4 lists the potential impacts and indicates which project phases are applicable to each impact.

A cumulative impact is the total, combined effect of multiple impacts over time and space. While a single action may cause only a minor change, adding it to past, present, and future actions creates a much larger collective result. In the context of this local area, cumulative impacts will be negligible as Project operations will coincide with the downscaling and imminent closure of the much larger Harmony Target operation.

Table 3-4: Summary of Project Impacts

Potential Impact	Impact Type	Construction Phase	Operational Phase	Decommissioning Phase
Dust emissions.	Negative	Applicable	Applicable	Applicable
Noise emissions.	Negative	Applicable	Applicable	N/A
Light spill.	Negative	Applicable	Applicable	N/A
Increased traffic.	Negative	Applicable	Applicable	N/A
Population influx.	Negative	Applicable	Applicable	N/A
Small-scale employment opportunities.	Positive	Applicable	Applicable	N/A
Small-scale job losses at project closure.	Negative	N/A	N/A	Applicable

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3.3 Significance Ratings of Identified Risks

The following outlines the significance ratings of identified Project risks, at pre- and post-mitigation. For each identified risk, recommended management/ monitoring measures are also specified, for relevant phases of the Project.

3.3.1 Dust Generation

Dust can be more than simply a nuisance for the local community. Inhalation of dust particles can result in respiratory issues, particularly for vulnerable populations such as children and the elderly.

For the brief construction phase, dust generation will occur owing to increased traffic volumes on existing gravel roads and disturbance of land within the Project footprint. Sensitive receptors include Allanridge and Nyakallong, as well as adjoining farmland.

The dust impact assessment is summarised in Table 3-5, Table 3-6 and Table 3-7 for the construction, operational and decommissioning phases respectively. The significance rating of the impact of dust is moderate during the operational phase at pre-mitigation, owing to the long-term duration of the operational phase – and the moderate magnitude of the impact. Mitigation measures will assist in reducing the magnitude and probability of the impact, which will reduce the significance impact rating to a low level.

Owing to the short-term phase duration, the significance rating of dust is low during the construction phase and the decommissioning phase, for both pre- and post- mitigation. The Project's Air Quality Management Plan provides detailed measures to mitigate air quality impacts, including dust generation. Key mitigation measures include the following:

- Maintain roads and surfaces regularly to reduce dust from vehicle traffic and winds;
- Implement dust suppression systems, such as water sprays or chemical dust suppressants on exposed surfaces;
- Regulate vehicle speeds on the access roads to no more than 40 km/h (heavy vehicles) and 60 km/h (light vehicles);
- Keep activities to the approved footprint area; and
- Ensure that the local community is aware of (and has access to) a Project-specific Grievance Management Procedure (GMP).

Monitoring measures include the following:

- In accordance with the Air Quality Management Plan, undertake regular air quality monitoring to enable identification of impacts, and implement corrective actions if impacts are identified; and
- Resolve community grievances relating to dust generation.

Table 3-5: Dust Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

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Table 3-6: Dust Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Medium	Low

Table 3-7: Dust Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

3.3.2 Increased Noise

Various sources of noise associated with the construction and operational phase have the potential to be audible to nearby sensitive receptors, such as places of residence (i.e., Allanridge). Noise sources include vehicles and drilling/ mining infrastructure at the mine surface level.

The noise impact assessment is summarised in Table 3-8, Table 3-9 and Table 3-10 for the construction, operational and decommissioning phases respectively. As the site is not near sensitive receptors, the significance rating of noise is low for all phases, for both pre- and post- mitigation.

Regardless of the low significance ratings for noise, the magnitude of the impact can be mitigated by the following measures:

- Schedule noisy activities during times when they will have the least impact (i.e., daytime);
- Provide training for vehicle drivers to reducing noise levels during the operation of their vehicles (e.g. vehicles to be switched off when not in use);
- Machinery, equipment, and vehicles are to be serviced/maintained as per the Original Equipment Manufacturer (OEM) requirements to limit noise emissions;
- Regulate vehicle speeds on access roads to no more than 40 km/h for heavy vehicles and 60 km/h for light vehicles; and
- Ensure that the local community is aware of (and has access to) a Project-specific GMP.

Monitoring measures include the following:

- Monitor the effectiveness of the above mitigation measures and maintain records to demonstrate compliance. Adjust measures, as necessary; and
- Resolve community grievances relating to noise exceedances.

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Monitoring should be undertaken on a fortnightly basis during the construction phase - and a quarterly basis thereafter.

Table 3-8: Noise Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

Table 3-9: Noise Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Unlikely	Unlikely
Significance	Low	Low

Table 3-10: Noise Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

3.3.3 Light Spill

Residents in the local area might be impacted by light spill from Project infrastructure, particularly at night.

The light spill impact assessment is summarised in Table 3-11, Table 3-12 and Table 3-13 for the construction, operational and decommissioning phases respectively.

The significance rating of the impact of noise is moderate during the operational phase at pre-mitigation, owing to the long-term duration of the operational phase – and the higher probability of the impact occurring without

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mitigation measures. Mitigation measures will assist in reducing the probability of the impact, which will reduce the significance impact rating to a low level.

Owing to the short-term phase duration, the significance rating of light spill is low during the construction phase and the decommissioning phase, for both pre- and post- mitigation. The following mitigation measures will assist in reducing the probability of the impact:

- Only illuminate work areas, access routes and security zones that require lighting;
- Install shielding or directional lighting;
- Conduct regular maintenance to ensure lighting fixtures are operating efficiently and effectively;
- Use timers or motion sensors to control lighting and reduce unnecessary illumination; and
- Ensure that the local community is aware of (and has access to) a Project-specific GMP.

Monitoring measures include the following:

- Monitor the effectiveness of the above mitigation measures and maintain records to demonstrate compliance. Adjust measures, as necessary; and
- Resolve community grievances relating to light spill exceedances.

Monitoring should be undertaken on a fortnightly basis during the construction phase - and a quarterly basis thereafter.

Table 3-11: Light Spill Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

Table 3-12: Light Spill Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Medium	Low

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Table 3-13: Light Spill Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Minor	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

3.3.4 Increased Traffic

An increase in traffic volumes on the existing gravel roads constitutes a safety hazard for the local community. The traffic impact assessment is summarised in Table 3-14, Table 3-15 and Table 3-16 for the construction, operational and decommissioning phases respectively.

The significance rating of the impact of traffic is moderate for each phase at pre-mitigation. Mitigation measures will assist in reducing the magnitude and probability of the impact and thereby reducing the significance impact rating to a low level. Key mitigation measures include the following:

- Keep site access roads in a good condition;
- Install visible speed limit signs along site access roads;
- Ensure that employees and contractors adhere to speed limits;
- Avoid transporting abnormal load vehicles during peak periods, where practical; and
- Prior to the construction phase, ensure that the local community is aware of (and has access to) a Project-specific GMP.

Monitoring measures include the following:

- Monitor the effectiveness of the above mitigation measures and maintain records to demonstrate compliance. Adjust measures, as necessary; and
- Resolve community grievances relating to traffic speed exceedances.

Monitoring should be undertaken on a fortnightly basis during the construction phase - and a quarterly basis thereafter.

Table 3-14: Traffic Impact Assessment During the Construction Phase, Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Possible	Unlikely
Significance	Low	Low

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Table 3-15: Traffic Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Possible	Unlikely
Significance	Medium	Low

Table 3-16: Traffic Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Medium	Low
Probability	Possible	Unlikely
Significance	Medium	Low

3.3.5 Population Influx

Any mine has the potential to attract large numbers of job seekers into the local area. Population influx can lead to various social challenges, including conflicts with existing community members and further strain on public infrastructure. However, as the operation will only contract employees from the Target Operation, there will be no incentive for job seekers to move into the area.

The risk of influx is most applicable to the construction phase and, to a much lesser extent, during the operational phase. The impact is not relevant to the decommissioning phase. The influx impact assessment is summarised in Table 3-17 and Table 3-18 for the construction and operational phases respectively.

As the Project will only source labour from the Harmony Target Operation, the significance rating of influx is low for all phases, for both pre- and post- mitigation. The following mitigation measures will assist in further reducing the magnitude of the impact:

- Continue to publicise to the local community that the Project will only contract employees from Harmony. Harmony workers will be sourced from Target Operation. If this mine cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area;
- If employment opportunities arise, implement a policy requiring that recruitment activities occur off-site to avoid loitering of job seekers. No recruitment to take place at or near the Project premises; and
- Prior to the construction phase, ensure that the local community is aware of (and has access to) a Project-specific GMP. Communicate the availability of the GMP to the community on an annual basis.

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Table 3-17: Influx Impact Assessment During the Construction Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low

Table 3-18: Influx Impact Assessment During the Operational Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Moderate	Minor
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	Medium
Probability	Unlikely	Unlikely
Significance	Low	Low

3.3.6 Local Community Development

Although the labour force will be sourced from the Harmony Target Operation, the Project's Social and Labour Plan (SLP) will facilitate skills development opportunities for employees and the local community. The Local Economic Development (LED) project for the initial SLP cycle will also provide benefits to the community, through local procurement and improved facilities. This positive impact is applicable throughout the life of the Project.

The assessment of this positive impact during the construction phase is summarised in Table 3-19. The impact assessment during the operational and decommissioning phases is shown in Table 3-20.

Through the implementation of the SLP, the significance rating of the positive impact can be increased though improvements to impact's magnitude and probability. Enhancement measures include the following:

- Implement the SLP's Human Resource Development (HRD) Programme; and
- Implement the SLP's LED Programme.

Monitoring measures to track the effectiveness of the programmes are outlined in the SLP.

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Table 3-19: Local Community Development Impact Assessment During the Construction Phase, at Pre- and Post-SLP Implementation

Impact Attribute	Pre-enhancement Rating	Post-enhancement Rating
Nature	Positive	Positive
Magnitude	Minor	Moderate
Duration	Short term	Short term
Scale	Local	Local
Consequence	Low	Low
Probability	Unlikely	Definite
Significance	Low	Medium

Table 3-20: Local Community Development Impact Assessment During the Operational and Decommissioning Phases, at Pre- and Post-SLP Implementation

Impact Attribute	Pre-enhancement Rating	Post-enhancement Rating
Nature	Positive	Positive
Magnitude	Minor	Major
Duration	Long term	Long term
Scale	Local	Local
Consequence	Medium	High
Probability	Unlikely	Definite
Significance	Low	High

3.3.7 Retrenchments at Closure

There is an inherent risk that decommissioning of an operation can result in retrenchment of employees. The SLP provides a framework for reducing the impact of mine closure by providing opportunities for workers to progress their careers and diversify their skills, thereby increasing the likelihood of employment in the mining sector or other sectors.

The impact assessment is summarised in Table 3-21. Through implementation of the SLP regarding management and monitoring of downscaling and retrenchment, the magnitude and probability of the impact can be significantly reduced. Redeployment planning and skill diversification will be crucial aspects in addressing retrenchments at closure.

Table 3-21: Retrenchment Impact Assessment During the Decommissioning Phase, at Pre- and Post-mitigation

Impact Attribute	Pre-mitigation Rating	Post-mitigation Rating
Nature	Negative	Negative
Magnitude	Major	Minor
Duration	Long term	Short term
Scale	Local	Local
Consequence	High	Low
Probability	Possible	Unlikely
Significance	High	Low

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4. Conclusion

As the Project entails an underground mining operation adjoining the existing Target operation, social impacts will be minimal. The impact assessment supports this observation.

During the construction phase, the short term nature impacts of dust, noise, traffic, light spill and population influx were rated as having a low significance prior to mitigation. Through the application of mitigation measures, the magnitude and/ or probability of these impacts during the construction phases can be further reduced.

For the operational phase (which will occur over a much longer period than the construction phase), the above impacts were rated as having a medium significance level prior to mitigation. Through mitigation measures, the significance ratings of all of these impacts can be reduced to a low level.

All of the impacts described above had a low significance rating for the decommissioning phase, in regard to both pre- and most-mitigation scenarios.

Although the labour force will be sourced from the Harmony Target Operation, the Project's SLP will facilitate skills development opportunities for employees and the local community. The LED project for the initial SLP cycle will also provide benefits to the community, through local procurement and improved facilities. This positive impact is applicable throughout the life of the Project. Through implementation of the SLP, the Project can maximise it's contributions to local community development.

The SLP will also be instrumental in providing opportunities for workers to progress their careers and diversify their skills, thereby increasing the likelihood of employment after the mine closes. Through the implementation of the SLP, the impact of retrenchment on mine employees can be reduced from a high significance level to a minimal (low) level.

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Appendix A: CV of Specialist



ANDREW HAMLET

Principal Social Consultant
Kongiwe Environmental

AHAMLET@KONGIWE.COM

+27 (10) 140 6508

150 BRYANSTON DRIVE
BRYANSTON, SANDTON, 2191
SOUTH AFRICA

GEOGRAPHICAL EXPERIENCE



AFRICA
South Africa, Eswatini, Tanzania, Democratic Republic of the Congo (DRC), Namibia, Kenya, Ethiopia, Gabon, Uganda.

OTHER
Australia

EDUCATION

2000 - MSc Forestry Science, Stellenbosch University

1994 - BSc Agricultural Science, Melbourne University

LANGUAGES

English – Fluent

LEADERSHIP & IMPACT

Andrew is an Environmental and Social (E&S) specialist with over 20 years of multidisciplinary experience. In the context of E&S corporate performance, he is experienced in Due Diligence reporting and impact assessments.

Andrew also has extensive experience in resettlement and livelihood restoration planning, stakeholder engagement planning, socio-economic baseline data analysis, and Social & Labour Plans. He applies his comprehensive understanding of international best practice performance standards to the compilation of E&S corporate policy documentation and a wide range of management plans pertaining to, for example, community investment, gender equality, biodiversity, chemical contamination, wastewater and soils/ land capability. His early career in Australia covered catchment management, urban planning, sustainable agriculture, soil/ land capability assessments, and social impact analysis. Andrew's reporting is succinct and of a high quality - and his skills in data analysis and GIS mapping are extensive.

KEY SKILLS

- E&S Due Diligence reporting.
- Resettlement and livelihood restoration planning.
- Stakeholder engagement.
- Socio-economic assessments.
- Biodiversity and farming sustainability assessments.
- IFC compliance assessments.
- Risk and impact evaluation.
- Data analysis.
- GIS mapping.

SELECTED PROJECT EXPERIENCE

E&S Due Diligence reporting - Eswatini and DRC (2025-2026).

Socio-economic impact assessments - South Africa, Tanzania, DRC and Namibia (2019 - 2026).

Resettlement and livelihood restoration planning - Tanzania, DRC and Namibia (2019 - 2025).

Wastewater management planning - South Africa (2025 - 2026).

Social and Labour Plans - South Africa (2025 - 2026).

Andrew Hamlet Project Experience

Resettlement Planning and Implementation – Tanzania (2019-2025) and South Africa, DRC, Mali, Namibia (2024-2025)
Social Lead
Prepared Resettlement Action Plans and Resettlement Planning Frameworks.

Social Impact Assessments – South Africa (2019-2025) and Tanzania, DRC, Mali, Namibia (2024-2025)
Social Lead
Prepared Socio-economic impact assessments and aligned these into other specialist studies in Environmental and Social Impact Assessments (ESIAs).

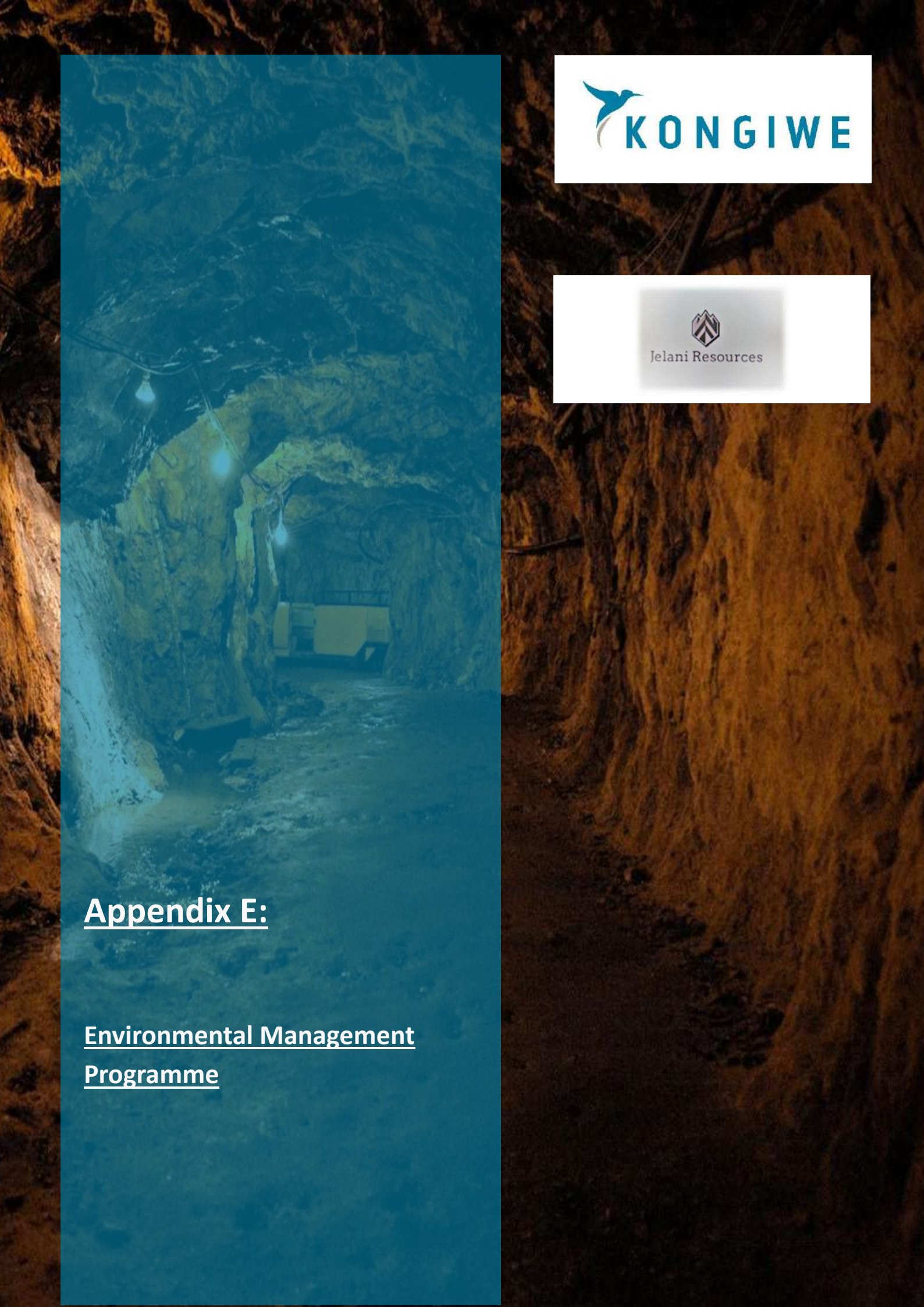
Resettlement Market Valuation Study, Uganda (2021)
Social Lead
Compared local compensation rates with IFC replacement values for key crops along a proposed transmission corridor.

Remedial Resettlement and Livelihood Restoration Plan, South Africa (2021)
Social Lead
Prepared a remedial approach to address residual livelihood impacts on displaced communities adjoining a mine.

SEECA Reports - Southern Africa (2021-2022)
Social Lead
Developed Social, Environmental, and Economic Context Analyses, incorporating socio-economic baselines, stakeholder engagement, and collaborative mitigation planning.

Resettlement Compliance Audits - Kenya, Ethiopia, Gabon (2021-2023)
Social Performance Specialist
Compiled compliance reports and conducted gap analyses comparing local legislation to IFC Performance Standards across multiple jurisdictions.

Appendix E: Environmental Management Plan report (EMPr)



Appendix E:

Environmental Management Programme

Environmental Management Programme

Project	Jelani Joint Venture (JV) Area Underground Mining Project
Report Title	Draft Environmental Management Programme
Client	Jelani Resources (Pty) Ltd
EIA Reference No.	FS30/5/1/2/3/2/1(10098) MR
Project No.	JELA#001
Compilation Date	28 September 2026
Status of Report	Draft for review

Approval

Verification	Capacity	Name	Signature	Date
By Author	Environmental Consultant	Ripfumelo Macevele		11 September 2026
Reviewed by:	COO	Grant Cornish-Bowden		16 September 2026

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1. Introduction and Background

Kongiwe Environmental (Pty) Ltd (Kongiwe) has been appointed by Jelani Resources (Pty) Ltd (Jelani), as the independent Environmental Service Provider (EAP) tasked with conducting the Scoping and Environmental Impact Assessment (S&EIA) process which is aimed at critically evaluating the potential environmental and social impacts of the proposed underground mining project (hereafter the Proposed Project).

1.1 Project Background and Motivation

Jelani Resources (Pty) Ltd ("Jelani") is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa.

Jelani intends to initiate underground mining operation within the JV area, to extract various minerals, primarily focusing on Gold ore, along with Silver, Uranium, and other associated minerals. The Proposed Project follows the completion of the Prospecting Phase, which confirmed the viability of developing an underground mining operation and identified significant potential mineral resources to support such development.

In addition, the project's development includes utilising the available spare capacity within Harmony's existing infrastructure at the Target Mine. This includes the Target No. 3 and No. 2 shafts, the Target No. 1 Processing Plant and associated surface infrastructure. All infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new infrastructure is planned within the project area.

1.2 Project Location

The Proposed Project area is situated immediately adjacent to and west of the Harmony Gold Target Mine, approximately 11km northwest of Odendaalsrus, 1,5km west of Allanridge town, and 22km east of Wesselsbron, in the Free State Province of South Africa. It lies within Ward 36 of the Matjhabeng Local Municipality, under the jurisdiction of the Lejweleputswa District Municipality. Refer to Figure 1-1 for the Proposed Project local orientation. Below is a summary of the location of the Project Site (Table 1-1).

Table 1-1: Summary of the Location of the Project Site

Province	Free State Province
Municipality	Matjhabeng Local Municipality
Ward Number	36
Nearest Town	Allanridge

Table 1-2 below shows the properties that are directly affected by the Proposed Project.

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Table 1-2: Description of Directly Affected Properties

Farm Name	Farm ID	Farm Portion	SG Code
Welvaart No. 63	RD	0 (RE)	F02400000000006300000
Welvaart No. 63	RD	1	F02400000000006300001
Welvaart No. 63	RD	2	F02400000000006300002
Diamant No. 37	RD	0	F02400000000003700000
Graspan No. 40	RD	0 (RE)	F02400000000004000000
Graspan No. 40	RD	1	F02400000000004000001
Swartpan No. 436	RD	0 (RE)	F02400000000043600000

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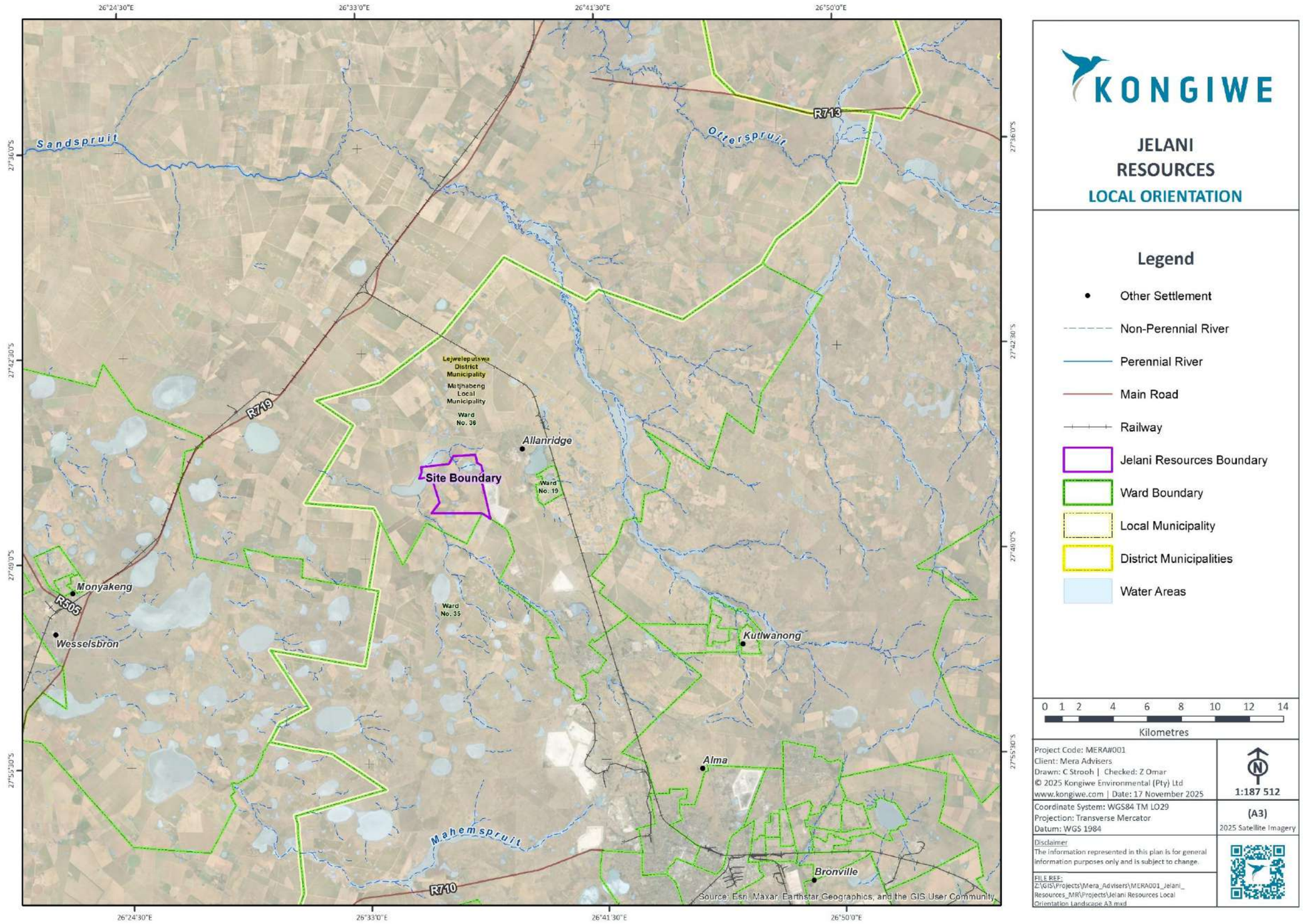
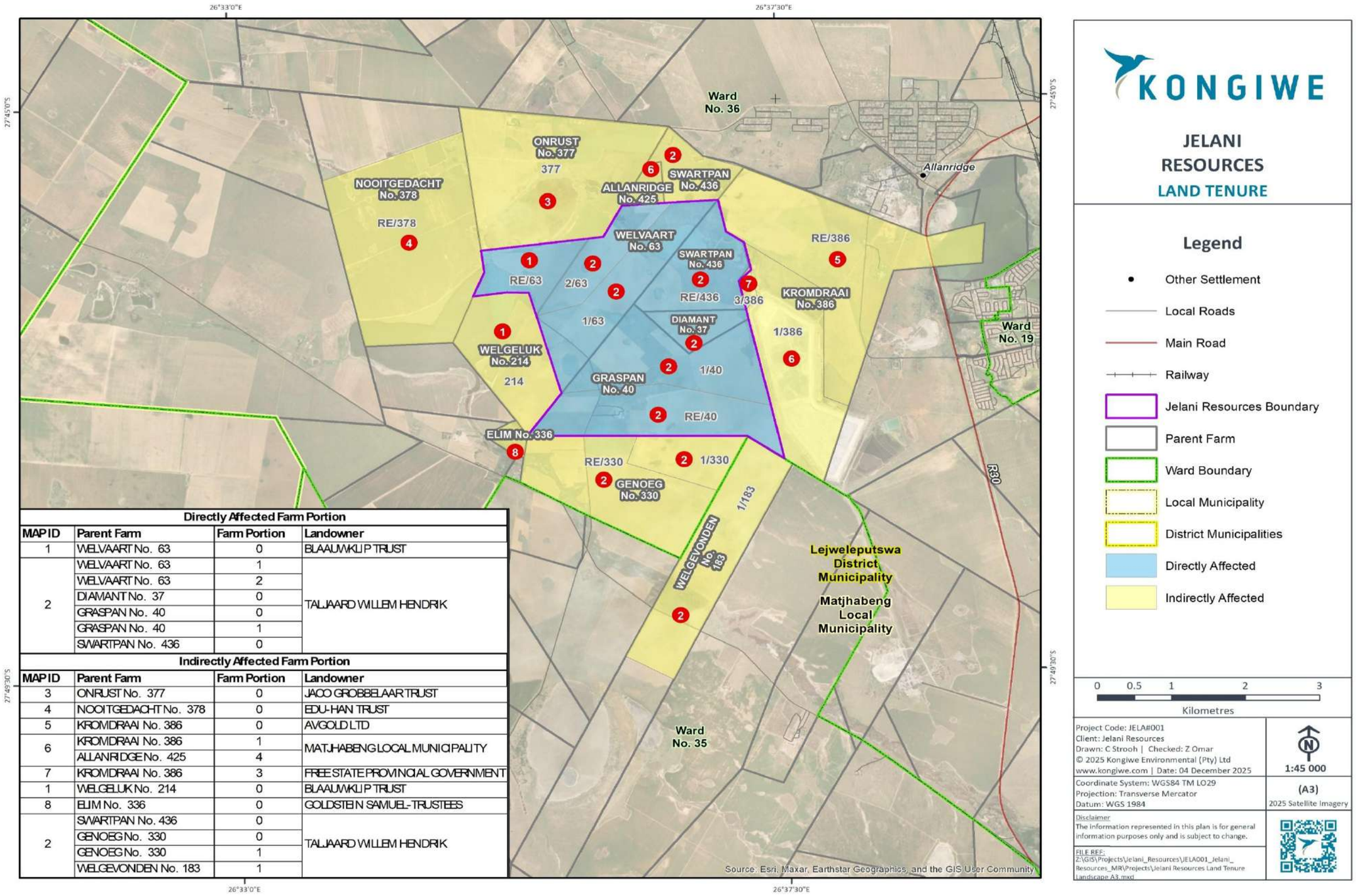


Figure 1-1: Local Orientation of the proposed JV Area Underground Mining Project

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Directly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
1	WELVAART No. 63	0	BLAAUWKLIP TRUST
2	WELVAART No. 63	1	TALJAARD WILLEM HENDRIK
	WELVAART No. 63	2	
	DIAMANT No. 37	0	
	GRASPAN No. 40	0	
	GRASPAN No. 40	1	
	SWARTPAN No. 436	0	

Indirectly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
3	ONRUST No. 377	0	JACO GROBBELAAR TRUST
4	NOOITGEDACHT No. 378	0	EDU-HAN TRUST
5	KROMDRAAI No. 386	0	AVGOLD LTD
6	KROMDRAAI No. 386	1	MATJHABENG LOCAL MUNICIPALITY
	ALLANRIDGE No. 425	4	
7	KROMDRAAI No. 386	3	FREE STATE PROVINCIAL GOVERNMENT
1	WELGELUK No. 214	0	BLAAUWKLIP TRUST
8	ELIM No. 336	0	GOLDSTEIN SAMUEL - TRUSTEES
2	SWARTPAN No. 436	0	TALJAARD WILLEM HENDRIK
	GENOEG No. 330	0	
	GENOEG No. 330	1	
	WELGEVONDEN No. 183	1	

KONGIWE

JELANI RESOURCES
LAND TENURE

Legend

- Other Settlement
- Local Roads
- Main Road
- Railway
- Jelani Resources Boundary
- Parent Farm
- Ward Boundary
- Local Municipality
- District Municipalities
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3
Kilometres

Project Code: JELA#001
Client: Jelani Resources
Drawn: C Strooh | Checked: Z Omar
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www.kongiwe.com | Date: 04 December 2025

1:45 000

Coordinate System: WGS84 TM LO29
Projection: Transverse Mercator
Datum: WGS 1984

(A3)
2025 Satellite Imagery

Disclaimer
The information represented in this plan is for general information purposes only and is subject to change.

FILE REF:
Z:\GIS\Projects\Jelani_Resources\JELA001_Jelani_Resources_MR\Projects\Jelani Resources Land Tenure Landscape A3.mxd

Figure 1-2: Jelani Underground Mining Project Land Tenure Map

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1.3 Site Access, Access Control and Security

The Proposed Project is located within an area served by an established road network. Public routes in close proximity to the site include existing roads currently used for Harmony Target Mine operations as well as gravel roads used by the local farmers.

Only the development of gravel access tracks to facilitate the monitoring of potential mining-induced seismicity and boundary interactions is anticipated at the project site.

Vehicle access to the shaft site is via the R30 public road, connecting to the existing mine access roads, that will continue to be used. No additional refurbishments are required on these roads other than possibly cutting back the overhanging branches of the two rows of trees that run along the entire length of the road.

The shaft site perimeter is already fenced and assumed to be according to the Harmony Standard, as no other security measures or devices were observed. Access to the shaft complex is controlled through the main access security gate (Item 21 in Figure 1-5). Provision has been made to refurbish the system.

1.4 Project Description

Jelani Resources (Pty) Ltd is a joint venture (JV) company established by White Rivers Exploration (WRE) and Harmony Gold. The JV was formed to conduct underground mining operations within the Joint Venture (JV) area, which is made up of areas within the existing Harmony Target mining right (Harmony contribution) and Prospecting Rights (PR) areas to the west of Harmony Gold's existing Target Mine (WRE contribution) in the Free State Province of South Africa. Following the exploration and licensing phases, Jelani intends to initiate underground mining operations within the same area.

The Proposed Project entails licensing the underground mining of the following potential mineral resources:

- Gold ore (primary target),
- Silver ore,
- Uranium ore,
- Sulphur,
- Platinum Group Metals,
- Rare earths,
- Diamonds (alluvial),
- Copper ore,
- Cobalt ore,
- Manganese ore,
- Molybdenum ore,
- Nickel ore,
- Lead ore,
- Tungsten ore,
- Zinc ore, and
- Iron ore.

Jelani's underground mining operations initially will target shallower mineral resource deposits at the project site. As mine development progresses, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of mined ore per month.

Two mining methods have been identified as the most practical for exploiting the mineral resources: conventional breast mining and shrinkage stoping. The selection of each method is primarily based on the dip of the mineralised reef, with the shrinkage stoping being used for the steeper slopes (3% of the total stope tonnage).

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Conventional Breast Mining

Where the orebody dips below 55°, conventional breast mining will be used. Footwall drives will be developed in the strike direction, between 40 to 48m below the mining horizon. Crosscuts will subsequently be developed perpendicularly to the footwall drives, towards the reef horizon. Access to the reef horizon will be by travelling way, developed from the crosscut. Ore passes will be developed between the reef horizon and the crosscut for the removal of blasted ore from the stope. On the stope horizon, a raise or centre gully will be developed between levels up the centre of the mining block. Breast mining panels will be established off the centre gully. The panels will be mined approximately in the strike direction away from the centre gully to the stope block limit. An advanced strike gully (ASG) will be carried on the down dip side of each mining panel for access to the stope face and for clearing of blasted ore from the face. Typically, two stope ore passes will be situated in the centre gully which will connect the stoping areas to the footwall infrastructure. All ore produced in the stopes will be scraped into the ore passes for loading in the crosscut. Figure 1-3 shows a plan of a typical stope block.

The breast faces will be drilled using hand-held, hydro-powered rock drills and airlegs. Blast holes will be charged with packaged emulsion explosives. Scraper cleaning will be used in the stope horizon. Ore will be scraped from the face, into the ASG and then into the centre gully. From the centre gully the rock is scraped over a stope grizzly into the ore pass. The bottom of the ore pass is equipped with a boxfront with a hydraulically operated gate.

Where multiple reefs occur, and both are payable and are planned to be mined, the order of mining will be to extract the uppermost reef first, working downwards.

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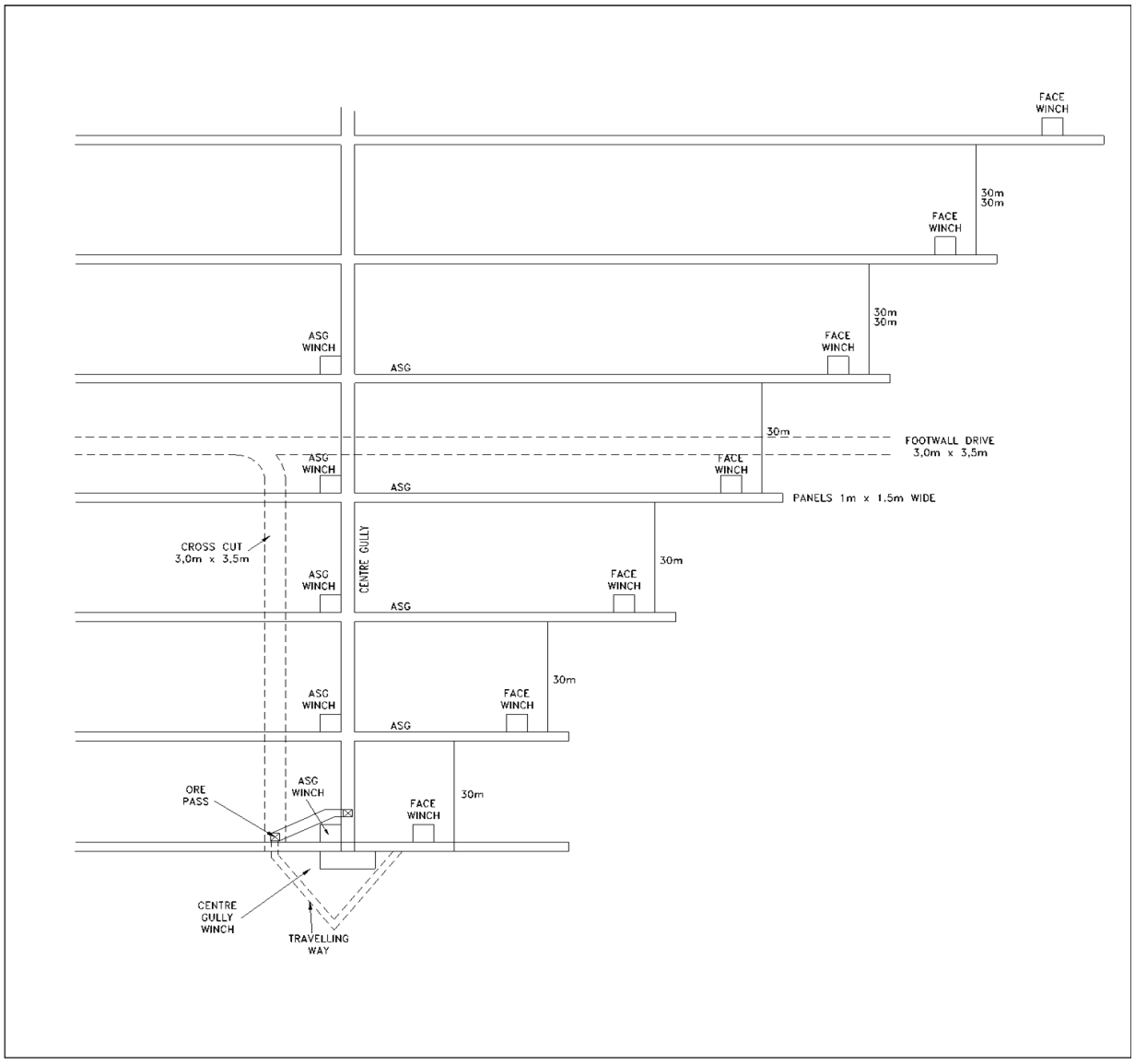


Figure 1-3: Schematic plan view of a conventional stope block

Shrinkage Stoping

Shrinkage stoping is an overhand mining method that relies on broken material being left in the stope to be used as the "working floor" and to support the walls. The shrinkage stope is accessed via a travelling way. The stope is established and accessed by the development of two raises, one on each end of the stope panel.

Two drives, separated by a sill pillar, are established at the bottom of the stope. Draw points are developed between the two drives for loading ore from the stope. Once the stope preparation development and equipping has been completed stoping commences by advancing the stope face up-dip from the sill drive. After each blast sufficient ore is drawn out to allow access between the new stope face and the top of the muckpile. Once the stope face reaches the upper limit, which is normally defined by a crown pillar, all men and equipment are withdrawn from the stope and the remaining ore is drawn from the stope. Ore is drawn out of the stope by

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operating the scraper winch in the reef drive. This clears rock from the draw points and allows the ore to continue to flow.

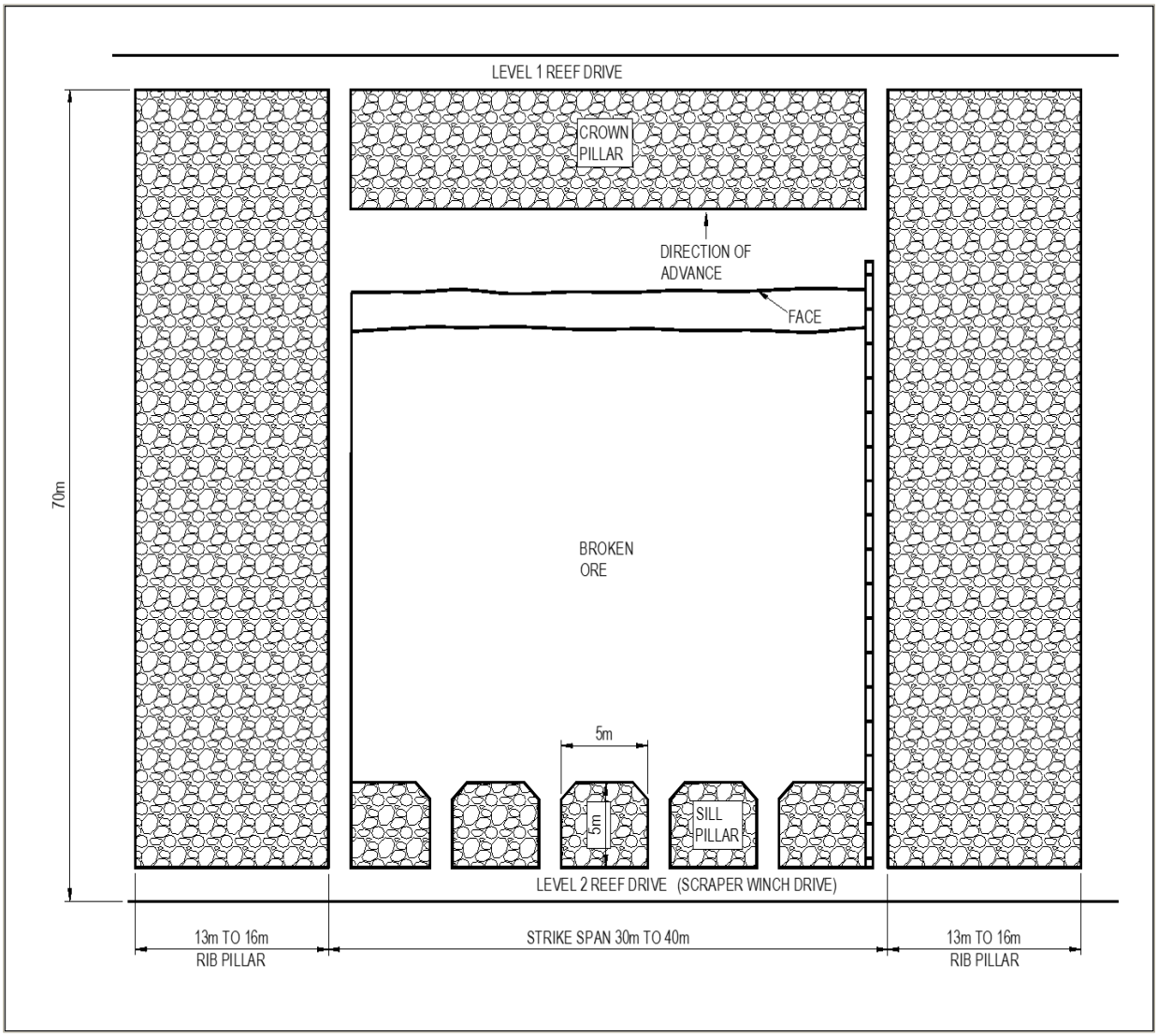


Figure 1-4: Schematic long section illustrating a typical shrinkage stope

Ore will be transported to the shaft ore pass system using a conveyor system loaded by a fleet of 30-tonne dump trucks which are loaded by 10-tonne loaders (LHD). Subsequently, the broken rock will be loaded into hoisting bins and will be hoisted to surface, where the rock will either be sent to the processing plant or to the waste rock dump.

Existing underground access (shafts and level access) will be refurbished and re-equipped. Target No 2 and Target No 3 shafts will, over the course of the mines life, be used for the movement of men, material and rock depending on which phase the mine is in.

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1.4.1 Infrastructure Requirements

All operational mining infrastructure required for the Proposed Project will be located within the existing Harmony Target Mine mining right area. No new operational mining infrastructure is planned within the project area. Underground access infrastructure will either consist of refurbished facilities at Target Shafts No. 3, 4 and 5 or newly constructed infrastructure at the Target No. 2 Shaft site, all within the existing mining right.

The infrastructure requirements are intended to support the managerial, supervisory, and operational functions associated with the respective underground mining operations/targets. A layout of the proposed Target 3 shaft surface infrastructure which either needs to be refurbished or constructed is presented in Figure 1-5. Target 3 shaft will be used to access the underground workings during Phase 1 of the project whilst Target 2 shaft is refurbished. Mining activities during this phase will take place between 57 Level and 48 Level (Figure 1-6).

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Figure 1-5: Target No 3 Shaft surface infrastructure layout

The No 3 shaft surface infrastructure will compromise of the following (as numbered):

1. No 3 shaft
2. Shaft facilities
   (a) Lamp repair
   (b) Proto room
   (c) Lamp room
3. Change house facilities
   (a) Main laundry
   (b) Main change house
4. Compressor house
5. Waste rock dump (not on Figure 1-5)
6. Surface rock handling
7. Main substation
8. Parking area
9. Offices
   (a) Management, administration and technical services
   (b) Mining
   (c) Engineering
10. Man winder
11. Barlow winder
12. Rock winder
13. Fridge plant
14. Store building
15. Services/fitting workshops
16. Dirty water dam & pump station
17. Sewerage plant
18. Evaporation plant
19. Change house (not on Figure 1-5)
20. No 4 shaft ventilation fans
21. Security office
22. Explosives store
23. Conveyors
24. Laydown area and salvage yard
25. Walkway
26. Marshalling yard
27. Drop off area
28. Ablution block
29. Laundry
30. Change houses
31. Offices
32. Lapa
33. Parking (not on Figure 1-5)
34. Parking
35. Turnstiles
36. Waiting area
37. Lean to roof
38. Underground store
39. Pump house
40. Service boiler shop (not on Figure 1-5)
41. Services boiler store (not on Figure 1-5)
42. Rail line
43. Pipeline
44. Security
45. Timber yard
46. Electrical workshop
47. Flammable store
48. Old oil store

An overview of the Target 3 Shaft with level elevations, is shown in Figure 1-6.

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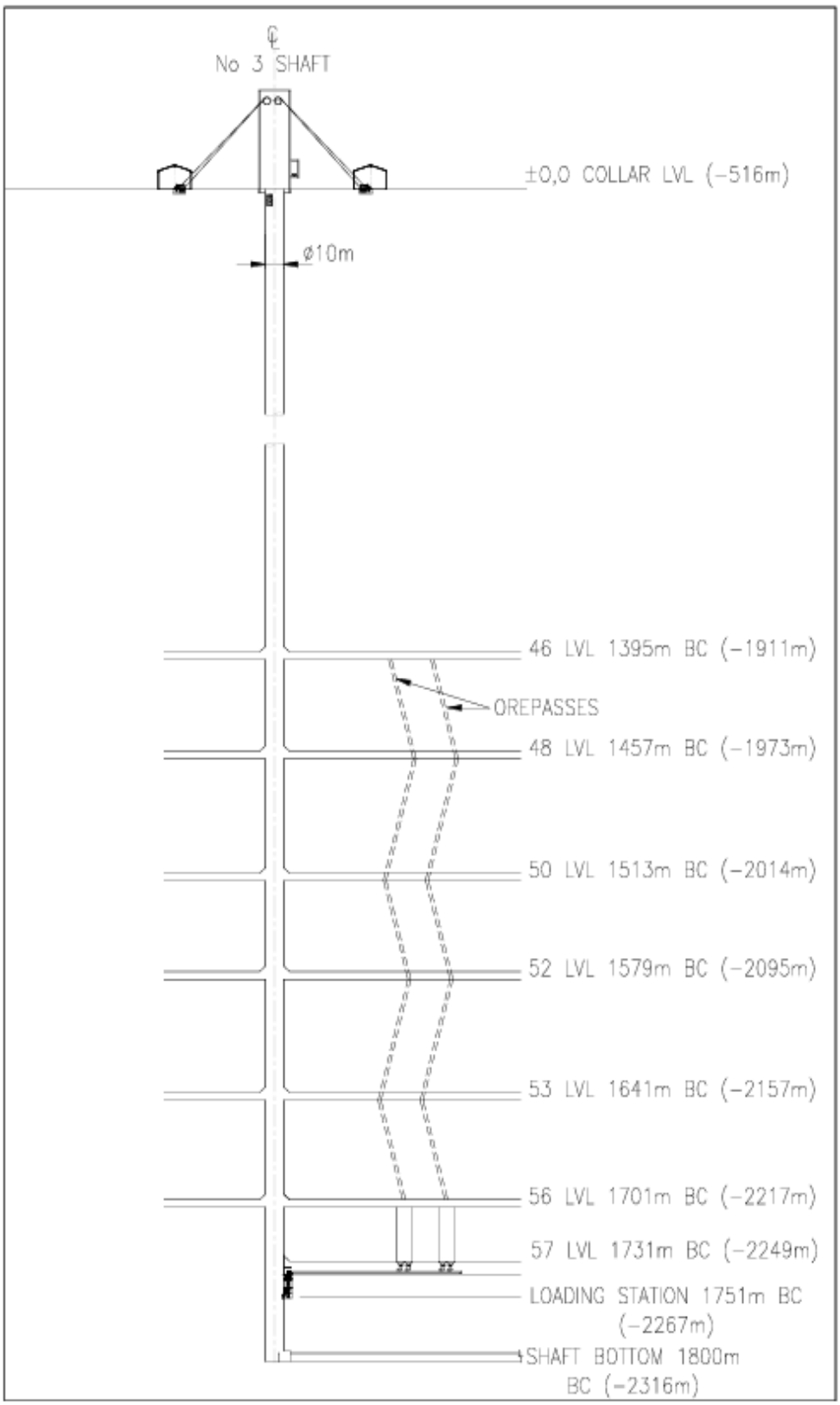


Figure 1-6: Target 3 shaft longitudinal arrangement

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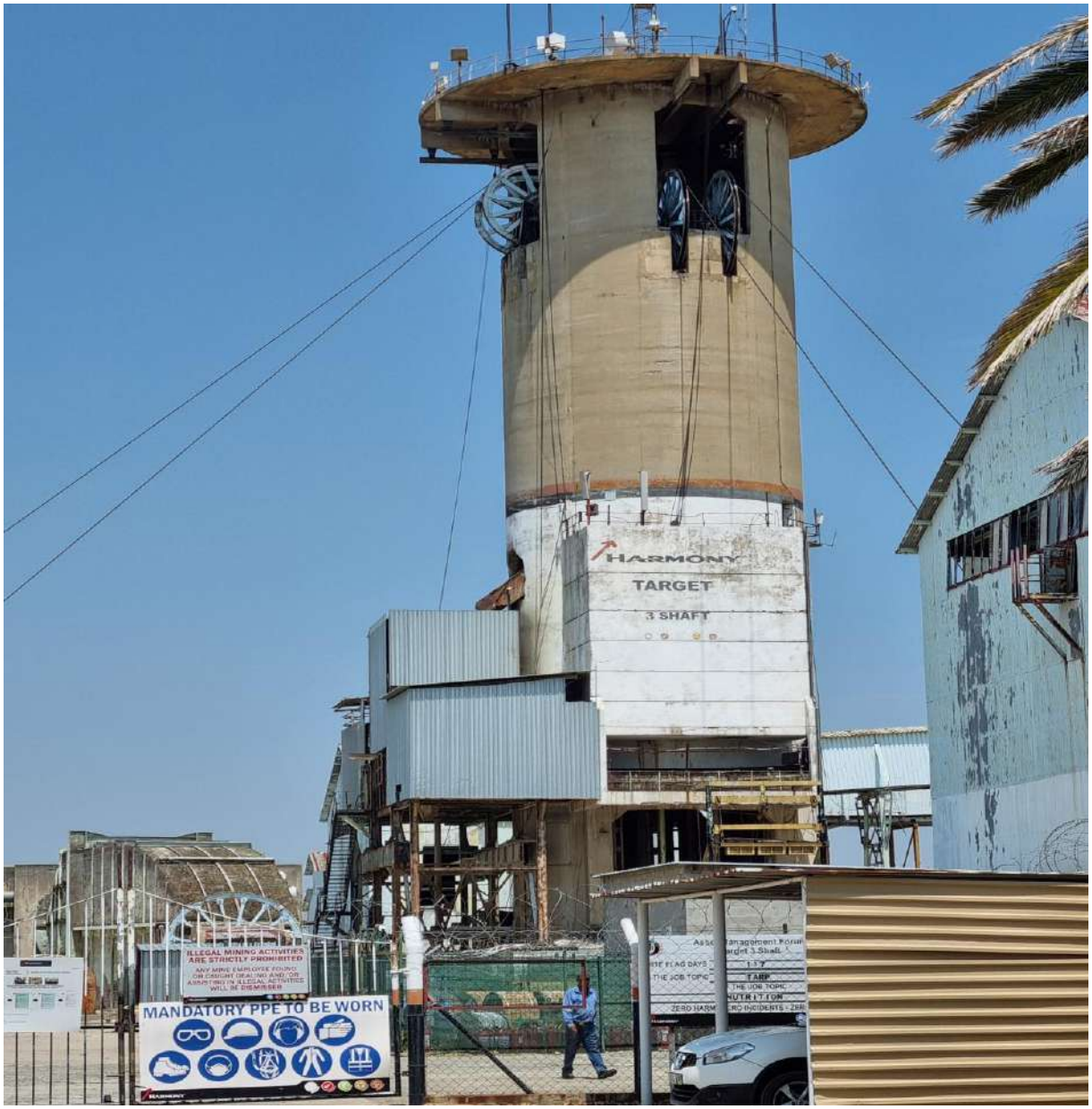


Figure 1-7: Harmony Target No 3 Shaft

The Target No 2 shaft will be used as the main access to the underground orebody and workings in Phase 2, and Target No 3 shaft will be maintained as a second outlet. Mining activities in this phase are planned to occur above 48 Level and below 57 Level.

The Target No 2 shaft is currently not utilised for mining production activities. Instead, it acts as the emergency exit for Target No. 1 Shaft with only a limited amount of infrastructure remaining in place. Once the shaft has been refurbished and surface infrastructure is completed and the shaft commissioned, mining operations associated with the Proposed Project will be relocated to this shaft.

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Figure 1-8*: *Harmony Target No 2 Shaft

A layout of the current Target No 2 Shaft surface infrastructure as well as the proposed new infrastructures which are required to be constructed are presented in Figure 1-9.

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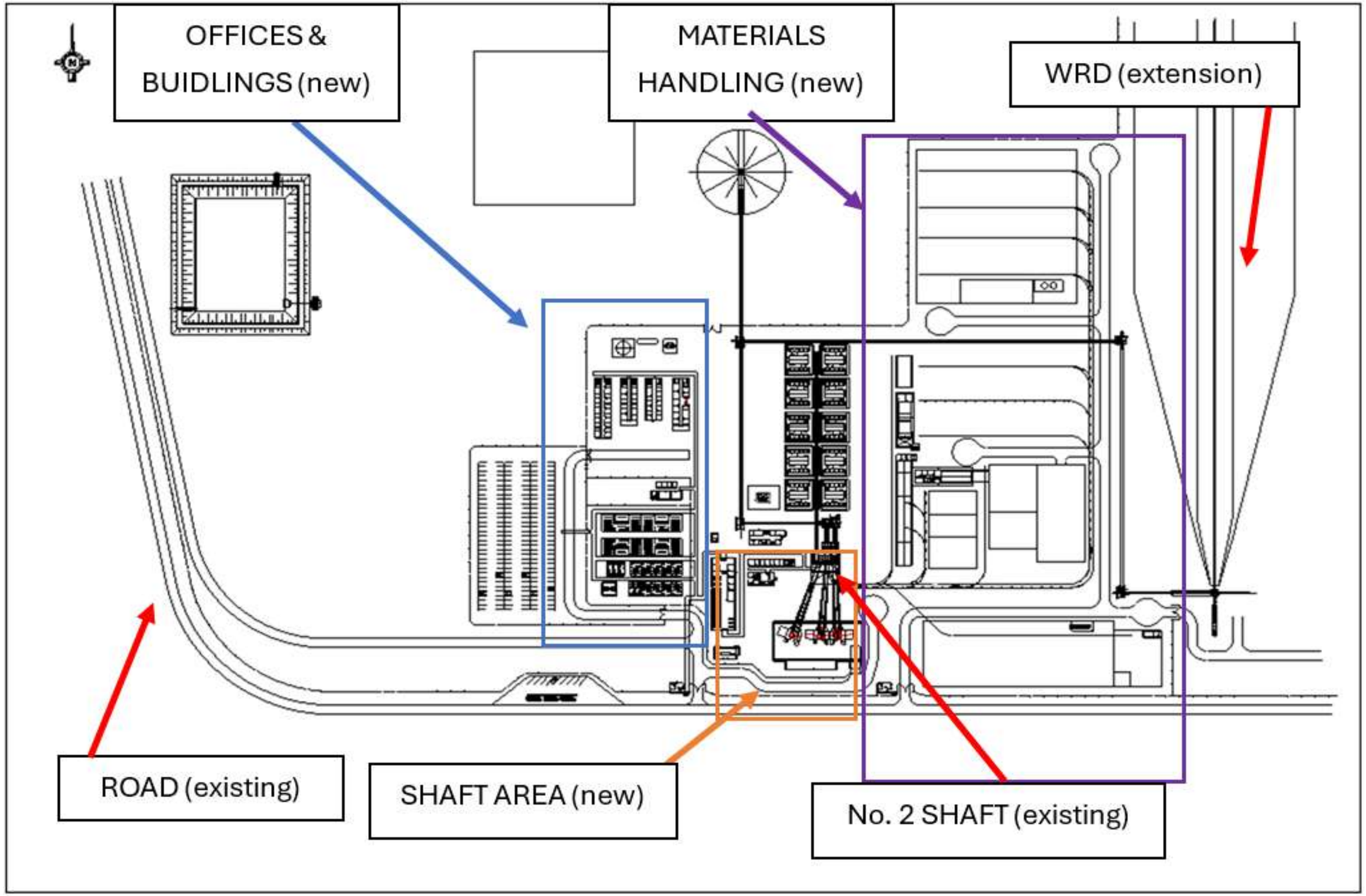


Figure 1-9: Target No 2 Shaft existing infrastructure and proposed infrastructure

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To monitor potential mining-induced seismicity and boundary interactions with the adjacent Harmony Gold operations, four seismographic monitoring stations will be installed, spread equally along the shared boundary. Each station will include a small sensor pad/housing (approximately 5–10 m²), basic power/comms setup, 6 m of perimeter fencing per station (total 24 m), and short gravel access tracks (total approximately 1 km across all stations, 4 m wide). These installations represent the only surface infrastructures on the JV project area.

Additionally, a new Tailings Storage Facility (TSF) will be constructed to the west of the existing Target metallurgical plant and north of the existing Target TSF. The total area required for this new facility is approximately 69 Hectares (Ha). This TSF is a separate project being undertaken by Harmony Gold.

1.4.2 Area Extent

The total extent of the application area is 956.76 hectares (ha).

1.4.3 Depth of Mineral Below Surface

The orebodies extend between 1 500m and 2 600m below surface.

1.4.4 Proposed Beneficiation Process

All ore produced from the underground mining operations will be transported to the existing Target 1 metallurgical plant for processing.

1.4.5 Project Schedule

Prior to the initiation of mine implementation and construction activities, various stages of design work will be required to be undertaken. It is expected that these activities will take approximately four years before implementation can be initiated. Active mining can commence during year 7. The key timelines are listed in Table 1-3 below:

Table 1-3: Project Timelines

Period	Description
Year 1 - 3	Site data gathering and feasibility studies
Year 4	Detailed engineering design
Year 5 - 8	Implementation and construction activities
Year 7	Hiring of employees
Year 7	**Initiation of mining activities underground**

The production build-up is planned to occur in two phases:

In Phase 1, which is planned to last for four years starting in Year 5, with construction and refurbishment with mining starting in Year 7. The first two years are required for level access and refurbishment, after which Target No 3 shaft will be used for hoisting of men, material and rock.

Phase 2 commences in Year 9, whereby access to the underground workings is via Target No 2 shaft, with Target No 3 shaft being reserved as a second outlet.

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As mine development progresses over the first four years, new mining areas will be developed which will allow for the production rate to be steadily increased to the targeted full production rate of 60 000 tonnes of ore per month, which is achieved in Year 10.

10 340 Mt of ore is expected to be mined over the Life of Mine (LOM), which is 14 years.

2. Details of Environmental Assessment Practitioner

Kongiwe is a contemporary, problem-solving consultancy specialising in solving real-world environmental challenges. We pride ourselves in using the latest technology available to realise pragmatic solutions for our clients. The company was created with the essential intent: 'To solve environmental challenges for a world driven towards a sustainable future.'

With offices in Johannesburg and Pretoria, South Africa, and in Canada and the United Kingdom respectively, our team of professional Environmental Scientists are highly trained in various environmental disciplines and have significant, hands-on experience in an array of projects across numerous industries. The company has extensive environmental and project management experience in multiple sectors, with significant experience in South Africa, as well as internationally. Kongiwe focuses on the integration of environmental studies and processes into larger projects. Moreover, Kongiwe provides clients with strategic environmental assessments and compliance advice, the identification of environmental management solutions and mitigation / risk minimising measures throughout the project lifecycle.

2.1 Contact Person and Corresponding Address

The report was compiled by Ripfumelo Macevele. The Environmental Assessment Practitioner (EAP) details are provided in Table 2-1.

Table 2-1: Details of Environmental Assessment Practitioner

Name of Practitioner	Ripfumelo Macevele, Kongiwe Environmental (Pty) Ltd
EAP Registration No.	2019/1051
Tel No	+27 (10) 140 6508
Cell No	079 178 9655
E-mail Address	rmacevele@kongiwe.com

Ripfumelo Macevele is an Environmental Assessment Practitioner at Kongiwe Environmental. He is EAPASA Registered Environmental Assessment Practitioner (2019/1051) as well as registered with SACNASP as Environmental Science Candidate Natural Scientist (128491) and has extensive experience in executing the process to obtain Environmental Approvals through Environmental Impact Assessment and conducting Environmental Monitoring, Auditing & Reporting and Developing Environmental Management Plans as well as Water Use Licence applications and Public Participation. Qualifications in Appendix A.

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3. Description of the Aspects of the Activity

This document must be read in conjunction with the EIA report. To minimise repetition throughout the documentation, the EAP refers the reader to Chapter 1 of the EIA report.

4. Description of the Baseline Environment

This document is kept as concise as possible. For an overview of the baseline environment of this project please refer to Chapter 7 of the EIA report.

5. Composite Map

The figure below (Figure 5-1) illustrates the preferred layout for the Proposed Project.

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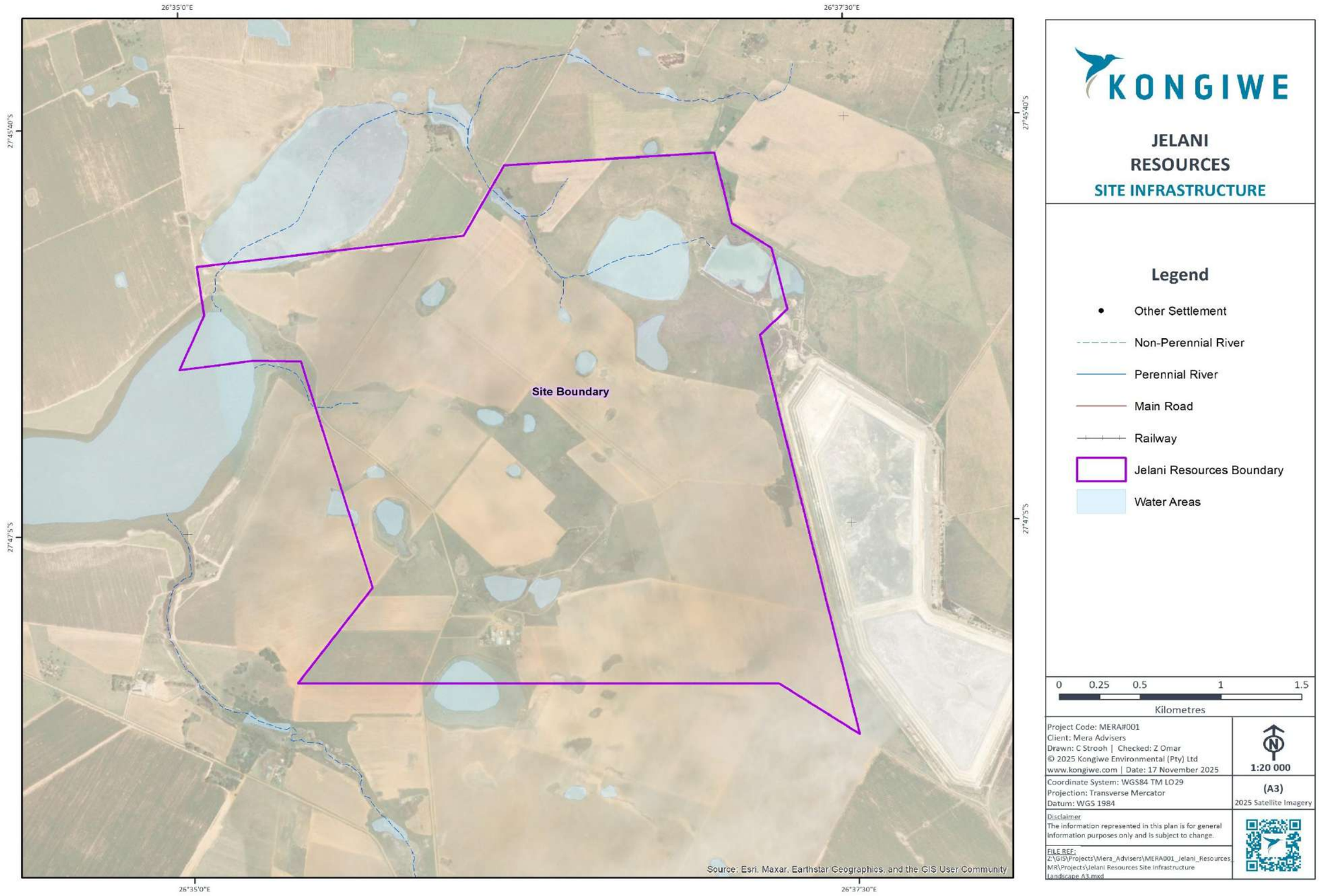


Figure 5-1: Jelani Underground Mining Project Infrastructure Map

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6. Impact Management Objectives

The EMPr is compiled with the aim of achieving a required end state that, as far as possible, ensures that environmental quality is maintained. The impact management objectives and outcomes for Proposed Project are as follows:

- To minimise the negative environmental impacts as far as feasible;
- To maximise the positive and minimise the negative socio-economic impacts;
- To maintain cordial relationships with local residents, authorities and other stakeholders via sustained open communication.
- To capture, contain, treat and recycle all contaminated water arising from the mining operations on site and to prevent the discharge of contaminated water to the environment

The EMPr describes how activities that have, or could have, an adverse impact on the environment will be mitigated, controlled and monitored. Moreover, the EMPr will address the environmental impacts associated with the Proposed Project. Due regard must be given to environmental protection during the entire Project, and a number of environmental recommendations are made in this regard. These recommendations are aimed at ensuring that the contractor maintains adequate control over the Project to:

- Minimise the extent of an impact during the life of the Proposed Project;
- Maintain a state of Environmental Quality following completion of the Project Proposed;
- Ensure appropriate restoration of areas affected by the Proposed Project; and
- Prevent long term environmental degradation.

The management and mitigation measures identified within the EIA process are systematically addressed in this EMPr and ensure the minimisation of adverse environmental impacts to an acceptable level.

Jelani must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits and obligations emanating from relevant environmental legislation.

Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation (EA) (once issued), the stipulations in the EA shall supersede those of this EMPr, unless otherwise agreed by the Competent Authority (CA) in writing. Similarly, any provisions in the legislation overrule any provisions or interpretations within this EMPr. This EMPr shall be binding on all parties involved in the operational phase and shall be enforceable at all levels of operational management.

This document must be adhered to and updated as relevant throughout the project life cycle.

6.1 Aspects for Inclusions as Considerations of the Environmental Authorisation

The Proposed Project may not commence prior to the Environmental Authorisation (EA) being issued. Should the Department of Mineral and Petroleum Resources (DMPR) grant the EA for this project, it should be subject to the following conditions:

- Minimise the extent of an impact during the life of the Proposed Project.
- Maintain a state of Environmental Quality following completion of the Proposed Project.

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- Ensure appropriate restoration of areas affected by the Proposed Project.
- Prevent long term environmental degradation.
- The project may not commence prior to the EA being issued;
- The project should remain in full compliance with the requirements of the EMPr and with all regulatory requirements;
- The EMPr should be implemented by qualified environmental personnel who have the competence and credibility to interpret the requirements of the EMPr. Such persons must be issued with a written mandate by Jelani management to provide guidance and instructions to employees and contractors;
- Jelani must undertake external auditing of the environmental performance as per the conditions of the Environmental Authorisation and provide the DMPR with a copy of the auditing report;
- The Applicant must report to the Department, with reason, if requirements of the EA have not been met.
- Stakeholder engagement must be maintained throughout the life of the project, with an emphasis on the continuous provision of information.
- A community forum should be implemented by Jelani, with the aim of engaging Stakeholders and the public;
- All necessary authorisations must be in place prior to commencement of the project activities.
- All employees and contractors should receive induction that includes an environmental awareness component. This is to allow employees and contractors to become aware of the potential noise risks that activities pose to the surrounding environment.
- The Applicant must maintain all financial responsibility throughout the life of the project, including monitoring.
- The Applicant must ensure that there are sufficient funds set aside to complete the project fully.
- Management and Monitoring plans contained in the EMPr must be strictly adhered to.
- A Chance Find procedure for heritage resources and artefacts needs to be in place.
- The mitigation and monitoring measures recommended by specialist assessments are to be implemented fully.
- Undertake rehabilitation activities as per the approved rehabilitation plan for the site.
- The first phase (five years) of the SLP must be implemented. Subsequent SLP renewals or amendments must be undertaken in accordance with applicable legislative requirements.
- The EIA and EMPr Report is a dynamic document. Since Proposed Project will be implemented in phases over a number of years, it is recommended that the EIA and EMPr Report be updated, especially for the areas that will only be mined years after the start of the project.
- A Chance Find procedure for heritage resources and artefacts needs to be in place.
- The groundwater monitoring programme described in this report shall be implemented prior to and throughout construction, operation and closure of the Jelani Project.
- Groundwater levels and groundwater quality shall be monitored at representative monitoring points, including identified third-party groundwater receptors where appropriate;
- Monitoring results shall be compared against established baseline conditions and defined trigger levels;
- Where monitoring identifies a prolonged or significant deterioration in groundwater quality or groundwater levels attributable to the project, the cause shall be investigated and appropriate corrective measures implemented;
- The groundwater monitoring network shall be reviewed periodically and updated where monitoring results, mine development or changes in groundwater conditions indicate that additional monitoring is required;

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- The groundwater model shall be reviewed and updated at least every two years, or sooner where new relevant information, changes in mine development or material deviations from model predictions occur;
- Existing Target Mine sources that may contribute to cumulative groundwater impacts shall continue to be managed by the responsible operator and incorporated into future cumulative groundwater assessments;
- Site-specific seepage and source-term characterisation shall be undertaken where required to refine the assessment of contaminant loading from mine water infrastructure.

6.2 Determination of Rehabilitation Objectives

As the mine is an underground mine, there will be no concurrent rehabilitation. Final rehabilitation must be carried out once the underground mining project goes into its closure phase. This final rehabilitation must be carried out within the context of the closure plan.

The principles for proper rehabilitation, which must be followed, are:

- Preparing a comprehensive rehabilitation plan prior to the commencement of all Jelani mining areas.

The objective of the final rehabilitation and mine closure plan, must be measurable and auditable, is to identify a post-mining land use that is feasible through:

- Providing the vision, objectives, targets and criteria for final rehabilitation and closure of the project.
- Outlining the design principles for closure.
- Explaining the risk assessment approach and outcomes and link closure activities to risk rehabilitation.
- Detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/ or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post closure.
- Committing to a schedule, budget, roles and responsibilities for final rehabilitation and closure of each relevant activity.
- Identifying knowledge gaps and how these will be addressed and filled.
- Outlining monitoring, auditing and reporting requirements.

This section must be read in conjunction with the EIA as well as follow the recommendations proposed by independent specialists.

6.2.1 Health and Safety

Regarding the safety of both the public and the employees, Jelani must complete a workers' safety assessment as well as a public safety assessment.

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7. Roles and Responsibilities

To ensure the success of the EMPr, it is important to assign definite roles and responsibilities. Compulsory adherence to the EMPr is required. The obligations of the EMPr create a legally binding document in terms of environmental legislation and civil law. It is important that Jelani, its contractors and sub-contractors ensure that all relevant aspects of the EMPr are communicated to all of their employees. It is the duty of Jelani, its contractors, sub-contractors and their employees to fulfil the project objectives with specific reference to the prevention and mitigation of impacts caused by the project development activities. It is the responsibility of the DMPR to ensure that the development takes place in accordance with relevant legislation.

7.1 Government Departments

As the responsibility for the protection of our natural heritage lies with the government departments, they have the power to conduct site inspections to ensure that the development complies with all legislation, regulations and standards. They may enforce penalties where non-compliance occurs.

7.2 Project Developers

The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental officer (EO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the EO to perform responsibilities, and he must ensure that the EO is integrated as part of the project team while remaining independent. The Project Developer must:

- Be fully conversant with the conditions of the EA;
- Ensure that all stipulations within the EMPr are communicated and adhered to by its Contractor(s);
- Issuing of site instructions to the Contractor; and
- Ensure that periodic environmental performance audits are undertaken on the project implementation.

7.3 Mine Manager

The Mine Manager will oversee all the activities. The Mine Manager will be responsible for the activities on site and see to the implementation of the EMPr and will establish a communication network between the different components conducting the work. All incidents and reports will be made to the Mine Manager. Ultimate responsibility in terms of compliance to the EMPr lies with the Mine Manager.

7.4 Contractors

Where contractors are used during the life of the project, the on-site responsibility for environmental and social matters lies with the Contractor Engineer. The Contractor will be responsible for the day-to-day direction and management of the contractor's activities on the site throughout the life of the project.

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7.5 Environmental Officer

An Environmental Officer (EO) is appointed. It will be the responsibility of the EO to:

- Oversee that the day-to-day activities that will take place on site comply with the EMPr and the relevant legislation;
- Monitor the activities through monthly site inspections to ensure compliance to the EMPr;
- Assess the EMPr as to its effectiveness in mitigating and preventing impacts;
- Assess compliance to the EA;
- Identify any non-compliances and to advise to the immediate action and remediation;
- Ensure that the best environmental options are followed throughout;
- Prepare a detailed communication strategy for liaison with I&APs, stakeholders and contractors;
- Manage and document forward and backward information flows between the Mine Manager, the Contractors, the I&APs and Jelani. This includes information pertaining to monitoring and evaluation;
- Assist Jelani upon request, with project communication with I&APs;
- Ensure meaningful participation with the I&APs, including capacity building exercises where the need is identified;
- Give induction and environmental awareness training;
- Ensure that a record keeping system is maintained; and
- Promote co-regulation, shared responsibility and a sense of ownership amongst all parties involved.

8. Impact Mitigation Per Phase

The management measures have been organised in the following project phases:

- Construction Phase;
- Operational Phase;
- Rehabilitation/Decommissioning Phase;

The tables in this section provide the management measures (actions) recommended to manage the potential impacts rated during the different phases. In addition to the management measures provided the tables indicate the person responsible to ensure that these commitments are adhered to and implemented as well as specifying the priority of these commitments (either prior to a phase, during a phase and/ or ongoing), and the outcomes.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- Planned activities change (i.e., in terms of the components and/or layout of the facility);
- Modification to or addition to environmental objectives and targets;
- Additional or unforeseen environmental impacts are identified, and additional measures are required to be included in the EMPr to prevent deterioration or further deterioration of the environment;
- Relevant legal or other requirements are changed or introduced; and
- Significant progress has been made on achieving an objective or target such that it should be modified.

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8.1 Construction Phase Mitigation Measures

Table 8-1: Construction Phase Mitigation Measures

Reference No.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
Hydrological								
1	Surface Water	Construction of the earth berm/open bypass channel to carry "clean" water to Swartpan	Erosion and wash off of exposed soils leading to siltation in nearby surface water runoff areas and/or Swartpan. Release of pollutants (waste piles) during site preparation and rehabilitation could pose a risk to water quality. Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the soil and nearby surface water. Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of concrete lining to bypass channel Contamination of surface water and therefore Swartpan from land disturbance and contaminated soils during construction of earth berm Construction works could be damaged and might have to be replaced, with a potential risk of contamination of Swartpan.	• Clearance of vegetation for the new earth berms/open bypass channel must be limited as far as possible. • Temporary erosion measures such as stormwater bypass mechanisms should be employed around exposed working areas. • The SWMP must be implemented as a first step during the construction phase. • Water quality monitoring must be implemented upstream and downstream of construction sites. • Waste piles to be bermed off to prevent stormwater erosion. • Rehabilitation plan to be implemented accurately and monitored closely. • Maintain all construction equipment. • Maintenance of construction equipment should be prohibited at or near the watercourse. • Train staff in spill response and deploy spill kits at active zones. • Drip trays shall be placed beneath leaking sections of construction equipment. • Phase construction to minimise exposed areas. • Monitor runoff during and after construction.	Local	• DWAF Best Practice Guidelines • Guideline Document for the Implementation of Regulations • GN R704	When: • Duration of the project – specifically construction. Responsibility: • Contractor. • EO. • Jelani/Harmony	Minimise soil erosion and reduce deterioration of water quality.
Hydrogeological								
2	Groundwater	Site preparation for refurbishment of the Shaft 2 and 3 areas	Release of pollutants during site preparation	• Contain clearance activities to required areas as much as practically possible.	Local	• DWAF Best Practice Guidelines.	When:	Minimise deterioration of water quality.

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Reference No.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
			could pose a risk to groundwater quality.	• Prevent ponding in cleared areas through (temporary) stormwater management. • Prevent erosion within the cleared areas and downgradient areas. • Any incidents that could release pollutants to groundwater should be reported and mitigated immediately.		• Guideline Document for the Implementation of Regulations.	• Duration of the project – specifically construction. Responsibility: • Contractor. • EO. • Jelani/Harmony	
		Use of construction equipment for the refurbishment of the Shaft 2 and 3 areas	Hydrocarbon (fuel/oil leaks) pollution from construction equipment can impact the groundwater.	• Regular service of vehicles in designated repair bays. • Refuelling of vehicles only in designated areas. • Restrict movement of vehicles to a minimum. • All vehicles to be provided with a spill kit. • Any incidents that could release hydrocarbons to groundwater should be reported and mitigated immediately.				
Social								
3	Social	Dust emissions. Noise emissions. Light spill. Increased traffic. Population influx, Local development; and Retrenchments at decommissioning.	Generation of dust due to increased traffic on existing gravel roads and disturbance of land within the project footprint	• Maintain roads and surfaces regularly to reduce dust from vehicle traffic and winds. • Implement dust suppression systems, such as water sprays or chemical dust suppressants on exposed surfaces. • Regulate vehicle speeds on the access roads to no more than 40 km/h (heavy vehicles) and 60 km/h (light vehicles). • Keep activities to the approved footprint area; and • Ensure that the local community is aware of (and has access to) a Project-specific Grievance Management Procedure (GMP).	Local	• NEMA; • National Spatial Development Framework; • NEM:AQA; • National Dust Control Regulations (Government Notice No. R827, 2013). • Social and Labour Plan • Stakeholder engagement plan. • Emergency Preparedness and Response Plan.	When • Duration of the construction phase of the project. • Duration of the operation phase of the project. Responsibility: • Contractor. • EO. • HR	Reduce risk of additional impacts due to increased traffic Maximise, as far as possible, positive social impacts

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Reference No.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
			Increased noise levels resulting from construction and mining activities	• Schedule noisy activities during times when they will have the least impact (i.e., daytime). • Provide training for vehicle drivers to reducing noise levels during the operation of their vehicles (e.g. vehicles to be switched off when not in use). • Machinery, equipment, and vehicles are to be serviced/maintained as per the Original Equipment Manufacturer (OEM) requirements to limit noise emissions. • Regulate vehicle speeds on access roads to no more than 40 km/h for heavy vehicles and 60 km/h for light vehicles; and • Ensure that the local community is aware of (and has access to) a Project-specific GMP.				
			Light spill from project infrastructure affecting adjacent land uses and nearby residents	• Only illuminate work areas, access routes and security zones that require lighting. • Install shielding or directional lighting. • Conduct regular maintenance to ensure lighting fixtures are operating efficiently and effectively. • Use timers or motion sensors to control lighting and reduce unnecessary illumination; and • Ensure that the local community is aware of (and has access to) a Project-specific GMP.				
			Increased traffic volumes on existing gravel roads resulting in safety risks for local communities and road users	• Keep site access roads in a good condition. • Install visible speed limit signs along site access roads. • Ensure that employees and contractors adhere to speed limits. • Avoid transporting abnormal load vehicles during peak periods, where practical; and				

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Reference No.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				• Prior to the construction phase, ensure that the local community is aware of (and has access to) a Project-specific GMP.				
			Population influx resulting in increased demand for housing, public services, and infrastructure, and potential social conflict within host communities	• Continue to publicise to the local community that the Project will only contract employees from Harmony. Harmony workers will be sourced from Target Operation. If this mine cannot provide all Harmony workers, the balance will be obtained from other Harmony mines in the Free State Goldfields area; • If employment opportunities arise, implement a policy requiring that recruitment activities occur off-site to avoid loitering of job seekers. No recruitment to take place at or near the Project premises; and • Prior to the construction phase, ensure that the local community is aware of (and has access to) a Project-specific GMP. Communicate the availability of the GMP to the community on an annual basis.				
			Skills development and capacity-building opportunities for employees and members of the local community through implementation of the Social and Labour Plan (SLP).	• Implement the SLP's Human Resource Development (HRD) Programme; and • Implement the SLP's LED Programme.				
			Loss of employment opportunities and associated socio-economic impacts following mine closure and decommissioning	• Redeployment planning and skill diversification will be crucial aspects in addressing retrenchments at closure.				

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Reference No.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
Heritage								
4	Heritage	Main Activities	Loss of fossil heritage by destruction, movement or sealing in of fossil heritage in or below the earths structure	• Implement a chance to find procedures in case where possible heritage finds are uncovered. • If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Procedure must be implemented immediately and the Environmental Officer (EO) in charge of these developments must report to SAHRA. • Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA.	Local.	• Recommendations from SAHRA under Section 36 and 38 of NHRA.	When: • Prior to commencement of Activities. • Duration of the construction phase of the project. • Duration of the operation phase of the project. Responsibility: • Licence holder. • Heritage specialist.	Minimise risk of damaging heritage resources.
Climate								
5	Climate	Construction and refurbishment of surface infrastructure, shaft upgrades, and associated vehicle and equipment use	Generation of greenhouse gas emissions from diesel-powered construction equipment, vehicles, and materials transport, contributing to anthropogenic climate change.	• Optimise construction scheduling and logistics to reduce unnecessary vehicle movements; ensure well-maintained equipment; prioritise local sourcing of materials where feasible; implement a construction-phase emissions tracking system.	National	• Climate Change Act, 2024 (Act 22 of 2024). • Carbon Tax Act, Act No. 15 of 2019. • National Guidelines for the Consideration of Climate Change. • National Environmental Management Act: Air Quality Act (Act 39 of 2004, as amended) • National Environmental Management Act (Act 107 of 1998, as amended)	When: • Duration of the construction phase of the project. Responsibility: • Contractor. • EO. • Jelani	Minimise GHG emissions.
Air Quality								
6	Air Quality	Refurbishment and/or construction at Target No. 2 and No.3 Shafts;	Dustfall and particulate matter (PM) emissions associated with construction, refurbishment, and infrastructure upgrade	• Using water trucks for dust suppression, particularly during the dry and windy periods, • Implementation of vehicle speed restrictions, i.e., set strict speed	Local	• National Standards for Ambient Air Quality for PM10 and for PM2.5; • National Dust Control Regulations.	When • Duration of the construction phase of the project.	Minimise generation of PM.

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Reference No.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
		Vehicle dust entrainment on unpaved roads; and	activities at Target No. 2 Shaft.	limits and ensure speed reduction for all onsite construction vehicles, and • Ensure full compliance with any further mitigation measures specified in the EMPr. • Implement dust control measures for construction • Implement Dustfall Monitoring			Responsibility: • Contractor. • EO.	

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8.2 Operation Phase Mitigation Measures

Table 8-2: Operation Phase Mitigation Measures

Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
Terrestrial and Aquatic Biodiversity								
1	Flora	Underground mining activities	Habitat loss and fragmentation as a potential impact from subsidence Soil disruption and degradation as a potential impact from subsidence. Increased incidence and proliferation of AIPs (due to habitat degradation associated with subsidence). Loss of significant biodiversity features as a potential impact associated with subsidence.	• Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • Planning and mine design: Adequate safety precautions and monitoring protocols be developed to lower the potential of subsidence and effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) to allow for immediate management of potential subsidence events. • In areas where subsidence is anticipated a walkdown should take place to observe and mark any floral SCC for the possibility of loss in an event of subsidence. Should any SCC be anticipated to be lost a permit has to be obtained from the authorising governmental body. Where possible these species need to be relocated to a suitable area. • Bare areas are more susceptible to erosion, and these areas should be monitored closed to indicate any initial signs of subsidence. • Concurrent rehabilitation should be implemented. At the first signs of soil erosion the surface should be covered promptly with native plant species to prevent further loss of soil (where applicable) from wind and water erosion. Use erosion and sediment controls (e.g. contouring, mulching, silt barriers) in areas affected by surface cracking or deformation.	Local.	• NEM:PAA; • NEMA; • National Biodiversity Assessment (NBA) • Free State C-Plan National Spatial Biodiversity Assessment (NSBA) National Freshwater Ecosystem Priority Areas (NFEPA's) • ECA; • Alien and Invasive Species Regulations, 2014 • CARA; • Mining and Biodiversity Guidelines	When: • Duration of the project. • Operation. Responsibility: • Contractor. • EO.	Minimise negative impacts on Biodiversity.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				• Offset strategies will need to be considered (and discussed with local authorities) should a significant subsidence event result in the loss of threatened vegetation types (EN Vaal Vet Sandy Grassland), CBA 1 and ESA 1&2.				
2	Fauna	Underground mining activities	Faunal Habitat and Diversity loss as a potential impact from subsidence. Faunal SCC loss as a potential impact from subsidence. Faunal displacement and disturbance as a potential impact from underground mining.	• Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • Planning and Mine Design: Adequate safety precautions and monitoring protocols must be developed to lower the potential of subsidence. Effective monitoring (especially of sensitive habitats, i.e., Vaal Vet Sandy Grasslands and watercourses) allows for immediate management of potential subsidence events. • At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase). • All infrastructure is to be regularly inspected for erosion or environmental risks. • At all times, ensure that sound environmental management is in place during the Mining Phase (construction and operational phase). • External noise should be kept to a minimum to limit the impacts on faunal species surrounding the mine, and • Mining activities, such as blasting, should aim to be done deep enough as to minimise disturbance to surface faunal species.	Local.		When: • Duration of the project. • Operation. Responsibility: • Contractor. • EO.	Minimise negative impacts on Biodiversity.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
3	Freshwater and Aquatic	Underground mining activities	Potential changes to hydrological functioning and water quality should subsidence occur. Potential changes to geomorphological processes should subsidence occur . Potential increased proliferation of AIPs and potential habitat loss.	• Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. • Planning and mine design: Adequate safety precautions and monitoring protocols be developed to lower the potential of subsidence and effective monitoring (especially of freshwater ecosystems) to allow for immediate management of potential subsidence events. • In areas where subsidence is anticipated a walkdown should take place to observe and mark any signs of erosion and any changes to hydraulic pattern in the landscape. • Bare areas are more susceptible to erosion, and these areas should be monitored to indicate any initial signs of subsidence. • Concurrent rehabilitation should be implemented. At the first signs of soil erosion the surface should be covered with native plant species to prevent further loss of soil (where applicable).	Local.	• South Africa's National Biodiversity Strategy and Action Plan (NBSAP) • NEM:PAA; • NEMA; • NEM:WA • National Biodiversity Assessment (NBA) • Free State C-Plan National Spatial Biodiversity Assessment (NSBA) National Freshwater Ecosystem Priority Areas (NFEPA's). • ECA; • Alien and Invasive Species Regulations, 2014 ; • CARA; • Mining and Biodiversity Guidelines. • ECA; • Alien and Invasive Species Regulations, 2014; • DWS Risk Assessment Protocol; • National Wetland Classification Systems (NWCS).	When: • Duration of the project. • Operation. Responsibility: • Contractor. • EO.	Minimise negative impacts on Biodiversity.
Hydrological								
4	Surface Water	Operation of the proposed "dirty" water and "clean" water system	Poorly maintained stormwater infrastructure reduces capacity of the infrastructure which could result in escape into other areas and nearby watercourses, degrading water quality.	• Implementation of the proposed SWMP. It must be ensured that stormwater measures (e.g. Berms) are designed, constructed, operated and maintained, to ensure that stormwater does not spill more than once in 50 years, to be compliant with GN R704 regulations.	Local	• DWAF Best Practice Guidelines • Guideline Document for the Implementation of Regulations • GN R704	When: • Duration of the project – specifically operation. Responsibility: • Contractor.	Minimise soil erosion and reduce deterioration of water quality.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
			Dirty" water infrastructure will overflow during extreme rainfall and contaminate Swartpan and the natural watercourse downstream of Swartpan.	• Undertake regular inspections and maintenance on the bypass channel and earth berms. • Regular inspections and maintenance of "dirty" water infrastructure. • Harmony to operate the infrastructure at the designed operating level. It is of utmost importance that the "dirty" water system (Emergency Overflow Dam, Blue RWD, and North-west RWD) are operated at the designed "operational" level allo wing capacity in the system to accommodate the 1:50 year storm. All stormwater infrastructure must be regularly monitored and maintained.			• EO. • Jelani/Harmony	
Hydrogeological								
5	Groundwater	Groundwater abstraction from the deep Witwatersrand aquifer.	Abstraction from the deep aquifer may impact the availability of the shallow groundwater resource.	• Mining should progress as swiftly as possible to reduce the period of active dewatering. • Dewatering of the underground mine should stop as soon as mining activities cease. • Abstraction volumes should be monitored regularly and where these deviate from expected volumes, this should be reported immediately.	Local	• DWAF Best Practice Guidelines. • Guideline Document for the Implementation of Regulations.	When: • Duration of the project – specifically operation. Responsibility: • Contractor. • EO. • Jelani/Harmony	Minimise deterioration of water quality.
		Groundwater abstraction from the deep Witwatersrand aquifer	Abstraction from the deep aquifer may impact on groundwater levels in the shallow Karoo aquifer.	• Groundwater levels in the shallow Karoo aquifer should be monitored on a regular basis throughout the LoM to verify no impacts on shallow groundwater levels. • Where it is proven that third-party boreholes have reduced yields due to mining activities, an alternative supply needs to be provided.				
		Mine water and waste containment in existing mine infrastructure.	Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use	• Diversion of clean water to Swartpan and prevention of dirty water from the emergency overflow dam. • Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling.				

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				• Continuous monitoring of process water in dams, pans and tailings ponds. • Continuous monitoring of groundwater quality in downgradient monitoring boreholes and third-party boreholes. • Yearly reporting of groundwater quality monitoring and comparison to groundwater model results. • Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.				
Soil, Land Use and Land Capability								
6	Soil, Land Use and Land Capability	Underground mining activities	Loss of agricultural land capability Soil erosion & contamination	• It must be ensured that areas of active cultivation are protected from subsidence. • The rock engineers must confirm that the risk of subsidence is low before commencement of any underground activities. • Regular morning of surface above the undermined areas must be considered to ensure that no subsidence occurs.	Local	• The Preservation and Development of Agricultural Land Act (PDALA), Act. No 39 of 2024. • NWA. • NEMA. • Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA).	When: • Duration of the project – specifically operation. Responsibility: • Contractor. • EO.	Minimise negative impacts on Agriculture.
Air Quality								
7	Air Quality	Material handling operations; conveyor belts and conveyor transfer points; exposed areas (WRDs); and truck loading/offloading operations.	Fugitive Dust – TSP, PM10 & PM2.5 emissions	• Reduce height of material transfer at the conveyor transfer points. • Partial or full enclosure of conveyors and conveyor transfer points. • Maintain the drop height to a minimum during truck loading/offloading operations. • Water sprays for material handling operations (e.g., wet material before loading trucks or conveying). • Water spraying or wind breaks at exposed material storage areas such as the WRDs. • Use vegetation, topsoil and/or rock armour on large stockpiles and WRDs that are prone to wind erosion.	Local	• National Standards for Ambient Air Quality for PM10 and for PM2.5; • National Dust Control Regulations.	When • Duration of the operation phase of the project. Responsibility: • Contractor. • EO.	Minimise generation of PM.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				• Regular maintenance of operational equipment, including dust suppression equipment such as water sprays, to ensure the equipment is operating properly. • Immediate clean-up of any material (i.e., ore and waste rock spillages. • Conduct regular site inspections to ensure the dust mitigation measures are being implemented. Regular visual site inspections are recommended to assess whether further mitigation is required for any of the dust emission sources. • A DMP will need to be developed for onsite activities, to comply with the requirements of the 2026 NDCR. • Dust control measures need to be assessed in detail and incorporated into the plan. • The plan should include a dustfall monitoring programme and appropriate mitigation measures for all key dust emission sources. • Implement Dustfall Monitoring • The plan can be compiled internally by the mine and used for internal management purposes.				
		Vehicle dust entrainment, truck exhaust emissions and any other mining vehicle/equipment exhaust emissions	Fugitive Dust – TSP, PM10 & PM2.5 & Gases emissions	• Have clearly defined hauling routes/vehicle access areas. These areas should be treated for dust suppression. • All main hauling roads should be treated for dust suppression. A combination of a fixed irrigation system and use of water trucks is recommended. A fixed irrigation system can reduce operational costs associated with dust mitigation of haul roads. • Conduct regular cleaning/sweeping of paved road surfaces to prevent the accumulation of dust, if applicable. • Conduct regular maintenance and checks for haul road surfaces. • Immediate clean-up of any spillages. • Trucks transporting ore should be appropriately covered or otherwise secured				

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				(where possible) to minimise wind-blown dust and material spillage during transportation, particularly when travelling on public roads. • Control the number of trucks on the road, weight of trucks and the travelling speed. Implement strict vehicle speed limits (e.g., 20-40 km/h). • Switch off engines whilst not in use; • Establish a maintenance schedule to ensure proper maintenance of the trucks & mobile equipment; • Conduct regular maintenance and quality checks (engines/tyres) for all heavy mobile equipment/trucks. • Implement Dustfall Monitoring				
Social								
8	Social	Refer to construction mitigation measures as these are applicable to operation as well.						
Heritage								
9	Heritage	Refer to construction mitigation measures as these are applicable to operation as well.						
Climate								
10	Climate	Underground mining operations, ore hoisting, ventilation, pumping, and surface support activities	Ongoing generation of Scope 1 (diesel combustion in mobile equipment and standby generators) and Scope 2 (electricity consumption from the national grid) greenhouse gas emissions over the life of mine, contributing to global climate change.	• Implement energy efficiency measures (optimised ventilation-on-demand, efficient motors and pumps, LED lighting); explore opportunities for renewable energy or wheeling; prioritise fuel-efficient mobile equipment; maintain accurate GHG monitoring and reporting in line with the Carbon Tax Act and future carbon budget requirements; develop a progressive emissions reduction plan.	National	• Climate Change Act, 2024 (Act 22 of 2024). • Carbon Tax Act, Act No. 15 of 2019. • National Guidelines for the Consideration of Climate Change. • National Environmental Management Act: Air Quality Act (Act 39 of 2004, as amended)	When: • Duration of the operation phase of the project. Responsibility: • Contractor. • EO. • Jelani	Minimise GHG emissions.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
		Mineral processing at the existing Target plant and associated materials handling	Indirect greenhouse gas emissions associated with electricity use and any process-related energy consumption at the metallurgical plant, contributing to the project's overall carbon footprint.	• Support energy efficiency initiatives at the processing plant; investigate opportunities to increase the renewable energy component of the electricity supply; maintain transparent GHG accounting for Scope 2 emissions.		• National Environmental Management Act (Act 107 of 1998, as amended)		
Ground Vibration								

11	Ground Vibration	Underground blasting	Ground vibration generated by underground blasting may propagate through the surrounding rock mass to surface and potentially impact neighbouring structures, infrastructure and communities.	• No specific mitigation measures are considered necessary at this stage based on the predicted ground vibration levels. Blasting activities should, however, be monitored during the mining process, with appropriate action taken should actual ground vibration levels differ significantly from the predicted levels.
				• A continuous monitoring programme for recording blasting operations is recommended. The following elements should be part of such a monitoring program:
				  ○ Ground vibration results;
				  ○ Comprehensive blast information;
					Local	• National Environmental Management Act (Act 107 of 1998, as amended)
						• Explosives Act No. 15 of 2003.
						• Mine Health and Safety Act No. 29 of 1996;
							When:
							• Duration of the project – specifically operation.
							
							Responsibility:
							• Contractor.
							• EO.
							• Jelani
								Minimise ground vibrations.

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8.3 Rehabilitation/Decommissioning

Table 8-3: Rehabilitation/ Decommissioning Phase Mitigation Measures

Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
Terrestrial and Aquatic Biodiversity								
1	Flora	Main activities	Habitat loss and fragmentation from potential subsidence post mine closure.	• Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Safety protocols should be adhered to during decommission phase (to reduce the risk of surface deformation and preserves soil and vegetation structure) and (iv) Monitoring for spalling, scaling, and convergence. • A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts. • Monitoring post mine closure and decommission should take place for at least 5-year post closure to ensure no delayed subsidence has occurred.	Local.	• NEM:PAA; • NEMA; • National Biodiversity Assessment (NBA) • Free State C-Plan National Spatial Biodiversity Assessment (NSBA) National Freshwater Ecosystem Priority Areas (NFEPA's) • ECA; • Alien and Invasive Species Regulations, 2014 • CARA; • Mining and Biodiversity Guidelines	When: • Duration of the project. Responsibility: • Contractor. • EO.	Minimise negative impacts on Biodiversity.
2	Fauna	Main activities	Faunal Habitat and Diversity loss as a potential impact from subsidence. Faunal SCC loss as a potential impact from subsidence.	• Adaptive Subsidence Management: Where subsidence is anticipated (i) Use backfilling and engineered support to reduce ground collapse, (ii) Design underground layouts to minimise removal of key support pillars (this reduces surface deformation and preserves soil and vegetation structure)	Local.		When: • Duration of the project. Responsibility:	Minimise negative impacts on Biodiversity.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				and (iv) Monitoring for spalling, scaling, and convergence. • A Rehabilitation and Landscape Plan should be developed in the case of subsidence to follow protocols and guidelines provided by qualified experts. • Implement all recommendations as per the mine closure plan. • Continue monitoring of rehabilitation activities for a minimum period of 5 years following the mine closure or until an acceptable level of habitat and biodiversity reinstatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous to the pre-mining conditions of the area.			• Contractor. • EO.	
3	Freshwater and Aquatic	Main activities	Potential freshwater habitat/functionality loss and impacts to biota due to potential subsidence post mine closure.	• Adaptive Subsidence Management: Mitigation measures as stipulated in the specialist studies to mitigate against subsidence must be implemented. As per the Technical Report (Bara Consulting, 2025) to avoid potential surface subsidence, pillars will be designed with a minimum factor of safety to ensure subsidence is avoided. It is advised that the pillar safety factor under the wetlands be increased to further ensure no subsidence takes place. • A Rehabilitation and Landscape Plan should be developed as a precautionary measure for subsidence to follow protocols and guidelines provided by qualified experts. • Monitoring post mine closure and decommission should take place for at least 5 year post closure to ensure no delayed subsidence has occurred.	Local.	• South Africa's National Biodiversity Strategy and Action Plan (NBSAP) • NEM:PAA; • NEMA; • NEM:WA • National Biodiversity Assessment (NBA) • Free State C-Plan National Spatial Biodiversity Assessment (NSBA) National Freshwater Ecosystem Priority Areas (NFEPA's). • ECA; • Alien and Invasive Species Regulations, 2014 ; • CARA; • Mining and Biodiversity Guidelines. • ECA; • Alien and Invasive Species Regulations, 2014; • DWS Risk Assessment Protocol; • National Wetland Classification Systems (NWCS).	When: • Duration of the project. Responsibility: • Contractor. • EO.	Minimise negative impacts on Biodiversity.

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
Hydrological								
4	Surface Water	Demolition of existing "dirty" water infrastructure, and open bypass channel	Effluents residues containing alkaline or heavy metals pollutes nearby soil and water resources	• Remove and treat effluent before demolition begins. • Neutralise pH to environmentally acceptable limits before discharge or containment. • Stormwater infrastructure to be implemented once end land use has been determined. • Post-Rehabilitation monitoring. • Stormwater infrastructure to be implemented once end land use has been determined. • Design reprofiled areas with stable drainage patterns.	Local	• DWAF Best Practice Guidelines • Guideline Document for the Implementation of Regulations • GN R704	When: • Duration of the project – specifically rehabilitation/closure Responsibility: • Contractor. • EO. • Jelani/Harmony	Minimise soil erosion and reduce deterioration of water quality.
		Rehabilitation of the existing "dirty" water infrastructure, and open bypass channel	Erosion and wash off soils resulting in water quality issues in the surrounding watercourses					
		Reprofiling of land to restore original topography	Land being levelled to its original functioning topography levels will redirect runoff and affect existing drainage patterns					
Hydrogeological								
5	Groundwater	Cessation of groundwater abstraction from the deep Witwatersrand aquifer	Cessation of groundwater abstraction causes the recovery of deep groundwater levels, allowing for hydraulic connection between the deep and shallow aquifers.	• Groundwater levels in the deep Witwatersrand aquifer should continue to be monitored on a regular basis. • Water level recovery in mine voids should continue to be monitored on a regular basis.	Local	• DWAF Best Practice Guidelines. • Guideline Document for the Implementation of Regulations.	When: • Duration of the project – specifically rehabilitation and closure. Responsibility: • Contractor. • EO.Jelani/Harmony	Minimise deterioration of water quality.
		Mine water and waste containment in existing mine infrastructure	Contaminant plume migration from mine waste and water infrastructure impacting on downgradient groundwater use	• Rehabilitation of process water storage dams. • Rehabilitation and evaporative cover on the Target TSF. • Geochemical assessment of Target TSF tailings, including source terms and long-term seepage quality modelling. • Continuous monitoring of water quality in dams and pans for a period of at least five years. • Continuous monitoring of groundwater quality in downgradient monitoring and				

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Reference no.	Aspect	Activities	Impact	Mitigation Measures	Size and Scale of Disturbance Post-Mitigation	Compliance with Standards	Time Period for Implementation & Responsible Person	Outcomes
				third-party boreholes for a minimum period of five years. • Yearly reporting of groundwater quality monitoring and comparison to groundwater model results. • Where it is proven that third-party boreholes show impacted groundwater quality due to mining activities, an alternative supply needs to be provided.				
Social								
6	Social	Refer to construction mitigation measures as these are applicable to operation as well.						
Heritage								
7	Heritage	Refer to construction mitigation measures as these are applicable to operation as well.						
Climate								
8	Climate	Decommissioning of surface infrastructure, rehabilitation earthworks, and associated vehicle/equipment use	Temporary generation of greenhouse gas emissions from diesel-powered equipment used during the removal of monitoring infrastructure, regrading of access tracks and revegetation of disturbed footprints. Emissions are limited by the small scale of the rehabilitation obligation within the Jelani mining right area, where no shafts, processing facilities, tailings facilities or waste rock dumps require decommissioning.	• Minimise the duration and intensity of earthworks; use well-maintained equipment; prioritise progressive rehabilitation to reduce the overall equipment hours required.	National	• Climate Change Act, 2024 (Act 22 of 2024). • Carbon Tax Act, Act No. 15 of 2019. • National Guidelines for the Consideration of Climate Change. • National Environmental Management Act: Air Quality Act (Act 39 of 2004, as amended) • National Environmental Management Act (Act 107 of 1998, as amended)	When: • Duration of the phase of the project. Responsibility: • Contractor. • EO. • Jelani	Minimise GHG emissions.

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9. Specific Impacts Management Plans

The impact management actions per Phase are detailed in Section 8 of this report. The impact management outcomes for the Proposed Project are as follows:

- Restrict activities to the designated area.
- Reduce groundwater pollution.
- Reduce surface water pollution.
- Maintain transparent engagement and communication.

The following compliance mechanisms are required by Jelani on an annual basis or as determined by the Environmental Authorisation:

- An environmental audit of the EMPr should be undertaken on an annual basis by an independent auditor.
- An internal audit should be undertaken annually.

9.1 Environmental Awareness Plan

9.1.1 Communication Chain

Communication regarding environmental risks and management measures relevant to each phase of the project must be provided to all levels of personnel, including management, administrative staff, site workers, contractors, and subcontractors.

9.1.2 Management Sector

A workshop will be conducted to inform all management of the risks associated with the project. The risks for all aspects will be explained and the appropriate management options discussed. The workshop will also elaborate on the monitoring programmes that will be implemented to identify and monitor the level of impact on the environment and discuss various remediation actions, should there be deterioration.

The evaluation process is integral in the assurance that the site reduces any possible environmental risks associated with the project. The workshop will be conducted prior to the commencement of the project to ensure that all risks are discussed before there is any chance of the impacts occurring.

The workshop may be repeated at certain stages during the project development, in the case of new employees.

This workshop will seek to explain the following necessary actions:

- Risks associated with each aspect will be discussed to ensure that there is an understanding of how each action of the project may impact on the environment.
- The mitigation of the environmental risk will be elaborated on.
- It is important that each person understands these management strategies as it ensures that the impact on the environment is kept to a minimum.

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- Data collection regarding each aspect will also be explained to ensure that each aspect is monitored according to those protocols specified by the authorisations and licence. Along with data collection, the reporting of findings will be discussed.
- This workshop will take place prior to the commencement of the project, thus ensuring a full understanding of the project and its associated environmental risks before any activity is undertaken.
- The following communication channels and media will/can be used to communicate environmental and social issues with employees:
    - Head of Department (HOD) Meetings: The Site Manager communicates information to senior management on environmental issues and the information is minuted.
    - HSEC Meetings: 'Environmental issues' should be an agenda item on monthly safety, health & environmental meeting agendas.
    - Publications: Leaflets, posters etc. are produced by the relevant department or other designated persons, for use on notice boards, and distribution.
    - EMS Database: Feedback from line management on objectives, targets and actions.
    - Daily/ Weekly Safety Meeting: All meetings are scheduled to commence with a discussion on safety, health & environmental topics.

9.1.3 Construction Workers Sector

The workers associated with the activities on site will attend an induction course to ensure that each person is aware of the environmental risks associated with the project. This induction will form part of the health and safety induction. The environmental risks of each aspect as well as the mitigation will be elaborated on.

A debriefing should take place when the project moves from one phase to the next. A Job Hazard Analysis (JHA) or Issue Base Risk Assessment could also be conducted to identify potential risks associated with the project.

Furthermore, weekly toolbox talks / green meetings must cover topics raising awareness on environmental and social issues relating to the project.

9.1.4 Contractors

A Risk Conversancy Training (RCT) is conducted and is applicable to all contactors. Here focus will be on activities that carry an environmental risk, actions to be taken to reduce these risks, and procedures to be followed in the event of an incident.

Furthermore, weekly toolbox talks / meetings must cover topics raising awareness on environmental and social issues relating to the project.

9.1.5 Environmental Officer

The Environmental Officer (EO) will oversee environmental awareness induction training to all contractor staff. The EO will ensure that the necessary environmental induction training takes place and that records of attendance are maintained and up to date.

An EO must also be present on site throughout the development phases of the project to ensure compliance and the implementation of the EA, WUL and EMPr condition.

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9.2 Strategic Communication Plan

9.2.1 Environmental Communication Strategies

Jelani Management is required to establish procedures for the internal communication between the various levels and functions of the organisation, and receiving, documenting and responding to environmental risks for each phase of the project will take place for the management, administrative and worker sectors of the site, as well as contractors. The organisation shall conduct processes for external communication on its significant environmental aspects and record its decision in line with the communication policy as well as conditions stated in any EA or License.

9.2.1.1 Stakeholder Engagement Plan

A Stakeholder Engagement Plan (SEP) and Grievance Mechanism (GM) must be compiled for a project. The SEP needs to provide guidance for engagement with Stakeholders.

9.2.1.2 Internal Communication

Internal communication is done within the Administrative Sector.

9.2.1.3 External Communication Strategies

The following communication channels and media may be used to communicate environmental issues to persons who are not employed on the project or by its subcontractors:

- **Environmental Stakeholder Engagement Forum**: An Environmental Stakeholder engagement forum must be established and used to keep interested and affected parties informed of the significant environmental aspects identified through the Environmental Impact Assessments and Management Plans. This forum should preferable be initiated prior to commencing with any activities on site. This is also the forum where interested and affected parties get the opportunity to raise environmental concerns. Records must be kept of all decisions and concerns. The Environmental Stakeholder engagement meetings must be chaired by the personal of Jelani, or another appropriately appointed competent individual.
- **Publications**: Selected publications should be produced and used to communicate environmental issues to outside parties. Examples include newsletters and Annual Reports.
- **Communication from External Parties and Employees**: A clear communication point is established within the company through the communication procedure that determines who is responsible for liaison with the media in respect of any crisis that may arise. A complete procedure for media liaison is available to all employees. Communication from external interested and affected parties may be received by email, fax, telephonically or by mail. Where required, a written response will be sent, on receiving such communication, by the appropriately appointed individual under signature of the Mine Manager, to the respective interested and / or affected party. All telephonic or facsimile correspondence received on the site must be forwarded to the relevant department for action. All events or concerns will be captured and actioned on an existing and / or future database.
- **E-mail**: E-mail communication received must be stored, with replies, in an appropriate folder on a server. E-mail messages, relevant to environmental management, should be kept for a minimum of two years before deletion.

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- **Mail**: Correspondence received by mail must be filed, along with the response (where relevant), within the relevant department's filing system for a minimum period of two years. Paper correspondence will be archived in this department.
- **Storage of Correspondence**: All original correspondence must be retained by the Mine manager for a minimum period of two years.
- **Environmental Reports**: Copies of relevant specialist study reports and Environmental Impact Assessments will be available on request from an external party by the Mine manager.
- **Queries from Interested and Affected Parties**: Response to queries about environmental impacts and aspects will be addressed by the relevant department and approved by the Mine manager.

9.2.1.4 Evaluation of the Environmental Awareness Plan

The evaluation of the environmental awareness and training plan will be conducted by Jelani management. This evaluation will entail the auditing of the operation once activity has commenced. The environmental awareness and training plan described above is sufficient to make all those involved in the project aware of those risks that may occur as well as the necessary mitigation required to minimise these risks.

9.2.1.5 Emergency Incident Reporting

Environmental incident reporting is a vital part of communication at the Jelani JV Underground Mining project. Employees are required to report all environmentally related problems, incidents and pollution, so that the appropriate litigator action can be implemented timeously. In the event of an Environmental Incident, the incident must be reported according to the Incident Reporting Procedure.

An Emergency Incident Preparedness and Response Plan needs to be developed.

9.2.1.6 Induction

All full-time staff and contractors are required to attend an induction session. Employees are inducted when they start on the project. Any contractor, who works on the project is required to undergo prescribed induction training. This induction will form part of the health and safety induction.

Environmental issues and aspects related to the project will be addressed in the induction sessions. All environmental impacts and aspects and their mitigatory measures will be discussed, explained and communicated to employees. The induction sessions will be modified according to the level of employee attending the induction session so that all employees gain a suitable understanding of environmental issues and pollution.

The records of all individuals attending induction sessions to be kept; the records to be kept include names, ID, contact details, designation and signature.

9.2.1.7 Hazardous Substances

Individuals dealing with potential hazardous situations and risks that could lead to hazardous spills, pollution incidents, excessive dust or other forms of environmental damage should receive appropriate job specific training on the risks and potential consequences of their appointment and work situation, how to avoid

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environmental impacts and how to respond during an environmental incident or emergency situation. All these actions will be done in accordance with the procedures on management of hazardous substances.

9.2.1.8 Dust mitigation

Individuals dealing with potential situations and risks that could lead to excessive dust should receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, how to avoid environmental impacts and how to respond during an environmental incident or emergency situation.

9.2.1.9 Fire Incidents

Individuals dealing with potential hazardous situations and risks that could lead to fire incidents or emergencies should receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, how to avoid environmental impacts and how to respond during an environmental incident or emergency situation.

9.2.1.10 Pollution Incidents or Forms of Environmental Damage

Any incident or form of environmental damage must be dealt with in accordance with the Incident management procedure.

Individuals dealing with potential situations and risks that could lead pollution incidents or other forms of environmental damage to receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, how to avoid environmental impacts and how to respond during an environmental incident or emergency situation.

9.2.1.11 Waste Management

Site personnel and contractors responsible for the operation and safe handling of the various waste streams will receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, how to avoid environmental impacts and how to respond during an environmental incident or emergency situation. Jelani must ensure that training and awareness programmes cover the safe transportation, handling, storage, transfer, handling, use and disposal of all waste streams, and the location of waste receptacles for each waste stream. All waste management activities must be done in accordance with the procedures, the EMPr and in terms of registers dealing with storage of waste in specific areas.

9.2.1.12 Water Management

All persons responsible for active water management will receive appropriate job-specific training on the risks and potential consequences of their appointment and work situation, how to avoid environmental impacts and how to respond during an environmental incident or emergency.

9.2.1.13 Water Consumption and Use

All staff will receive training on minimising water consumption and how to use water sparingly.

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9.3 Emergency Response Plan

An Environmental Emergency Response Plan defines the process to follow to respond rapidly and effectively to and manage emergency situations that may arise as a result of the proposed underground mining project. This plan must be initiated when an emergency:

- Cannot be immediately brought under control;
- Has the potential to extend beyond site boundaries;
- Has the potential to significantly impact on the environment and/or community; and
- Requires assistance from External Emergency Services.

Jelani will develop an Emergency Response Plan for the Proposed Project.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will ensure that Contractors comply with all procedures described in this document.

9.3.1 Intent

A Work Method Statement should be prepared prior to the commencement of any activities, detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

- Areas where accidents and emergency situations may occur;
- Communities and individuals that may be impacted, as read in the specialist studies;
- Response procedure;
- Provisions of equipment and resources;
- Designation of responsibilities; and
- Communication, both internally and externally.

The purpose of this plan is to define the emergency response structure and process of the Proposed Project. The objectives of the plan are:

- To ensure communication of all vital information as soon as possible;
- To provide clear guidance in the management of emergencies that have the potential to impact on life, property, environment and community;
- Clearly define roles and responsibilities;
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed;
- For employees to be able to take prompt effective action to reduce the risk of injury, minimise environmental impact and property damage likely to result from possible emergencies;
- To specify the emergency communication process necessary to establish links with key site personnel.

The Emergency Preparedness and Response Code of Practice will be compiled in accordance with the Occupational Health and Safety OHSAS 18001, and the Site Health and Safety Act, 1996 (Act No. 29 of 1996).

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9.3.2 Planning

There are three levels of emergency, these are delineated as follows:

- Local Emergency: An alert confined to a specific locality.
- Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
- Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation, and every effort must be made to reduce or stop the cause of any emergency provided it is safe to do so. Factors effecting the success of the emergency response strategy include:

- The type and scale of incident/accident will govern the type of response.
- The scale of the incident, accident or emergency will govern the resources required to bring under control.
- Communications after which an incident or emergency is first reported governs scale, type and resources required to maintain effective control and bring to resolution.

To facilitate the effective implementation of the procedures, copies of the Environmental Emergency Response Plan must be placed in accessible and visible locations around the site.

Jelani's EO representative, who is responsible for managing the day-to-day on-site implementation of this Plan, must act as liaison and advisor on all environmental and related issues.

9.4 Surface Water Management

9.4.1 Conceptual Stormwater Management Plan

Please refer to Section 7.5.4 of the EIA and the Hydrological Report in Appendix D5 detailed description of the Conceptual Stormwater Management Plan. The water quality monitoring requirements can be found in the Hydrological Report.

The following design philosophy was adopted to guide the development of the Stormwater Management Plan (SWMP), and is based on GN R704 regulations and the DWS BPG G1: Storm Water Management:

- Confine or divert any unpolluted water to a clean water system, away from a dirty area.
- Runoff from dirty areas must be captured and contained and should as far as possible be recycled and reused.
- Clean and dirty water systems must be designed and constructed to prevent cross contamination.
- Clean and dirty water systems must convey or contain runoff from the 1:50 year storm event.
- Appropriate maintenance and management of stormwater related infrastructure should always be ensured.

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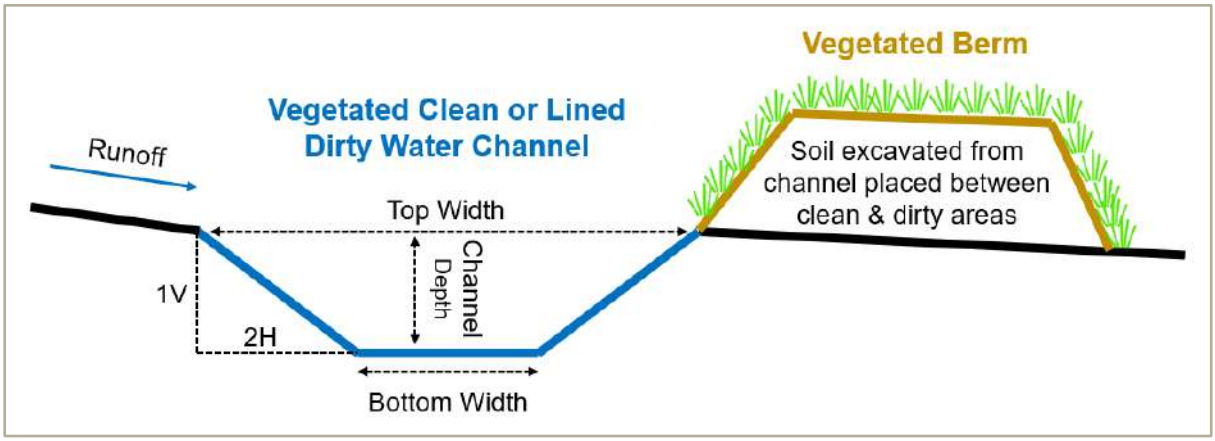


Figure 9-1: Typical proposed design for clean and dirty water channels

9.4.2 Surface Water Quality

Refer to Section 7.5.3 of the EIA Report and the Hydrological Report included in Appendix D5 for a detailed description of the surface water quality and monitoring results.

Reporting should continue to be done on a monthly / quarterly basis (or as recommended by the DWS). It is recommended that monitoring reports include trend analyses. It is further recommended that the water quality from upstream monitoring points is compared to downstream monitoring points.

9.4.3 Management Plan

The following monitoring plans are recommended:

- It is recommended that stormwater infrastructure be inspected once a month during the dry season and wet season. They should also be observed right away following any extreme rainfall events. Any identified damage, or maintenance issues should be addressed promptly to ensure the continued functionality of the stormwater infrastructure. The maintenance manager or onsite Environmental Officer should oversee monitoring. The following should be included in inspections that are documented:
    - The date of the examination.
    - Rainfall quantity received before inspection.
    - Photos of any identified damage or maintenance issue observed.
    - The steps taken to resolve problems.
    - Time required to do so.
    - Photos taken after action was performed.
- A surface water quality monitoring programme plays a critical role in managing potential impacts by identifying water quality deterioration early and guiding the implementation of appropriate mitigation measures. Sampling must be conducted in line with the DWS Best Practice Guideline G3: Water Monitoring Systems. All samples should be stored at approximately 4°C, shielded from direct sunlight, and delivered to an accredited laboratory within 24 hours for analysis. Monitoring results must be evaluated against previous sampling data to identify any significant deviations or emerging trends. Should trend analysis reveal a decline in water quality from the established baseline, an immediate

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investigation is required to determine whether the operation is the source. If found responsible, corrective actions must be promptly implemented to prevent further contamination. Monitoring reports should be compiled monthly, or as otherwise directed by the DWS, and should include trend analyses. It is also recommended that upstream and downstream monitoring points be compared to assess the potential influence of site activities on surface water quality.

9.5 Groundwater Management

9.5.1 Monitoring Network Update

The current monitoring network should be updated and include at least the following:

- Background Boreholes:
  - BH88, Bh85, BH01, BH07.
  - Continue to monitor baseline groundwater quality and levels.

- Target TSF Monitoring Boreholes
  - Monitoring boreholes A2, A3 and A5, monitored on a set frequency and analysed for a predetermined range of parameters.
  - Focus on seepage zones and plume migration.

- Compliance / Receptor Boreholes
  - Process water dams: A1, B38N, B8.
  - Local pan: B41S.
  - Losdoringspruit: B86, BH11.
  - TSF: B7, B1, B2N1

Relevant monitoring points are shown in. As shown in Figure 9-2, It is recommended that all proposed monitoring points will form part of future monitoring rounds for consistency, spatial coverage and trend analyses.

9.5.2 Monitoring Frequency

The following monitoring frequencies should be adhered to.

Parameter	(Construction and Operational)	(Post-Closure)
Groundwater levels	Quarterly	Biannually
Process / tailings water quality	Quarterly	Quarterly to Biannually (depending on outcomes)

9.5.3 Monitoring Parameters

Based on hydrochemistry results and typical tailings, waste rock and seepage geochemistry for gold mines, key parameters for groundwater monitoring should at least include:

- Major cations/anions (for water type assessment).
  - Ca, Mg, Na, K, SO_4, Cl, HCO3, NO_3

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- Physico-chemical parameters (for acidity and total dissolved salts):
    - pH, EC, TDS, Temperature

- Identified parameters of concern:
    - Nitrogen-based parameters:
        - NH3, NO2,

    - Metals:
    - Sb, B, Co, Mn, Se, U

The parameters above should be included in further monitoring of groundwater as a minimum. Where sampling of process and tailings waters show concerns for other parameters, these should be added. These results should be compared to and analysed in conjunction with surface water, process water and tailings pond water to be able to determine source-pathway-receptor linkages.

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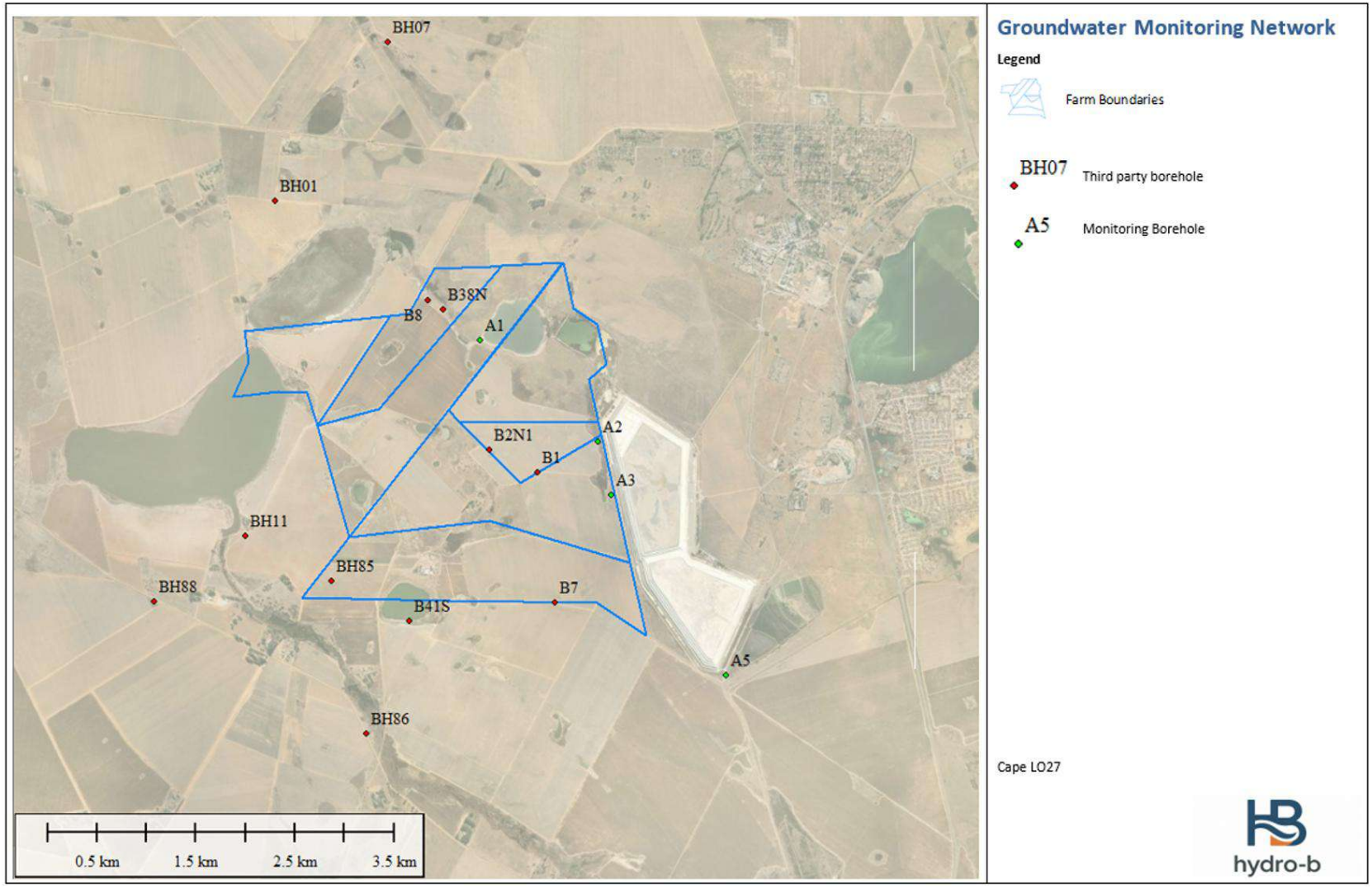


Figure 9-2: Groundwater Monitoring Network

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9.6 Waste Management

The Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste generated from the project activities on site.

This management plan was formulated based on waste stream information available at the time of compilation. Construction and operation activities must be assessed on an ongoing basis to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be updated throughout the life-cycle of the project, as required to ensure that appropriate measures are in place to manage and control waste and to ensure compliance with relevant legislation.

Prior to the commencement of the project, a detailed Waste Management Method Statement for the site should be compiled by the Contractor.

9.6.1.1 Waste Management Principles

An integrated approach to waste management is needed on site. It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

- Reducing volumes of waste is the greatest priority;
- If reduction is not feasible, the maximum amount of waste is to be recycled; and
- Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner

9.6.1.2 Project Phase Waste Management

A plan for the management of waste during all phases of the project is detailed below.

(a) Waste Inventory

- The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during the project life cycle for both general and hazardous waste streams.
- Construction methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities, to be pro-actively implemented.
- Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) should be set.
- The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM:WA.

(b) Waste Collection, Handling and Storage

- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, to record and prove continual compliance for future auditing.

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- Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- The SHE Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
- Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
- Recyclable waste must be removed from the waste stream and stored separately.
- All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or wet waste).
- Waste generated on site must be removed on a regular basis throughout the operation phase.
- Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.

(c) Record Keeping

- The success of waste management practices is determined by measuring criteria such as waste volumes, cost recovery from recycling and cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards. It will provide clear evidence of the success or otherwise of the plan.
- Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
- Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

(d) Monitoring of Waste Management Activities

- Records must be kept of the volumes/ mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:
    - Monthly volumes/ mass of the different waste streams collected;
    - Monthly volumes/ mass of the waste that is disposed of at a landfill site;
    - Monthly volumes/ mass of the waste that is recycled;
    - Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. This report must from part of the EO's reports on a monthly basis.

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10.Compliance Monitoring Mechanism

Table 10-1 depicts the monitoring and management plan for the management measures and actions identified in the impact assessment. Where specific monitoring and management plans are required, these are detailed in Section 9.

Table 10-1: Monitoring and Management Plan

Impact Management Action	Monitoring / Management Action	Monitoring Frequency	Roles and Responsibilities	Compliance Mechanism	Compliance Reporting Frequency	Monitoring trigger response criteria
Groundwater						
Refer to section 9.5.2 for the Groundwater monitoring frequency						
Surface Water						
Surface water quality monitoring	The DWS Best Practice Guideline G3: Water Monitoring Systems	Quarterly (or as suggested by the DWS) prior to the commencement of project	Jelani/EO	• DWS best practice guidelines G3: Water Monitoring Systems. • South African National Accreditation System (SANAS) accredited laboratory for analysis. • Compare against baseline quality.	Quarterly	A continued decrease in water quality below the standards listed on a continual basis. If there is a clear reduction in water quality due to the activities.
		Quarterly (or as suggested by the DWS) basis during the life of the project	Jelani/EO		Quarterly	
		Quarterly (or as suggested by the DWS) until the project is completed	Jelani/EO		Quarterly	
Stormwater infrastructure	Stormwater management infrastructure	Monthly Basis during the dry season. Weekly basis during the wet season	Jelani/EO		Monthly	Any storm events.
		Monitored immediately after a stormwater event	Jelani/EO/Maintenance Manager		Immediately	
Reporting	Monitoring reports to include trend analyses. Sampling of water quality from upstream monitoring points must be compared to downstream monitoring points	Monitoring reports submitted to DHSWS.	Jelani/EO		Quarterly (or as recommended by the DHSWS)	

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11.Oath Undertaking

11.1 Undertaking Regarding Correctness of Information

The EAP hereby confirms:

- The correctness, to the best of his knowledge, of the information provided in the specialist reports and on information provided by Jelani. The information was accepted as being as reliable as information generated during an EIA and a feasibility study, and provided in good faith, can be;
- The inclusion of comments and inputs from stakeholders and I&APs;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Kongiwe Environmental (Pty) Ltd	
Company Name	
Ripfumelo Macevele	
Name of the Environmental Assessment Practitioner	**Signature**
11 September 2026	
Date	

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