KONGIWE

THE RECLAMATION OF THE LIBANON TAILINGS STORAGE FACILITY IN THE WEST RAND, GAUTENG PROVINCE

Draft Integrated Water and Waste Management Plan (IWWMP) Report

Date: 10 January 2025

DWS Reference No.: WU37611

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Executive Summary

Kongiwe Environmental (Pty) Ltd ('Kongiwe') has been appointed as the independent Environmental Service Provider tasked with facilitating the Integrated Water Use Licence Application (IWULA) process for the proposed **Libanon Tailings Storage Facility (TSF) Reclamation Project** (hereafter the Proposed Project).

As part of the WULA process, a proponent is required to compile an Integrated Water and Waste Management Plan (IWWMP) for mining related activities. The draft version of the IWWMP will be made available to Interested and Affected Parties (I&APs) for a 60-day public commenting period from **Friday, 10 January 2025 until Tuesday, 11 March 2025**. Following this commenting period, this report will be updated to include all comments received and submitted to the Department of Water and Sanitation (DWS) for consideration.

Project Background

Far West Gold Recoveries (Proprietary) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSFs) in the West Rand of Gauteng. The TSFs are being reprocessed at the Driefontein No. 2 Plant, with residue material to be disposed of onto Driefontein 4 TSF.

It is FWGR's intention to reclaim and reprocess the gold residues of the Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and or other authorised plants in the area.

The following infrastructure is required for the Project:

- Pumpstation;
- Connecting pipelines for process water from Kloof Shaft 10# to the Libanon TSF;
- Connecting slurry pipelines to existing pipelines;
- Lined catchment paddock;
- Access roads;
- Laydown area;
- Powerlines; and
- Stormwater management infrastructure.

The proposed reclamation activity will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses. An Integrated Water Use Licence Application (IWULA) will be prepared and submitted in accordance with the Water Use Licence Application (WULA) and Appeals Regulations 2017 published in GNR 267 on 24 March 2017, and will be supported by an Integrated Water and Waste Management Plan (IWWMP).

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Purpose and Scope

The purpose of this document is to provide sufficient information that will enable informed decision making through a detailed description of the proposed water use scenario and shortcomings in respect to the relevant water management measures. A list of the general and specific management commitments pertaining to this IWWMP is also included to show FWGR's commitment towards continuous improvement in water management and to reduce the impacts on water resources to as low as reasonably practicable. This IWWMP is also the technical information document in support of the WULA for the relevant water uses under Section 21 of the NWA. This document is based on the following technical guidelines:

- Best Practice Guideline 1.1: Integrated Mine Water and Waste Management developed by the Department of Water Affairs (DWAF, 2008);
- Operational Guideline to assist in the compilation of an Integrated Water and Waste Management Plan, First Edition: February 2010;
- External Guideline: Generic Water Use Authorisation Application Process, as compiled by the DWA, dated November 2007; and
- Regulations regarding the procedural requirements for water use licence applications and appeals, Government Notice 267, dated 24 March 2017.

In summary, this IWWMP presents:

- General information pertaining to the operation and a background description of the activity, description of the property and the specific purpose for the development of the IWWMP;
- A broad description of the Proposed Project, products, business and corporate policies;
- Water uses (new, existing, lawful, exemptions and general authorisations);
- Environmental context (climate, surface water, groundwater and socio-economic environment);
- Analysis and characterisation of activities (organisational structure, training, awareness, monitoring and control);
- Risk assessment in relation to process water, stormwater, groundwater and waste (methodology, potential impacts and significance of risks to the environment);
- Water and waste management strategies, specifically focussing on process water, stormwater, groundwater and waste; and
- The regulatory status of water use activities accompanied by the section 27 motivation.

Water Use Activities

A detailed list of water use activities and description of these activities are included in Chapter 3 below. However, the following water use activities will be applied for as part of the Proposed Project.

- Section 21(c) of the NWA: Impeding or diverting the flow of water in a watercourse;

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- Section 21(i) of the NWA: Altering the bed, banks, course or characteristics of a watercourse; and
- Section 21 (g) of the NWA: Disposing of waste in a manner which may detrimentally impact on a water resource.

Main Water and Waste Related Risks and Mitigation Measures

A detailed risk assessment for the activities of the Project is included in Chapter 5 of this report. The main water uses and waste related risks for the activities are associated with wetland, surface water and groundwater impacts. Mitigation measures are discussed in Chapter 5 of this report, with a detailed water and waste management plan included in Chapter 6 of the report. The water and waste management plan focuses on minimising the impact of the activities on water resources.

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Appendix B: Groundwater Impact Assessment Reports

Appendix C: Public Participation Report

Appendix D: Wetland Impact Assessment Reports

Appendix E: Stormwater Management Plan

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Abbreviations

AMD	Acid Mine Drainage
BPG	Best Practice Guideline
CSR	Corporate Social Responsibility
CRR	Comments and Responses Report
DTM	Digital Terrain Model
DMR	Department of Mineral Resources (previously the Department of Mineral Resources and Energy)
DWAF	Department of Water Affairs and Forestry (now the DWS)
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EC	Electrical Conductivity
EIA	Environmental Impacts Assessment
ELU	Existing Lawful Water Use
EMPr	Environmental Management Programme
EMS	Environmental Management System
FDEM	Frequency Domain Electromagnetics
FWGR	Far West Gold Recoveries (Pty) Ltd
GA	General Authorisation
GM	Grievance Mechanism
GSDF	Gauteng Spatial Development Framework
I&APs	Interested and Affected Parties
IEA	Integrated Environmental Authorisation
IFC	International Finance Corporation
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
LOO	Life of Operation
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MLM	Merafong City Local Municipality
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Right Area
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEM:WA	National Environment Management: Waste Act, 2008 (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NNR	National Nuclear Regulator
NNRA	National Nuclear Regulator Act, 1999 (Act No 47 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PAOI	Project Area of Influence
PES	Present Ecological State

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PPP	Public Participation Process
RAM	Risk Assessment Matrix
REC	Recommended Ecological Category
RQO	Resource Quality Objectives
RTSF	Regional Tailings Storage Facility
RWLM	Rand West City Local Municipality
SANAS	South African National Accreditation System
SAWS	South African Weather Service
SEI	Site Ecological Importance
SEP	Stakeholder Engagement Plan
SPLUMA	Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)
SWMP	Stormwater Management Plan
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility
TWQR	Target Water Quality Range
USGS	United States Geological Survey
UVB	Unchanneled Valley-Bottom
VCR	Ventersdorp Contact Reef
WMA	Water Management Area
WML	Waste Management Licence
WRTRP	West Rand Tailings Retreatment Project
WSA	Water Services Act (Act No. 108 of 1997)
WUL	Water Use Licence
WULA	Water Use Licence Application

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1 Introduction

Kongiwe Environmental (Pty) Ltd ('Kongiwe') has been appointed as the independent Environmental Consultant tasked with conducting the Integrated Water Use Licence Application (IWULA), as well as the compilation of the Integrated Water and Waste Management Plan (IWWMP) for the proposed **Libanon Tailings Storage Facility (TSF) Reclamation Project** (hereafter the Proposed Project).

1.1. Activity Background

Far West Gold Recoveries (Proprietary) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSFs) in the West Rand of Gauteng. The TSFs are being reprocessed at the Driefontein No. 2 Plant, with residue material to be disposed of onto Driefontein 4 TSF.

It is FWGR's intention to reclaim and reprocess the gold residues of the Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and/or other authorised plants in the area.

The following infrastructure is required for the Project:

- Pumpstation;
- Connecting pipelines for process water from Kloof Shaft 10# to the Libanon TSF;
- Connecting slurry pipelines to existing pipelines;
- Lined catchment paddock;
- Access roads;
- Laydown area;
- Powerlines; and
- Stormwater management infrastructure.

Section 2.5 contains a detailed description of the proposed infrastructure for the Project.

The proposed reclamation activity will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses. 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 an Integrated Water and Waste Management Plan (IWWMP).

1.1.1 Project Rehabilitation and Future Land Use

In the event of any pipeline spills, especially within wetlands, there will be an emergency response plan that details the clean-up procedure that will need to be carried out. When the project has been completed, all infrastructure will be removed.

After the reclamation has occurred it is proposed that the following activities are undertaken as rehabilitation actions:

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- All surface infrastructure, buildings and equipment will be removed from site.
- Once all the infrastructure has been removed, the surface will be cleared to “red earth” and levelled, to match the local and functional topography.
- All access and other activity roads will be ripped.
- Paddocks and other stormwater infrastructure will be removed along with powerlines, pipelines and other electrical infrastructure.

It is envisioned that after the reclamation has occurred overburden composed of material that FWGR cannot process, will remain on the site. This overburden will need to be cleared of any possible radiation risk and vegetated to prevent any possible residual impact. The location of this overburden will need to be determined to ensure the least amount of impact to the surrounding environment, especially if it might possess any benefit to other land users.

As part of the rehabilitation, decommissioning and closure, FWGR will need to ensure that the land is cleared of possible radioactive contamination and that all the required clearance and closure certificates have been received. This would require the remaining post reclamation surface (rehabilitated surface) to have a non-radioactive level of radiation which would need to be in accordance with the requirements stipulated by the National Nuclear Regulator Act, 1999 (Act No 47 of 1999) (NNRA). This will then allow the landowner to take the land through the Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013) (SPLUMA) process, which in turn will decide what the future land use of the land will be; at this stage an industrial use is envisaged.

It is however critical that the land not be left vacant, and that all TSF material be removed, and that it be used in a suitable and agreed upon manner as soon as possible to prevent any residual or compounded impact, which might negatively impact the local environment or communities. Thus, it is the primary aim of rehabilitation, in the context of this document, to:

- Reduce the actual or potential environmental threat.
- Reduce the potential risks so that unacceptable risks identified in this IWWMP are reduced to acceptable levels.
- Protect the future liability of the land by re-establishing a sustainable land use.

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1.2. Applicant Details

The contact details of the responsible personnel are provided in Table 1-1 below.

Table 1-1: Contact Details of Applicant

Applicant:	Far West Gold Recoveries (Pty) Ltd
Registration No.:	2017/449061/07
Primary Contact:	Anja Esterhuizen
Head Office Address:	Far West Gold Recoveries, FWGR Driefontein Plant, Carletonville, 2499
Postal Address:	PO BOX 12442, Selcourt, Springs, 1567
Telephone:	(010) 822 8440
E-mail:	Anja.Esterhuizen@drdgold.com

1.3. Property Description

This IWULA process is being conducted for a Water Use Licence (WUL) to reclaim the TSF and will be confined to the Remaining Extent of Libanon or Witkleigat 283 IQ

This is a “Brownfield Project" as it is the reclamation of a historic mineral storage deposit with partly existing infrastructure. The potential negative and positive impacts of the Proposed Project on the environmental and social aspects will be objectively considered though studies undertaken by specialist professionals.

Refer to Table 1-3 for the directly and indirectly affected properties.

Table 1-2: Property Details

Application Area (ha)	The Proposed Project site covers an area of **170 Ha**.
Magisterial District	Ward 5 of Rand West City Local Municipality (RWLM)
Distance and Direction from Nearest Town	The site is located approximately 2 km west of Westonaria.

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Table 1-3: Description of the Directly and Indirectly Affected Properties

Farm Name	Farm ID	Farm Portion	Farm owner	Infrastructure
Directly Affected Properties				
Libanon 283 IQ	T0IQ00000000028300000	R/E	Sibanye Gold (Pty) Ltd	Libanon TSF
Indirectly Affected Properties				
Libanon 283 IQ	T0IQ00000000028300004	4	Far West Rand Dolomitic Water Association	
Gemspost 288 IQ	T0IQ00000000028800039	39	Westonaria Local Municipality	
Gemspost 288 IQ	T0IQ00000000028800041	41	Westonaria Local Municipality	
Venterspost 284 IQ	T0IQ00000000028400031	31	G F I Mining South Africa Pty Ltd (Sibanye Gold (Pty) Ltd)	
Venterspost 284 IQ	T0IQ00000000028400092	92	Sibanye Gold (Pty) Ltd	

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1.4. Regional Setting and Location of Activity

As specified in Table 1-2, the Libanon TSF is situated in Ward 5 of the RWLM, 2 km west of Westonaria. Refer to Figure 1-1 for the local orientation of the Proposed Project area.

The current land uses of the surrounding areas are typified by mining and agricultural activities; dispersed settlements; and other mine dumps.

Figure 1-2 shows the current state of the Proposed Project site. The municipal landfill site is situated to the north of the Libanon TSF. Sibanye Stillwater's Celamanzi Shaft (Kloof #10 Shaft) is located to the southwest of the Libanon TSF.

1.5. Purpose of IWWMP

Regulation 267 dated March 2017 under the NWA, regarding the procedural requirements for WULAs requires that an IWWMP must be submitted with the WULA if the purpose of a water use is for industry or mining.

The original intent of an IWWMP was aimed at collating and rationalising the information submitted for WULAs, but subsequently it has also developed to:

- Provide the regulatory authorities with focused and structured information to meet their general information needs;
- Articulate the required management measures and actions to achieve the water and waste related performance on an ongoing basis; and
- Provide direction and guidance to the water user on water and waste management of any activity.

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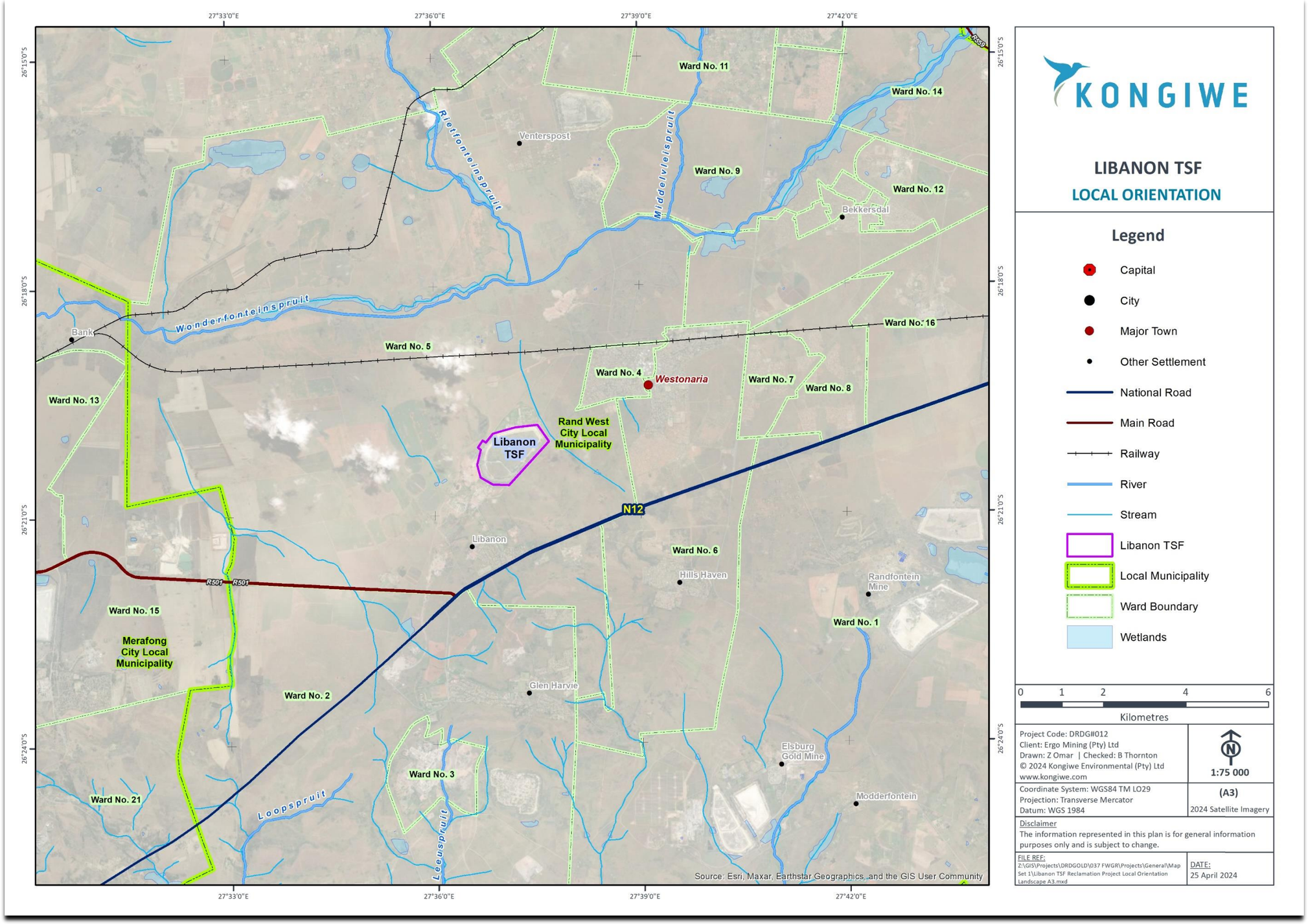


Figure 1-1: Proposed Project area locality map

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Figure 1-2: Current state of the Proposed Project site

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2 Conceptualisation of Activity

This section describes a broad description of the activities, processes and products related to the Proposed Project. It also provides the background information of the organisational structure of the water user i.e., FWGR, and all the business and corporate policies related to the environment.

2.1. Description of Activity

As described in Section 1.1 above, it is FWGR's intention to reclaim and reprocess the Libanon TSF. After beneficiation at the Driefontein No. 2 Plant, final residue will be deposited on the RTSF.

2.2. Extent of Activity

The Proposed Project site covers an area of approximately **170 Ha.**

2.3. Key Activity Related Processes and Products

The proposed method which will be used to remove the TSF is referred to as top-down **hydraulic reclamation**. This technique uses high-pressure water monitor guns (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being reclaimed.

At the sump, finger screens remove any debris that may impact pumping operations, while a penstock controls water flow into the collection sump. The position of the collection sump will change as reclamation progresses. From the collection sump, the slurry reports to a reclamation station. To control the volume of water reporting to the reclamation station, flapper valves are used to hold and release slurry contained in the collection sump. This slurry will then be pumped via slurry pipelines to the Driefontein No.2 Plant. At the Driefontein No.2 Plant, the slurry will be prepared and treated for gold extraction and beneficiation. The beneficiation process involves thickening, milling, a leach section, an acid wash, elution, electro winning and regeneration. The mechanically agitated residue will then be pumped to the Driefontein No.4 TSF for disposal until such time that the RTSF is constructed and operational.

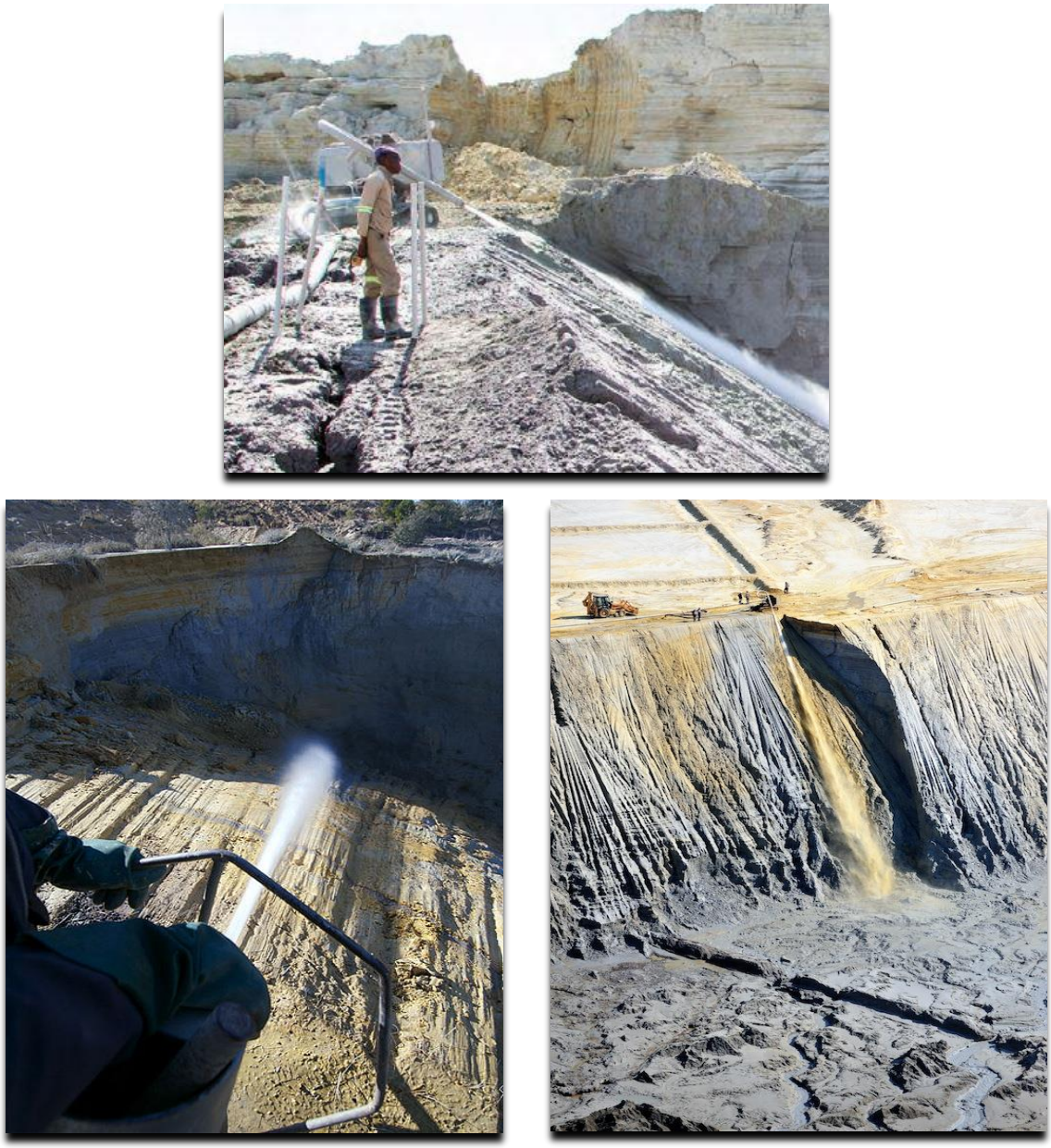


Figure 2-1: Mobile tracked hydraulic monitor on a tailings facility in South Africa

Reclamation will take place in predetermined benches (or 'cuts') and will move unidirectionally until the entire TSF has been reclaimed. Generally, 15-30 m cuts are made for reclamation.

Figure 2-2 below is a graphical representation of the proposed activity.

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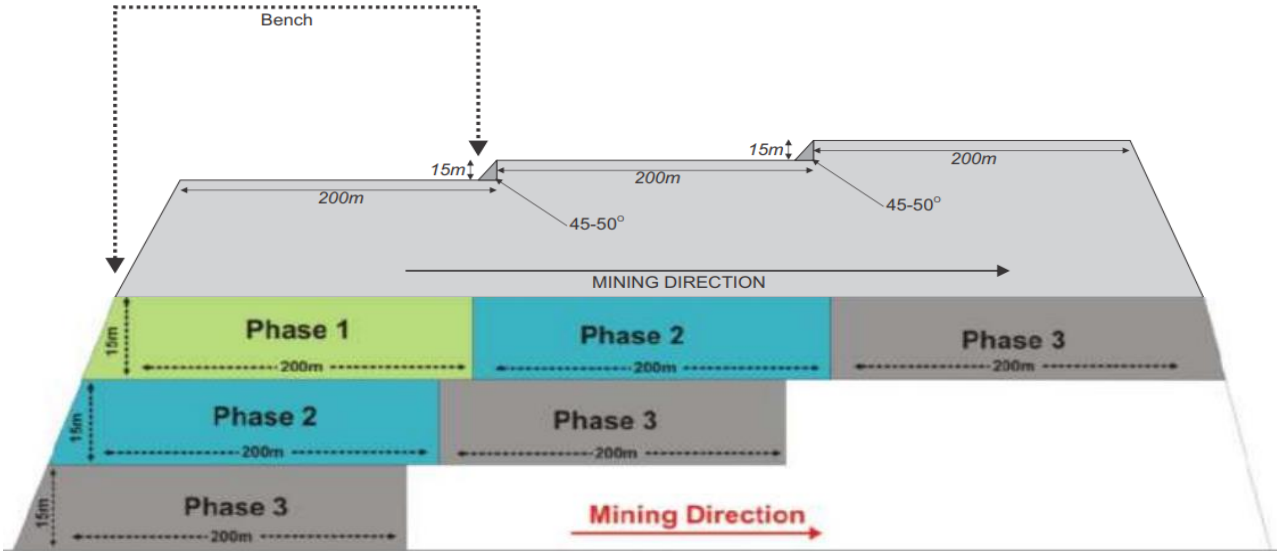


Figure 2-2: Typical reclamation widths proposed for a gold reclamation project (Source: www.drdgold.com/investors-and-media/circulars/cpr-samrec-wrtrp-26022018.pdf).

2.4. Activity Life Description

The reclamation method is divided into a number of stages, as shown in Figure 2-3 below.

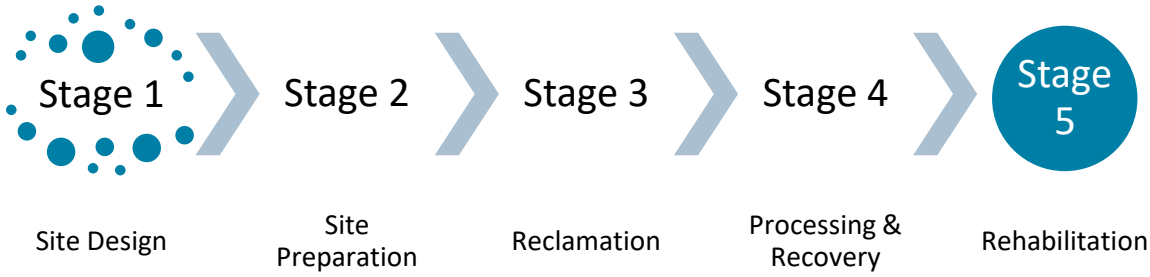


Figure 2-3: Project Process

2.4.1 Estimated Project Timeframes

The anticipated life span of the project is approximately **12 years.** It is expected that there would be a 1-year construction and ramp-up period which would include the placement of infrastructure and site preparation, a 6-year Life of Operation (LOO) where active hydraulic reclamation and mechanical removal would take place, a 2-year ramp-down period and 3 years to rehabilitate the reclaimed site.

Table 2-1 gives an indication of the estimated timeframes in relation to the implementation of the actions, activities or processes of the reclamation phases (construction, operation and decommissioning) for the proposed project.

Table 2-1: Estimated timeframes and deadlines of the different phases associated with the Proposed Project

Phase	Timeframe	Year Start Date
Pre-Construction and Construction	1 year	2025- 2026
Operations starting at Libanon TSF	6 years	2026 – 2032
Decommissioning and rehabilitation of Libanon TSF	5 years	2032 – 2037

2.4.2 Life-Cycle Phases of the Project

The following table is summary of the activities that will occur at the different phases of this project.

Table 2-2: Summary of activities per phase

ACTIVITY	DESCRIPTION
Pre-Construction	
1	Conduct a further pre-construction baseline radiation walk-over survey
2	Removal of vegetation and site clearance
3	Preparation of access roads
4	Initiation of a community forum for engagement throughout the project life cycle
5	Start implementing monitoring plans, Environmental Authorisation (EA), WUL and Environmental Management Programme (EMPr) conditions.
6	Employment of workers should this be required (minimal)
Construction Phase	
7	Operation of construction machinery and vehicles
8	Install reclamation station and its associated infrastructure
9	Construction of pipelines and electricity reticulation and power line
10	Instatement of waste management and dust control measures on site
11	Desilting of existing facilities and construction of a lined paddock
12	Instatement of traffic signage, access, parking bays
13	Clearing of material on top of the TSF that cannot be reclaimed
Operational Phase	
14	Reclamation Activities (including concurrent rehabilitation)
15	Operation of pipes
16	Operation of pump station and its associated infrastructure
17	Community engagement
Decommissioning	
18	Decommissioning and rehabilitation activities: Demolition of temporary infrastructure such as: screens, the pump station and pipelines, and Rehabilitation of the project area.
19	Closure forum to be established with key stakeholders.
Post-Closure	
20	Post- Closure Monitoring.
21	SPLUMA Process to determine end land-use

2.4.2.1 Pre-Construction Activities

Prior to the initiation of construction, a radiation survey will be undertaken to determine the radioactive baseline. Following this, the sites will be cleared of vegetation, and access will be prepared for construction. The existing paddocks will be desilted prior to commencing with construction. Before reclamation can commence, the site must be cleared of aggregate, vegetation and any other materials that cannot be screened and blended with slurry. All discard material found on the top of the TSF that cannot be reprocessed by FWGR will be removed from the TSF and stockpiled on site in an overburden. This process will occur concurrently with the operational phase of the project.

The baseline radiological assessment will be undertaken by a registered professional prior to any activity undertaken on site.

Pre-construction activities will include the development and implementation of all the required monitoring plans as stipulated by the EMPr. These monitoring plans must start as early as possible prior to the commencement of the reclamation activities and continue until rehabilitation has successfully been completed and/or as stipulated by the EMPr.

2.4.2.2 Construction Phase Activities

The construction phase will be short, as some of the site infrastructure already exists. Employment will be allocated for the project and communities will be engaged regarding the commencement of activities on site. Access roads will be prepared and FWGR will be expected to erect traffic signage. Parking and delivery bays and on-site traffic circulation will also be constructed. In addition to this, FWGR will appoint security guards for the Proposed Project. Pipeline construction, electricity reticulation and powerline construction will be undertaken.

During construction, temporary and mobile (container) site infrastructure will be established at the reclamation site with connections to powerline that will provide power to the site which it will source from the power grid. Potable water will be sourced from Rand Water or the RWLM via existing water connections and/or infrastructure with contingency for water storage tanks (JoJo tanks) should this be required. As part of construction and site preparation activities, the existing Libanon paddocks and stormwater systems will be upgraded/reinstated for capturing and managing dirty water around site. The construction phase will also include the connection of the pumpstation to the slurry pipelines as well as the connection of the process water pipeline.

2.4.2.3 Operational Phase Activities

Once site preparation and construction are completed, hydraulic reclamation can begin. To excavate unconsolidated tailings material within the TSF, a high-pressure water monitor (or cannon) will be directed onto the face of the TSF.

Reclamation will take place in predetermined benches (or ‘cuts’) and will move unidirectionally until the entire TSF has been reclaimed. Generally, 15 – 30 m cuts are made as reclamation progresses. The water

from the monitor mixes with the tailings and forms a slurry with a high solid content. The outer walls of the TSF will remain intact to act like a bowl to keep all the slurry within the site footprint. The slurry then flows under gravity, along the base of the TSF, to a collection sump which is positioned at the lowest elevation of the bench being mined. The collection sump is then able to filter and screen appropriately sized slurry, and direct this into pipelines which will pump the slurry to the existing Driefontein No. 2 Plant for gold recovery. Residual tailings will then be pumped to the Driefontein No. 4 TSF until such a time that the RTSF is constructed and operational.

During the operational phase, it is advised that continual monitoring of both surface and ground water is conducted. This information needs to be collected and used to update specific water models and to monitor and evaluate the impact of the operation. It is additionally advised that continual site inspections be undertaken to ensure that the implemented mitigation measures are operating as required.

2.4.2.4 Decommissioning Phase Activities

Once reclamation is completed down to a red earth footprint, the area will be shaped to the local functioning topography for correct storm water management and cleared of radiation concern. It is envisioned that the property will be cleared down to red-earth and levelled to match the local topography, to ensure the property is free draining, as a preliminary rehabilitation process after which rehabilitation and end land use will occur in accordance with the requirements of the SPLUMA. Yearly rehabilitation reviews will be undertaken to ensure that the area is rehabilitated as required. During this phase, all project infrastructure will be removed, and a final radiological survey will be undertaken.

Thus, it is the primary aim of rehabilitation, in the context of this document, to:

- Reduce the actual or potential environmental threat.
- Reduce the potential risks so that unacceptable risks identified in this IWWMP are reduced to acceptable levels.
- Protect the future liability of the land by re-establishing a sustainable land use.

2.4.2.5 Post - Decommissioning Phase Activities

After the reclamation has occurred it is proposed that the following activities are undertaken as rehabilitation actions:

- All surface infrastructure, buildings and equipment need to be removed from site.
- Once all the infrastructure has been removed, the surface will need to be cleared to red earth and levelled, to match the local and functional topography.
- All access and other activity roads will need to be ripped and cleared to red earth.
- Paddocks and other stormwater infrastructure will need to be removed along with powerlines, pipelines and other electrical infrastructure.

It is envisioned that after the reclamation has occurred, overburden composed of material that FWGR cannot process, will remain on the site. This overburden will need to be cleared of any possible radiation

risk and vegetated to prevent any possible residual impact. The location of this overburden will need to be determined to ensure the least amount of impact to the surrounding environment and to assess if it might possess any benefit to other land users.

As part of the rehabilitation, decommissioning and closure, FWGR will need to ensure that the land is cleared of possible radioactive contamination and that all the required clearance and closure certificates have been received. This would require the remaining post reclamation surface (rehabilitated surface) to have a non-radioactive level of radiation which would need to be in accordance with the requirements stipulated by the NNRA. This will then allow land to be taken through the SPLUMA process, which in turn the landowner will decide what the future land use of the land will be; at this stage an industrial use is envisaged.

It is however critical that the land not be left vacant and that it be used in a suitable and agreed upon manner as soon as possible to prevent any residual or compounded impact, which might negatively impact the local environment.

Post-decommissioning activities will entail the assessment of rehabilitation and will address any further rehabilitation requirements. Surface water monitoring must occur on site until the site has been fully rehabilitated. Groundwater monitoring must be implemented bi-annually as in other phases of the project. During this phase, preparatory work will be done to achieve closure.

Maintenance and Aftercare

Groundwater must be monitored for at least a period of two years on a quarterly basis after decommissioning. The monitoring process will be used to assess whether the rehabilitation process has been successful or not and to indicate that no further deterioration on groundwater quality is foreseen. It is also suggested that the up and down stream surface water monitoring points continually be monitored until all activities (including rehabilitation) have been completed.

Maintenance will specifically focus on the rehabilitated in accordance with the approved EMPr. Continuous erosion monitoring of rehabilitated areas, the remaining overburden and slopes should be undertaken and zones with excessive erosion should be identified. The cause of the erosion should be identified, and rectified. Zones with erosion will need to be repaired with topsoil. In addition, infiltration of contaminated water will be contained within paddocks.

2.4.3 Health and Safety

Regarding the safety of both the public and the employees, FWGR will complete a workers safety assessment as well as a public safety assessment. This has to been done in relation to the requirements of the National Nuclear Regulator (NNR).

2.5. Activity Infrastructure Description

The following infrastructure will be utilised on site:

- Reclamation infrastructure consisting of a pump station which include:
  - Slurry sump;
  - Penstock;
  - Vibrating Screen
  - Water tank;
  - Motor control centre;
  - Pump;
- A short connecting 600 mm pipeline for process water from Kloof Shaft 10#;
- A short connecting 550 mm pipeline to the slurry pipeline to Driefontein 2 Plant;
- Stormwater management infrastructure including:
  - Water infrastructure and stormwater systems; and
  - Existing catchment paddocks on the TSF footprint
  - Pollution paddock;
- An 11 kV overhead powerline capable of transmitting 3 kVA of electricity and electricity reticulation;
- Administration buildings, including change houses and ablution facilities;
- Access roads, routed from existing entry points; and
- Construction contractors' yards (temporary facilities).

2.5.1 Water and Power Supply

The proposed reclamation activity will require 3kVA of electricity.

Power will be supplied by Eskom and potable water will be purchased from Rand Water or the RWLM, with a contingency for portable water storage tanks (JoJo tanks) or connection to water pipeline infrastructure.

In terms of process water, the water cycle operates as a closed circuit, meaning that limited make-up water will be required for the reclamation of the TSF. Water required for the reclamation activity will be sourced from the Kloof Shaft 10# and conveyed through process water pipeline to the project site for reuse in a closed-circuit system.

2.5.2 Access

The main access route is off Bridges Avenue which runs parallel to the south of the TSF. As far as possible, existing access roads will be utilised, and where this is not possible, these will be constructed. Where access roads are to be constructed, these will be 4m wide gravel roads with mitre drains to protect the road structure from flood damage. Intersections will be properly designed to provide safe entry and exit in and out of the reclamation area. Approvals from the Provincial Roads authorities will be obtained where necessary.

2.6. Key Water Uses and Waste Streams

2.6.1 Water Balance

A monthly water balance was setup to estimate the volumes of water in the reclamation circuit. The water balance has been setup to simulate the average yearly, average dry and average wet season volumes. This section details the water balance which has been prepared in accordance with the Best Practice Guideline (BPG) G2: Water and Salt Balances.

The water balance components include water inflows and outflows.

Water inflows include the following:

- Runoff from rainfall from the working area;
- Runoff from the high-pressure water cannons/monitors; and
- Potable water supply from municipal sources.

Water losses include the following:

- Evaporation and seepage; and
- Water in slurry pumped to the plant.

The project is designed to operate as a closed water system and therefore most water on site will be captured and re-used as much as possible.

Water balance details for the Proposed Project are in Section 5.2.

2.6.1 Waste Streams

The anticipated waste streams for the project are:

- **Domestic/General waste** from the offices, change houses, canteen and workshops which can include paper and cardboard, wood, plastic, metal, glass and organic articles such as food residue.
- **Construction and Demolition Waste** from activities such as the construction of buildings, civil and reclamation infrastructure, roads and maintenance. Construction waste includes materials such as concrete, bricks, gypsum, wood, glass, metals, plastic and solvents.
- **Hydrocarbons and waste oils** are hazardous waste as they display some hazardous properties.

Waste will however be managed as per Section 5.2.8.

2.7. Organisational Structure of Activity

FWGR has a simple and efficient structure. The organisational structure applicable to the Applicant is shown in Figure 2-4 below. As at January 2023, Sibanye holds a 51% interest in DRDGOLD which wholly

owns the subsidiaries FWGR and Ergo. The activities subject to this application will be operated under the entity FWGR.

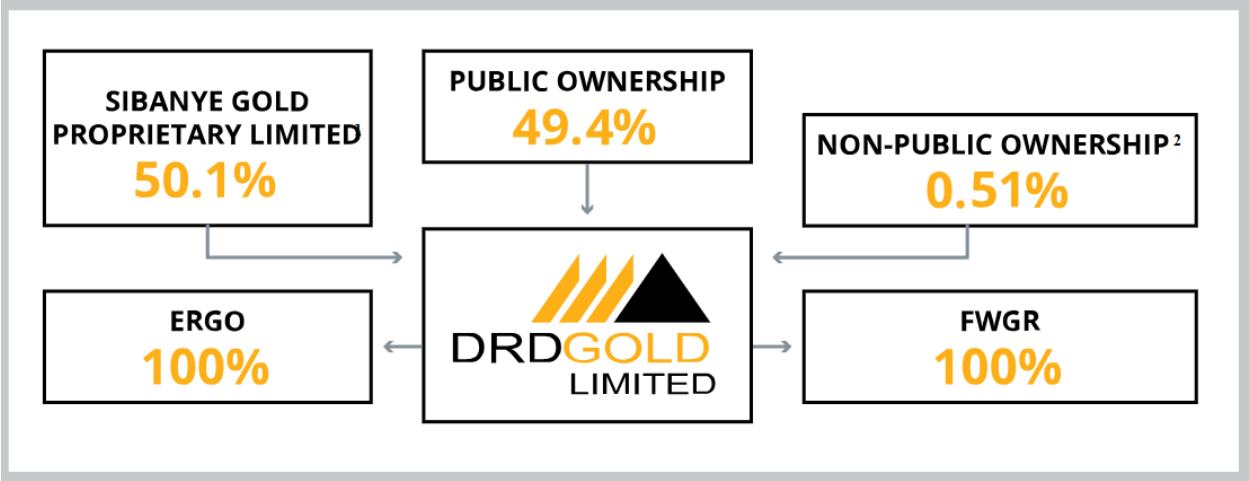


Figure 2-4: DRD Gold Group Structure

The roles, responsibilities and authority of personnel at FWGR will be assigned to facilitate effective environmental management.

2.8. Business and Corporate Policies

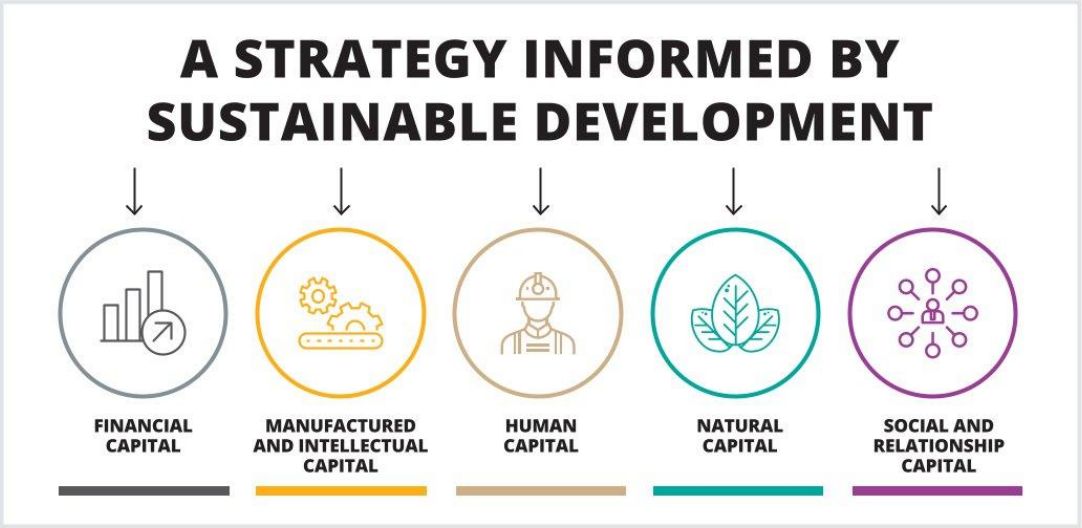
FWGR is a subsidiary of DRDGOLD Limited ("DRDGOLD"). DRDGOLD has a Sustainability Policy in place. The sustainability focus areas, which support and are sustained by DRDGOLD's financial, intellectual and manufactured capital include:

- Natural capital: water, land and energy;
- Social and relationship capital: communities and broader society, including government and regulators; and
- Human capital and intellectual capital: employees – their development and protection.

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STRATEGIC APPROACH TO SUSTAINABILITY

In the early days of gold mining in Johannesburg, there was limited understanding and focus on the future environmental impacts of mine residue depositioning. In the decades that followed, a second, equally challenging situation arose when a city sprung up around these dumps, with residential communities growing and moving ever closer to the mines.



This was aggravated by the forced displacement of communities and the social engineering of the apartheid era, and poorly managed urban influx and development policies since democracy. This has resulted in hundreds of thousands of people living in formal and informal communities, much too close to mine dumps – dumps that were closed to a standard of environmental containment that assumed community presence much further away.

We deal with this dilemma by taking an integrated approach to social and natural capital. They are inextricably linked, and delivering value in respect of the one, also brings us closer to our goals in respect of the other. Our aim is to leave an enduring legacy by permanently removing many of the old mine dumps scattered around the Witwatersrand that were either built where they did not belong in the first place, or that had become inappropriately situated because of the movement of people and our new urban reality.

We do this by reprocessing the dumps and redepositing resultant waste onto tailings storage facilities that are managed in accordance with contemporary standards of environmental and geo-technical standards, cleaning environmentally sensitive areas in the process and freeing up land for redevelopment. This yields both a substantial environmental dividend as well as a social dividend in improving the quality of life of affected communities whilst also creating financial value, allowing sustainable land use to take place in areas previously sterilised. The value delivery is therefore truly integrated and firmly aligned with the principles of sustainable development.

Our process is technology-based requiring a specialised skillset on the part of our employees. Hazardous reagents are used in our metallurgical process which requires sharp focus on safety and governance while the prominence of water and electricity consumption requires acute awareness and ongoing development to limit and reduce our impact on the environment. ESG is key to our commitment to sustainable development and our goals of reversing the environmental legacy of early mining, limiting and reducing our impact on natural resources and of improving the quality of life of our affected communities.

With every project we challenge ourselves to ensure that our values, ambitions and actions are aligned.

We ask ourselves:

- Do we provide an inclusive workspace that promotes diversity?
- Do we provide our employees and women in particular with a working environment that is both physically and emotionally safe?
- Is our workforce trained and equipped to deal with the ever-changing factors influencing our business and the increasingly prominent role of technology?

- Is our water usage optimal and do we minimise the extent to which we rely on potable water?
- Are we managing effluent effectively and preventing the discharge of pollutants into surrounding water sources?
- Are we doing enough to reduce our reliance on power utility Eskom and thus our reliance on coal-fired electricity and its associated carbon footprint, and promoting sustainability through strategies that soften the impact of Eskom's pricing policy, and the poor quality and erratic nature of electricity supply?
- Is our dust monitoring programme effective in reducing the nuisance factor to affected communities?
- Do we have the relevant regulatory compliance requirements to address uncertainty?

These questions also inform an integrated thinking process in the execution of our overall business strategy by the board of directors (Board).

A very prominent part of our business focus is that of tailings storage facility (TSF) safety. We subscribe to the contemporary imperative of greater transparency and enhanced governance in terms of the technical standards, safety and environmental impact of TSFs, a commitment that so far has led us to implement the following:

OUR STRATEGIC FOCUS AREAS WITH A DIRECT LINK TO ESG INCLUDE:

Using technology and information to enhance operational performance and to minimise the impact on the environment

Create a values driven culture of employee safety, empowerment, diversity and inclusivity

Improving the quality of life of communities surrounding our operations

ESG GOVERNANCE

The Board is ultimately responsible for setting the governance standards of the Company to ensure that business is conducted ethically, responsibly and in accordance with principles of good corporate governance. The Social and Ethics Committee assists the Board in executing this responsibility. Key activities of the social and ethics committee include:

- Monitoring the Group's activities with regard to the 10 principles set out in the United Nations Global Compact and the Organisation for Economic Co-operation and Development recommendations regarding corruption; the Employment Equity Act 55 of 1998; and the Broad-Based Black Economic Empowerment Act 53 of 2003
- Monitoring principles governing sponsorship, donations and charity
- Monitoring the environment, health and public safety, including the impact of the Group's activities and of its products or services
- Monitoring labour and employment practices
- Reviewing the Group's Code of Ethics
- Providing guidance on corporate citizenship initiatives
- Reviewing cases of employee conflicts of interests, misconduct or fraud, or any other unethical activity by employees of the Group

The executive committee (Exco) led by the Chief Executive Officer is responsible for executing the ESG strategy and reporting back to the Board.

A Group wide review of the TSF management policy to align with best practice

Internal Tailings Performance Management System for dedicated data collection, storage and processing

Quarterly drone and satellite surveillance

Review of various technologies which could be used to enhance TSF observation and monitoring

External Independent Tailings Review Panel

Figure 2-5: DRDGOLD's sustainability policy (DRDGOLD Limited ESG Fact Sheet 2022)

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3 Regulatory Water and Waste Management Framework

3.1. Legislative Framework

This chapter provides an overview of the policy and legislative context relevant to the reclamation of the Libanon TSF. 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.

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 and*
- *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, additional 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.

Table 3-1: Applicable National Legislation and Guidelines

Legislation
Constitution of the Republic of South Africa, 1996 Describes the Bill of Rights and is the cornerstone of democracy in South Africa, enshrining the rights of all people and affirming the democratic values of human dignity, equality and freedom. Section 24 is directly relevant to environmental law. The Bill of Rights states that everyone has the right to an environment that is not harmful to their health or well-being.
National Water Act (Act No. 36 of 1998) (NWA) Section 19 of the NWA sets out the principles for "an owner of land, a person in control of land or a person who occupies or uses land" to: • Cease, modify or control any act or process causing pollution; • Comply with any prescribed waste standard or management practice; • Contain or prevent the movement of pollutants; • Eliminate any source of pollution; • Remedy the effects of the pollution; and • Remedy the effects of any disturbance to the bed and banks of a watercourse. It also describes the actions that can be taken by the catchment management agency to enforce the requirements of the NWA.
The NWA Amendment Act (Act No. 27 of 2014) This Act makes provision for integration and alignment of the WULA process with applications in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).
NWA Regulations: **Regulation GN R704** This regulation enforces the separation of clean and dirty water systems including restrictions on activities within the 1:100 floodline or 100 m from a watercourse. **Regulations regarding the procedural arrangements for water use licence applications and appeals (GN R267, Gazette No. 40713, 24 March 2017)** The final decision on the WULA is required within 90 calendar days from submission of the Phase 3 of the WULA, submitted via the electronic Water Use Licence Application and Authorisation System (e-WULAAS). **The General Authorisation (GA) for Section 21(c) and (i) water uses (GN 49833, Gazette Notice 4167, 8 December 2023)** Defines a regulated area of a watercourse as: • the outer edge of the 1:100 year flood line and/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;

Legislation
• in the absence of a determined 1 in 100 year flood line or riparian area, the area within 100 m from the edge of a watercourse where the edge of the watercourse (excluding flood plains) is the first identifiable annual bank fill flood bench (*subject to compliance to section 144 of the National Water Act 36 of 1998*); or • In respect of a wetland: a 500 m radius from the delineated boundary (extent) of any wetland (including pans).
Water Services Act (Act No. 108 of 1997) (WSA) Provides for the regulation of water boards and the setting of national water quality standards.
National Environment Management Act (Act No. 107 of 1998) (NEMA) Sections 28 (1) and (3) of NEMA set out the duty of care principle, which is applicable to all types of pollution and must be taken into account in considering any aspects of potential environmental degradation. Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.
National Environment Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) Follows the principle that waste generation must be avoided, or if it cannot be avoided, that it is reduced, reused, recycled or recovered, and as a last resort treated and/or safely disposed of. The objectives of this Act are- a. to protect health, well-being and the environment by providing reasonable measures for- i. minimising the consumption of natural resources; ii. avoiding and minimising the generation of waste; iii. reducing, re-using, recycling and recovering waste; iv. treating and safely disposing of waste as a last resort; v. preventing pollution and ecological degradation; vi. securing ecologically sustainable development while promoting justifiable economic and social development; vii. promoting and ensuring the effective delivery of waste services; viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and ix. achieving integrated waste management reporting and planning; b. to ensure that people are aware of the impact of waste on their health, well-being and the environment; c. to provide for compliance with the measures set out in paragraph (a); and d. generally, to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.
Waste Classification and Management Regulations The Waste Classification and Management Regulations require that all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within 180 days of generation and if the waste is to be disposed of to landfill that the waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal.
The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)

Legislation
The Act seeks amongst other things, to manage and conserve biological diversity, to protect certain species and ecosystems, to ensure the sustainable use of biological resources and to promote the fair and equitable sharing of benefits arising from bio-prospecting involving those resources. The NEM:BA includes a Regulation related to the management of threatened and protected species. A similar Regulation is applied to Threatened Ecosystems. NEM:BA has a set of norms and standards for the development of management plans for both species (e.g. Threatened or Migratory Species) and ecosystems (Endangered or Critically Endangered).
South African National Standards (SANS) 1936 The purpose of these regulations is to ensure for the safe development of areas where dolomite is present. This standard provides the required action needed to be implemented as well as specific investigations required to ensure for the safe development on top of dolomitic land.

3.2. Summary of all Water Uses

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);
(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.

Section 21 (c) & (i) as well as Section 21 (g) water uses are applicable to the Proposed Project.

The following infrastructure and associated activities trigger the Section 21 (c) and (i) water uses:

- Libanon TSF; and
- Slurry and process water pipelines;

The following infrastructure and associated activities trigger the Section 21 (g) water uses:

- Lined catchment paddock; and
- Dust suppression.

3.3. Existing Lawful Water Uses

Section 32(1) of the NWA defines an Existing Lawful Water Use (ELU) as follows:

"*An existing lawful water use means a water use:*

(a) Which has taken place at any time during a period of two years immediately before the date of commencement of this Act and which;
(i) was authorised by or under any law which was in force immediately before the date of commencement of this Act;
(ii) is a stream flow reduction activity contemplated in section 36(1); or
(iii) is a controlled activity contemplated in section 37(1)."

OR

(b) Which has been declared an existing lawful water use under section 33."

The Proposed Project is a new project and therefore not declared as an ELU.

3.4. Relevant Exemptions

3.4.1 GN 704 Exemption Motivation

Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources (GN R704) have been considered for the Proposed Project. Exemption from the GN 704 Regulations is not required for the Proposed Project.

3.5. Generally Authorised Water Uses

No general authorisations are applicable as this application is for a mining project which requires full licensing of water use activities.

It should however be noted that the Section 21 (c) and (i) water uses are triggered by wetlands that have been determined by the wetland specialist to be "Low Risk".

3.6. New Water Uses to be Licensed

The new water uses to be licensed for the Libanon Reclamation project are listed in Table 3-2.

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Table 3-2: Section 21 water uses applicable to the Proposed Project

Section 21 Water Use	Map Number	Site Name	Description	Purpose of Activity	Materials used to build infrastructure	Dimensions	Farm Portion	Co-ordinates
Section 21 (c) and (i)	1	Libanon TSF an associated infrastructure	Reclamation of the Libanon TSF, as well as the construction, operation and rehabilitation of the associated stormwater management infrastructure within 500m of an HGM 1 unchanneled valley-bottom (UVB) wetland.	Reclamation as well as the rehabilitation of the TSF area.	Tailings	Length: 479 m Width: 207 m Height: 26 m	Portion 0 (RE) of Libanon or Witkleigat 283 IQ	Start: 26°19'51.08"S 27°37'19.67"E End: 26°20'5.86"S 27°37'32.36"E
Section 21 (c) and (i)	2	Libanon TSF an associated infrastructure	Reclamation of the Libanon TSF, as well as the construction, operation and rehabilitation of the associated stormwater management infrastructure within 500m of an HGM 2 seep	Reclamation as well as the rehabilitation of the TSF area.	Tailings	Length: 720 m Width: 418 m Height: 32 m	Portion 0 (RE) of Libanon or Witkleigat 283 IQ	Start: 26°20'22.26"S 27°36'41.43"E End: 26°20'33.52"S 27°37'8.35"E
Section 21 (c) and (i)	3	Slurry and process water pipelines	Construction, operation and rehabilitation of the process water and slurry pipelines within 500m of an HGM 2 seep wetland	Transportation of slurry and process water as well as the rehabilitation of the pipeline route.	Steel and HDPE	Length: 711 m Width: 0.6m Height: 0.6 m	Portion 0 (RE) of Libanon or Witkleigat 283 IQ	Start: 26°20'22.26"S 27°36'41.43"E End: 26°20'44.22"S 27°36'32.57"E
Section 21 (g)	4	Catchment Paddock	Disposing of access slurry during a stormwater event or an electrical power trip.	Management of stormwater by retaining dirty water	HDPE liner and earth material	Disposal capacity: 4464.6m^3/annum Catchment paddock size: 1691.79 m^3	Portion 0 (RE) of Libanon or Witkleigat 283 IQ	26° 20' 5,072" S 27° 36' 41,316" E

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Section 21 Water Use	Map Number	Site Name	Description	Purpose of Activity	Materials used to build infrastructure	Dimensions	Farm Portion	Co-ordinates
Section 21(g)	5	Access Roads	Dust suppression of access roads	Reduce dust levels	Gravel	Volume: (m^3)/ annum: 19440 m^3/annum	Portion 0 (RE) of Libanon or Witkleigat 283 IQ	26° 20' 36,455" S 27° 37' 1,795" E

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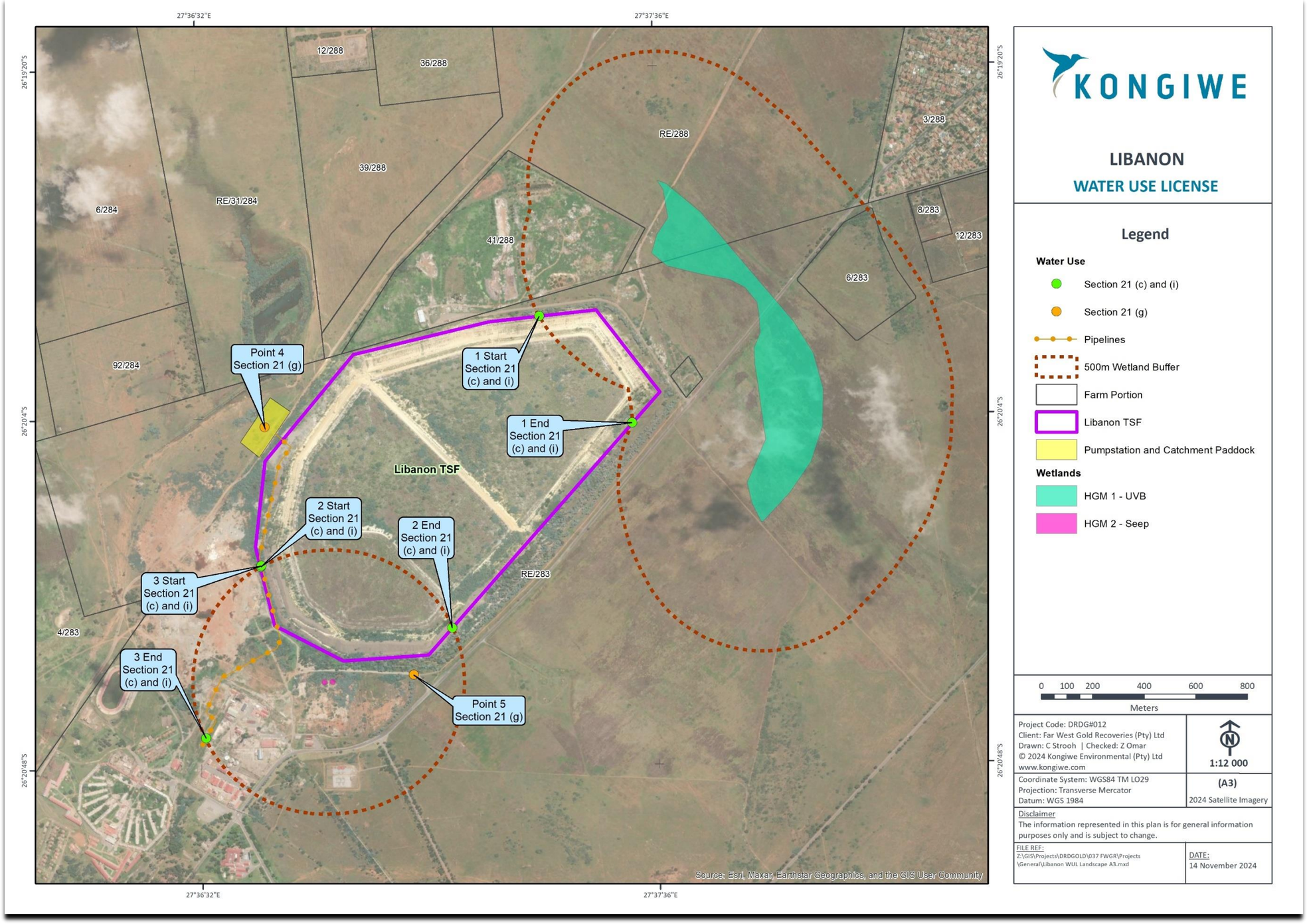


Figure 3-1: Water use map for the Proposed Project

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3.7. Waste Management Activity (NEM:WA)

The proposed project will trigger Category B Activity 11 of GNR 921. The required integrated application has been made to the competent authority which includes an application for a Waste Management Licence (WML).

3.8. Other authorisations (EIAs, EMPs, RODs, Regulations)

FWGR intends to acquire an EA for the Proposed Project in accordance with the NEMA and the NEM:WA. The Competent Authority (CA) for the EA application is the Department of Mineral Resources (DMR) (previously the Department of Mineral Resources and Energy). The required EA application has been made to the DMR.

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4 Present Environmental Situation

Information on the status of the environment in which the Proposed Project is situated is contained in this chapter.

4.1. Climate

4.1.1 Rainfall

Rainfall data for the area was obtained from the DWS weather station C2E007 located at the Zuurbekom pump station, 19 km east of the Proposed Project (Hydrospatial, 2024). This station is the closest available weather station to the Proposed Project with a recent rainfall record and a similar altitude as the Proposed Project area. Rainfall data was extracted for the period between October 2002 – September 2020, which was the most recent and complete record available. The mean monthly rainfall is depicted in Figure 4-1. The area has a Mean Annual Precipitation (MAP) of 685 mm. Rainfall is highest over the summer months of October to April, with January generally being the wettest month. The remaining winter months receive much less rain, with July being the driest month.

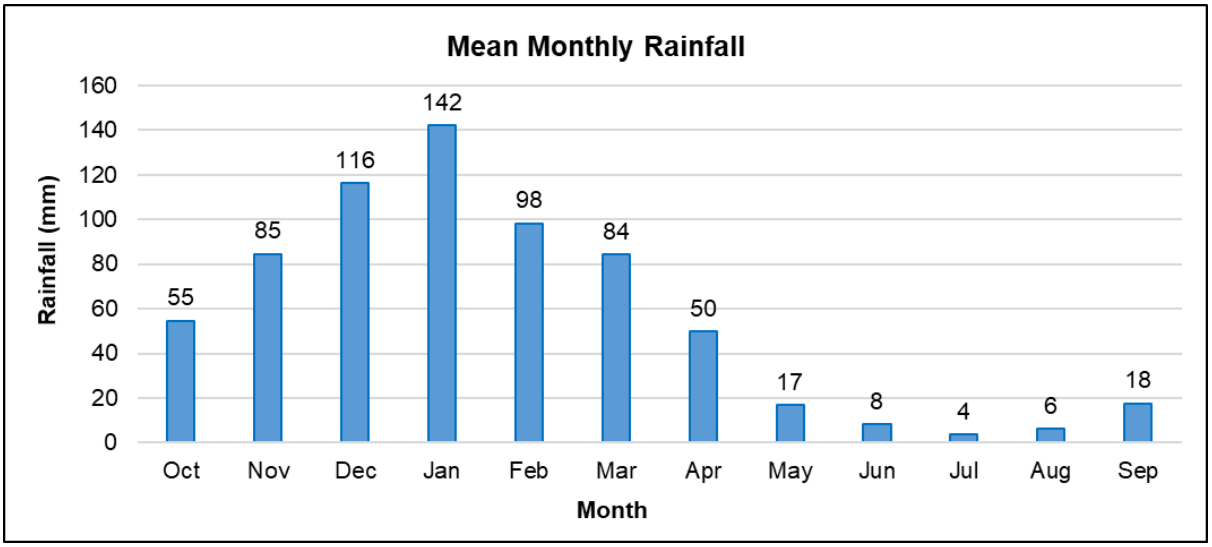


Figure 4-1: Mean monthly rainfall for the area

4.1.2 Storm Rainfall Depths

The storm rainfall depths for the centre position of the Libanon TSF were extracted from the Design Rainfall Estimation in South Africa software programme (Smithers and Schulze, 2002 as cited in (Hydrospatial, 2024)). The programme uses the six closest rainfall stations to a user specified position, to calculate the storm rainfall depths. The extracted storm rainfall depths for various storm durations and recurrence intervals for the Proposed Project are provided in Table 4-1.

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Table 4-1: Storm rainfall depths for the area

Storm Duration	Storm Rainfall Depth (mm)						
	1:2 yr	1:5 yr	1:10 yr	1:20 yr	1:50 yr	1:100 yr	1:200 yr
5 min	9	12	14	16	18	20	22
10 min	13	17	20	23	26	29	32
15 min	16	21	25	28	33	36	40
30 min	20	27	32	36	42	46	51
45 min	23	31	37	42	48	53	58
1 hr	26	35	40	46	53	59	65
1.5 hr	30	40	47	53	62	68	75
2 hr	33	44	52	59	68	75	83
4 hr	39	53	61	70	81	90	98
6 hr	44	58	68	77	90	99	108
8 hr	47	62	73	83	96	106	116
10 hr	49	66	77	88	102	112	123
12 hr	52	69	81	92	106	118	129
16 hr	56	74	86	99	114	126	138
20 hr	59	78	91	104	121	133	146
24 hr	61	82	96	109	126	140	153
1 day	53	71	83	94	110	121	132
2 day	65	87	102	116	135	149	163
3 day	74	99	115	131	152	168	184
4 day	80	107	125	142	165	182	200
5 day	86	114	133	152	176	194	213
6 day	90	120	140	160	185	205	224
7 day	94	126	147	167	194	214	234

4.1.3 Evaporation

As with the rainfall, Symons Pan (S-Pan) evaporation data for the area was obtained from the DWS weather station C2E007, which is located at a similar altitude as the Proposed Project (Hydrospatial, 2024). S-Pan evaporation measurements are not a true reflection of evaporation from natural open water bodies, as the water temperatures in the S-Pan are higher, resulting in higher evaporation rates. To convert S-Pan measurements to open water evaporation, monthly open water evaporation conversion factors were used, which were obtained from the WR2012 study. The adopted monthly evaporation for the project is indicated in Table 4-2. The open water Mean Annual Evaporation (MAE) is 1 267 mm, with evaporation being highest over the warmer months of September to March, and lowest over the cooler months of April to August (Hydrospatial, 2024).

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Table 4-2: Evaporation for the area

Month	S-Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
Oct	162	0.81	132
Nov	166	0.82	136
Dec	168	0.83	139
Jan	168	0.84	141
Feb	139	0.88	122
Mar	128	0.88	113
Apr	101	0.88	89
May	84	0.87	73
Jun	67	0.85	57
Jul	75	0.83	62
Aug	106	0.81	85
Sep	144	0.81	117
Total	**1 508**	**N/A**	**1 267**

4.2. Topography

The Highveld inland plateau has elevations varying from 1 400 m to 1 800 m (Johannesburg 1 757 m). The local terrain morphology consists of gently undulating grassland which is dissected by the Wonderfonteinspruit.

Figure 4-2 indicates the topography of the project area. The ground level elevation varies from 1 600 metres above mean sea level (mamsl) at the southern corner of the TSF, to 1 585 mamsl along the northern boundary. The TSF is approximately 55 m high and has a maximum elevation of 1 646 mamsl. Steep slopes in excess of 30 % occur along the sides of the TSF. Several sinkholes occur in the area, specifically along the Wonderfonteinspruit.

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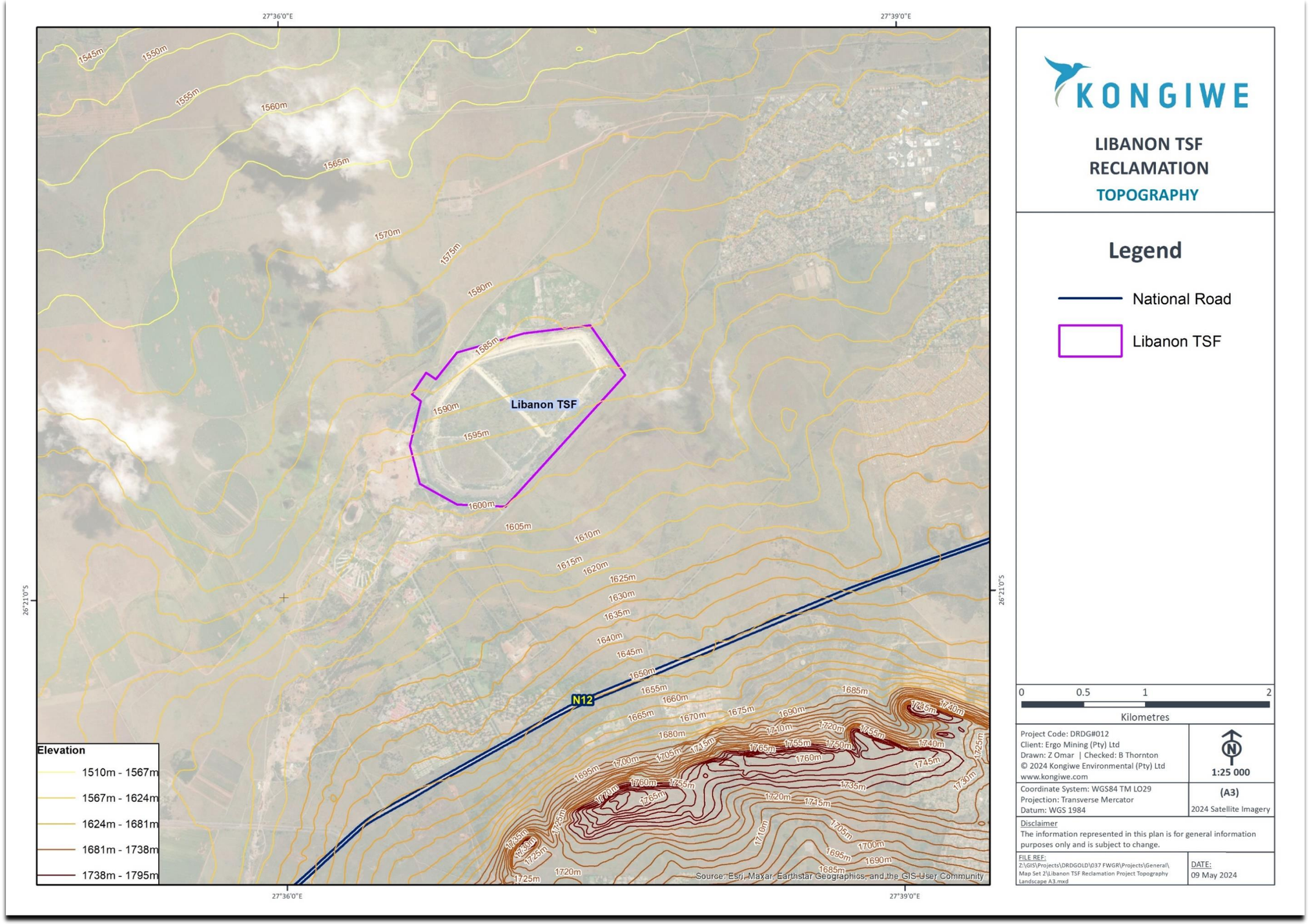


Figure 4-2:Topography map

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4.3. Geology

The regional surface geology for the Proposed Project area is presented in Figure 4-3. Regionally, the geology consists of formations of the Karoo, Transvaal, Ventersdorp and Witwatersrand Supergroups. Gold mineralisation is present in conglomerates of the Witwatersrand Supergroup. The Ventersdorp Contact Reef, Kloof Reef and the Middelvlei Reef were extensively mined in the Kloof underground workings. The Kloof Celamanzi Shaft (Kloof 10# Shaft) is located immediately southwest of the Libanon TSF, as indicated on Figure 4-3. The northern section of Kloof Mine was previously known as Venterspost and Libanon Mines. These northern sections have been mined out, but some of the Kloof Shafts remain open to dewater the old underground workings to preserve regional gold mining activities. The depth of the Ventersdorp Contact Reef in the underground workings is at least 800m to 1000m below surface, with deeper mining associated with reefs lower in the geological succession. The lower units of the Witwatersrand Supergroup include the West Rand Group and the upper unit the Central Rand Group. The West Rand Group is divided into three subgroups including the Hospital Hill, Government Reef and Jeppestown Formations. These comprise mainly shale, quartzite, banded ironstone, tillite and intercalated lava flows. At the north of Libanon TSF, the Government Formation outcrops. The Ventersdorp Supergroup overlies the Wits formations and comprises mainly andesitic lavas and related volcanic pyroclastics.

The overlying Transvaal Supergroup formations are of specific interest to the study area. The Black Reef quartzite, which is present at the base of the Transvaal Supergroup, outcrops north of the project area. Of the Transvaal Supergroup Formations, the Chuniespoort Group are of most significance, as the Libanon TSF is located on outcropping Malmani dolomite. The dolomite varies in thickness regionally from around 200m to 1500 m. Underneath the Libanon TSF, the base of the dolomite is at an elevation of 1000 to 800 mamsl and dips in a southerly direction (Jones and Wagener, 2013 as cited in (Groundwater Abstract , 2024).

According to Parsons (1991) (cited in Groundwater Abstract, 2024), the two lower formations of the Malmani Subgroup is present in this area, namely the Oaktree and Monte Christo Formations. The Oaktree Formation consists of chert-poor homogenous dark-grey dolomite with interbeds of shale and numerous columnar stromatolites. The Oaktree Formation is conformably overlain on the Black Reef Formation with a transitional zone of carbonaceous, calcareous, argillaceous and arenaceous sediments. The Monte Christo Formation lies conformably on the Oaktree Formation and consists of alternating chert-rich and chert-poor dolomite. This formation consists of interlayered crystalline coarse-grained dolomite, calcareous shale and fine-grained white dolomite.

The dolomite forms a significant aquifer regionally. Dissolution of the dolomite encourages deep zones of weathering. The residues of the weathering are present as brown clays and wad, chert rubble and boulders. The depth of weathering can vary significantly with pinnacles of fresh dolomite often adjacent to deeply weathered zones. The depth of weathering is controlled by the presence of fractures and fissures in the dolomite along which water can infiltrate. In addition, cavities often form in fresh unweathered dolomite where dissolution has taken place along faults and fractures to depth. These

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cavities can be filled with water, which provides hydrostatic pressure and keeps the cavities stable. If the cavities are dewatered, the stability is removed and the probability of sinkhole development increases.

The geomorphology of the weathered dolomitic aquifer, which has relevance to the geohydrology of the Libanon TSF, is presented in Figure 4-4 (Jones and Wagener, 2013 as cited in Groundwater Abstract, 2024). This aquifer has specific significance to the project, as the TSF is located on outcropping dolomite. The base of this aquifer was identified by means of a gravity geophysical survey completed by the Council for Geoscience, as presented in Figure 4-4. The information indicates that the base of the weathered dolomites is highly irregular, with an average depth of 200m.

To the south of Libanon TSF are formations of the Pretoria Group outcrop, including ferruginous shale and quartzite of the Timeball Hill Formation, Hekpoort lavas, as well as shale outcrops of the Strubenkop and Silverton Formations.

4.3.1 Structural Geology

The structural geology forms an important component of the hydrogeological setting of the Proposed Project and is complex in this region. The information presented here is based on work completed by Dr Marius van Biljon (Jones & Wagener, 2013 as cited in Groundwater Abstract, 2024).

The structural geology governs aquifer development and regional groundwater flow patterns. The region is characterised by several folds, of which the southern limb of the east-west striking Rand Anticline transects Kloof Mine. This structure affects the deeper geological setting and the underground mining areas and is distorted by several north-south trending folds. The result is a regional geological structure interpreted as domes and cusps (basins). Within the dome structures, prominently deeply weathered grykes form from the dolomite surface. A gryke is a deep narrow slot filled with dolomite wad. Dolomitic aquifers are also typically formed within the dome structures. The cusp structures for the most efficient groundwater conduits at the intersections of the synclinal fold axes. Some of the cusp structures resulted in post-Transvaal age faults, which are younger in geological age than he dolomites. These faults link the underground mine workings with the weathered dolomite aquifer that can yield significant volumes of groundwater and increased seepage to the mining areas. The positions of the post-Transvaal faults in the project area are indicated on Figure 4-3. It is shown that none of these faults transect the Libanon TSF footprint.

In addition to the regional post-Transvaal faults, regional diabase (dolerite) dykes have intruded into some of the north-easterly striking faults. Many of these faults penetrated the full Transvaal sequence as well as the underlying Ventersdorp and Witwatersrand Supergroups. These dykes have subdivided the dolomites in watertight compartments. A number of these dolomitic compartments are present in the region, including the Gemsbokfontein, Venterspost and Bank compartments, as indicated on Figure 4-3.

The Libanon TSF is located on the western edge of the Venterspost Compartment and possibly to some extent on the Bank Compartment, as shown in Figure 4-3.

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The eastern boundary of the Venterspost Compartment is formed by the Gemsbokfontein No. 2 Dyke and the western boundary by the Venterspost Dyke, which transects the western boundary of the Libanon TSF. The northern boundary of the dolomitic compartments is formed by the outcrop of the dolomite against the Black Reef Quartzite. The southern boundary is formed by the overlying Transvaal sediments.

Prior to mining, groundwater levels in the dolomitic compartments varied due to the impermeable nature of the compartment forming dykes. Mining activities have however punctured these dykes in places. The Venterspost Compartment is largely dewatered. The water level in the compartment is estimated to be around 1400 mamsl, which is more than 150m below surface underneath the Libanon TSF. The dewatering rate is reported as 40.4 ML/d from the Celamanzi (Kloof No 10#) Shaft.

4.4. Soils, Land Capability and Land Use

4.4.1 Soils

There is only one land type occurring in the study area, namely Ab7. Ab land types are freely drained, with red and yellow, dystrophic/mesotrophic soils occupying more than 40% of the area (yellow soils <10%). Refer to Figure 4-5 for a soil classification map of the project area.

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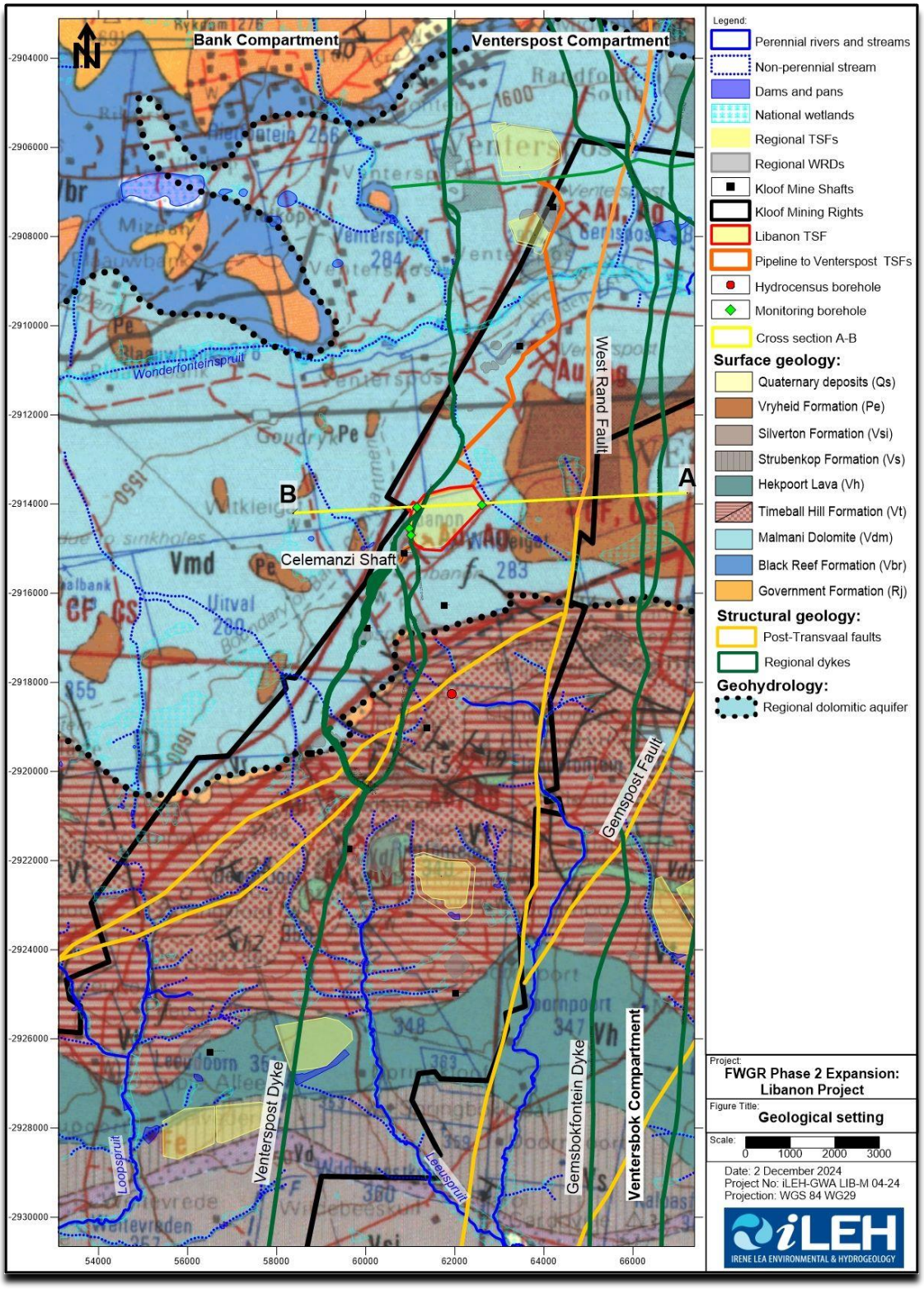


Figure 4-3: Geology of the project area (Groundwater Abstract , 2024)

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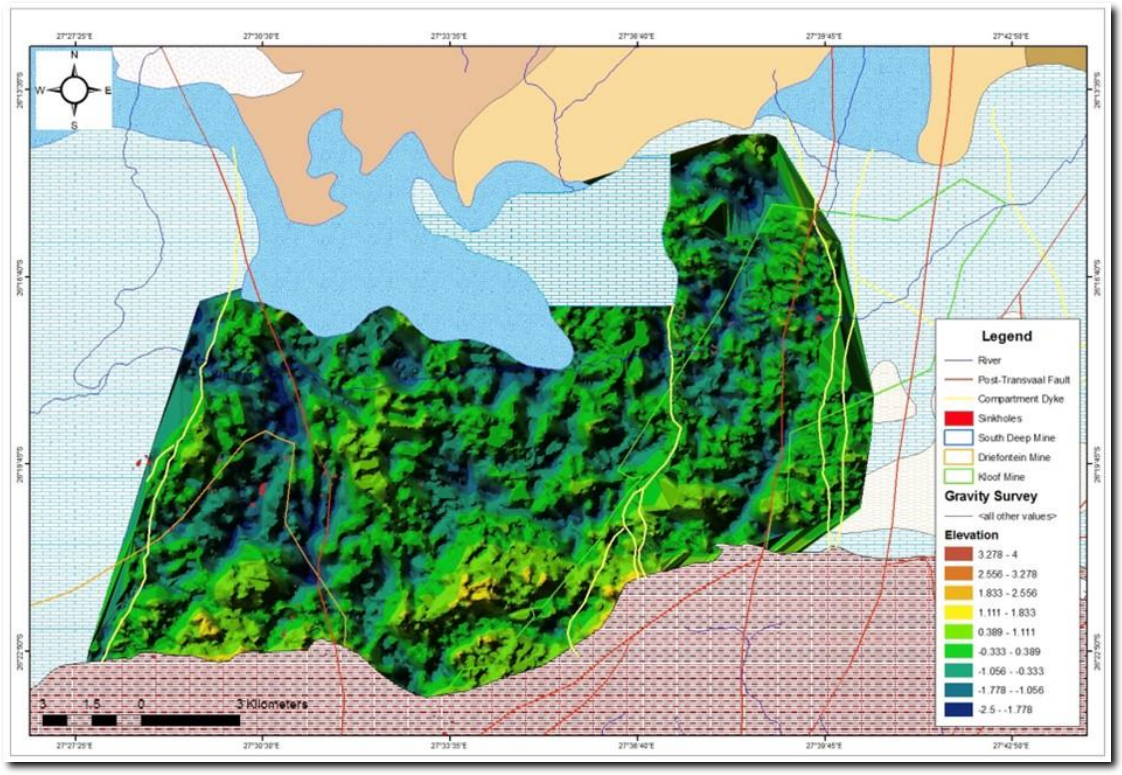


Figure 4-4:Geomorphology of the weathered dolomite aquifer (Groundwater Abstract , 2024)

4.4.2 Land Capability

The area on which the Libanon TSF is situated is a disturbed area, where previously the Libanon Plant was situated, but which has since been demolished. Land on which mine surface infrastructure was established, generally has low agricultural potential.

The assessment of agricultural potential rests primarily on the identification of soils that are suited to crop production. For soils to qualify as high potential soils they require the right properties such as a deep profile, sufficient clay and rock content, a good structure and distribution, as well as good internal and external drainage (Cambardella and Karlen, 1999 as cited in Groundwater Abstract, 2024). As a result to the mining history of the area, as well as the residential and industrial developments the land has been significantly modified and degraded.

4.4.3 Land Use

Land uses over the area are mining, stock farming and limited cropping (maize and vegetables). Due to shallow rocky soil, stock farming is the favoured agricultural practice. See Figure 4-6 land uses over the Project area.

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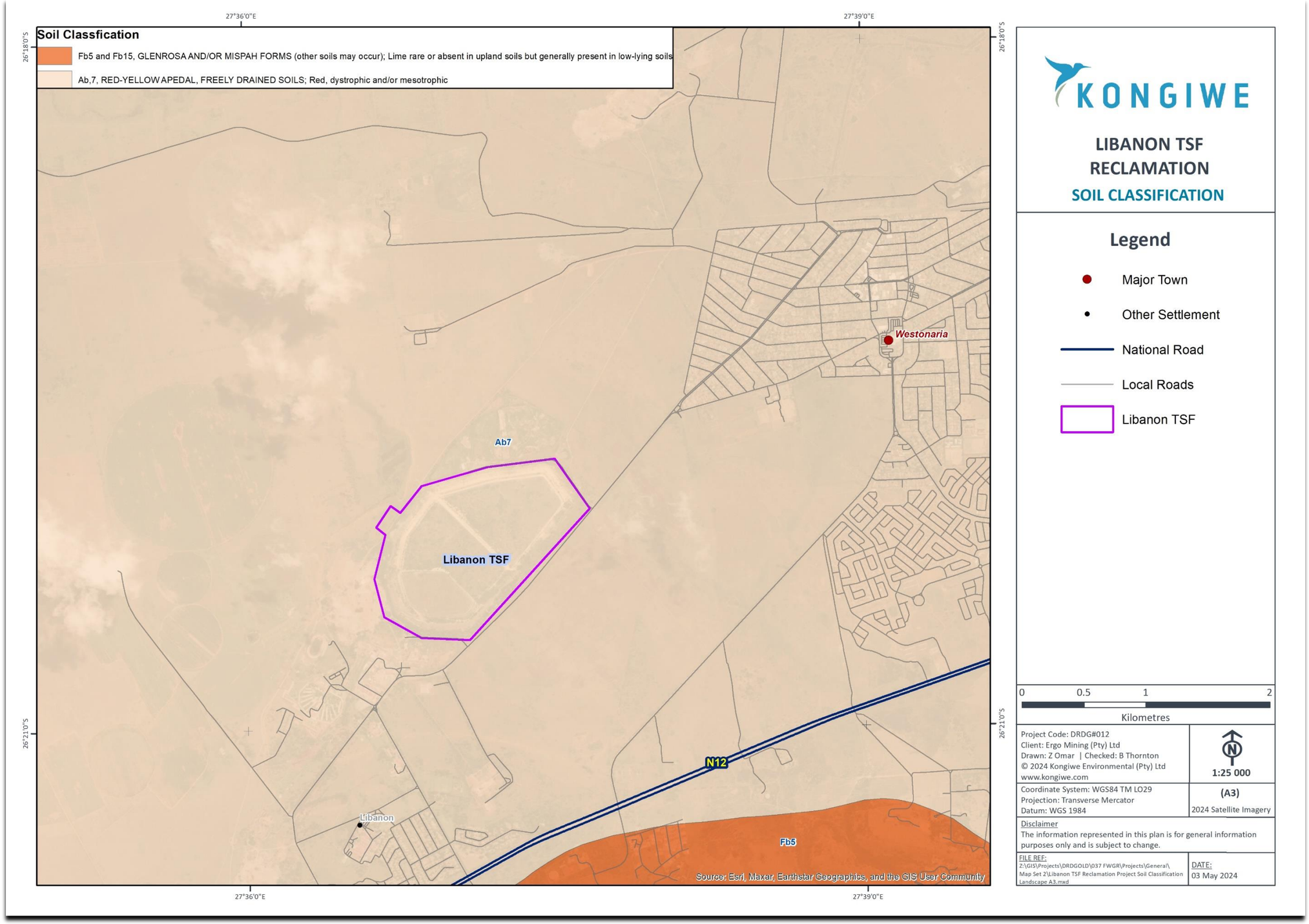


Figure 4-5: Soil classification map of the project area

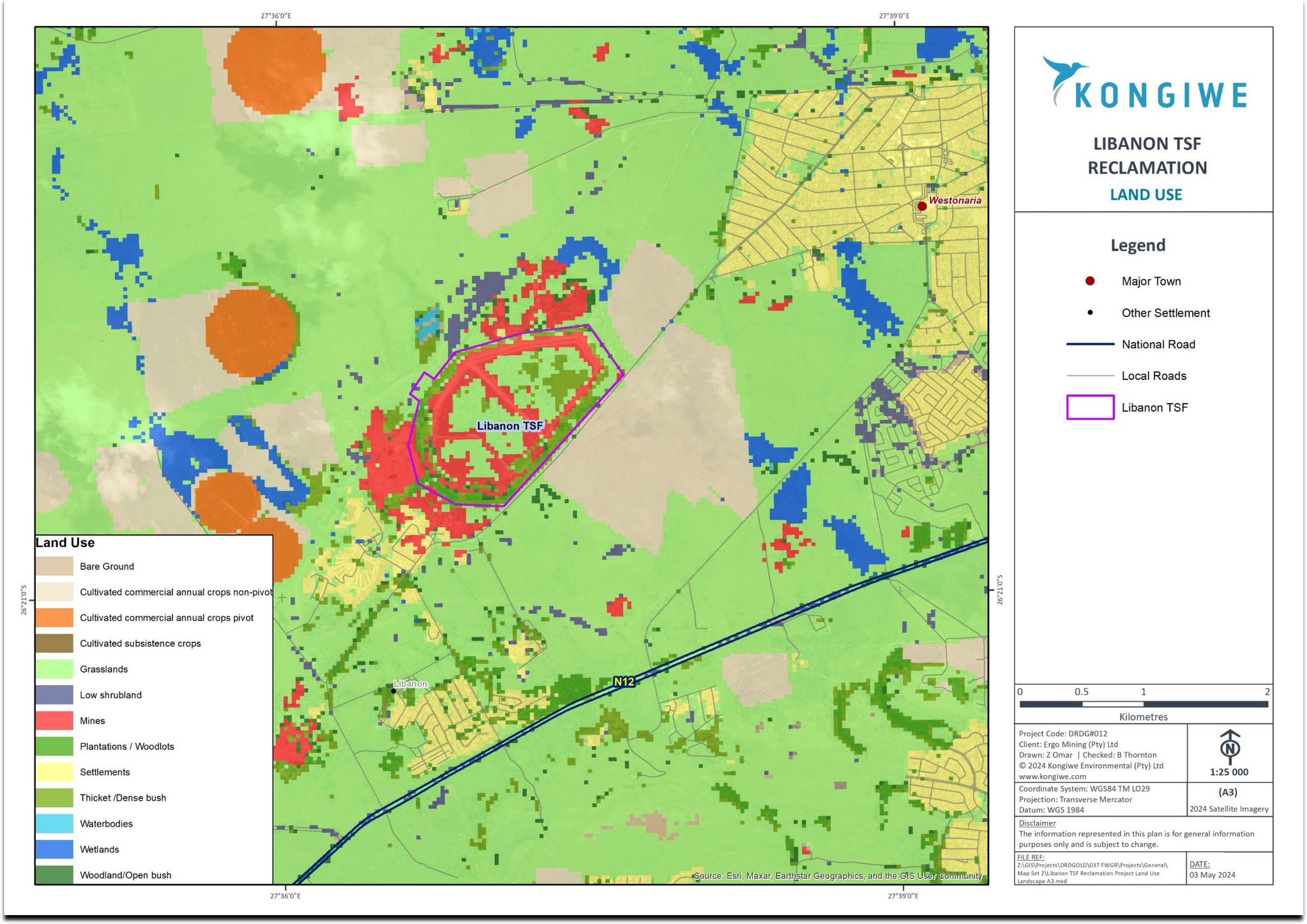


Figure 4-6: Land uses of the Proposed Project site and surrounding area

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4.5. Surface Water

Refer to Specialist Study: Appendix A – Hydrological Study

4.5.1 Regional Catchment

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, assigned the primary catchment letter within which they are located and a number e.g. A5 (secondary catchment 5 located within primary catchment A). Similarly, tertiary catchments are subdivisions of secondary catchments, represented for example by A53 (tertiary catchment 3 located within secondary catchment A5). Lastly, quaternary catchments are the smallest defined catchments and are assigned the tertiary catchment number, along with a quaternary catchment letter e.g. A53D (quaternary catchment D located within tertiary catchment A53).

Further to the above, the DWS has divided South Africa into 9 Water Management Areas (WMAs). The 9 WMAs consist of the Limpopo, Olifants, Inkomati-Usuthu, Pongola-Mtamvuna, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz and Berg-Olifants.

The Proposed Project is located in the Vaal-Orange WMA within quaternary catchment C23D (Figure 4-7), which is drained in a northerly direction towards the Wonderfonteinspruit. The Wonderfonteinspruit has its source to the south-east of Krugersdorp, where several old mine dumps, dirty water dams and settlements are located.

4.5.2 DWS Classes and Resource Quality Objectives

The NWA specifies that water resources are to be protected and managed through the classification of water resources and Resource Quality Objectives (RQOs) and the setting of the reserve. The Classes and RQOs of Water Resources for Catchments of the Upper Vaal (Government Notice No. 468, 22 April 2016) (DWS, 2016), was consulted to obtain the classes and RQOs for the quaternary catchments within which the Libanon TSF is located. However, quaternary catchment C23D does not have any classes or RQOs set.

4.5.3 Floodline Determination

No project infrastructure is near or within 100 m of a stream/river and the 1:100 / 1:50 year floodlines.

4.5.4 Mean Annual Runoff

The proposed project is in quaternary catchment C23D within the Upper Vaal WMA. Due to the large number of sinkholes that have formed along non-perennial drainage lines and the Wonderfonteinspruit, surface water runoff within quaternary catchment C23D is limited.

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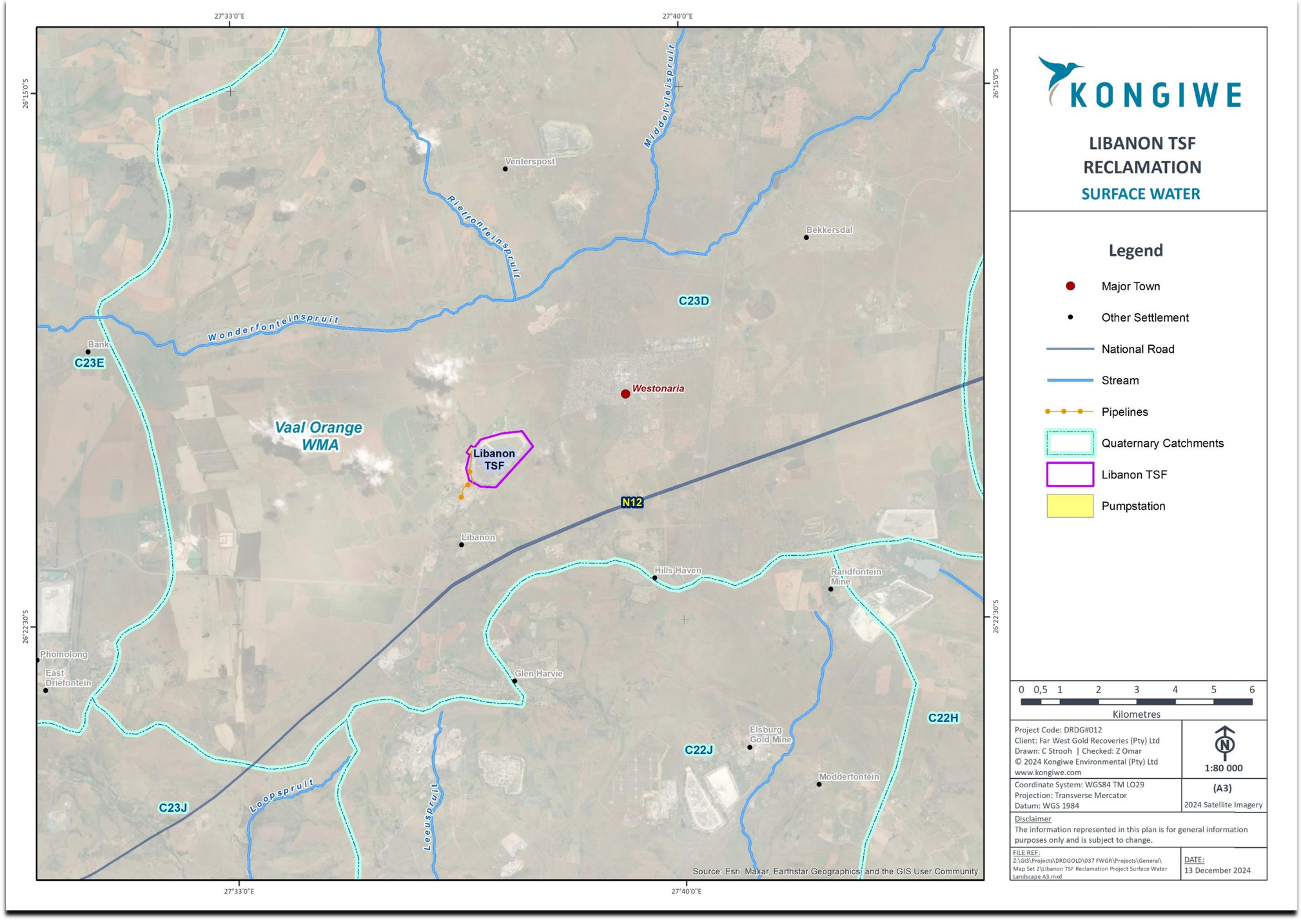


Figure 4-7: Surface water map

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4.5.5 Resource Class and River Health Receiving Water Quality Objectives and Reserve

Various studies of the Vaal River system show that it is under water quality and quantity stress as it is unable to meet the needs of its users adequately in respect of their quality and quantity requirements. From a water quality perspective, the current state of the system shows unacceptably high nutrient and salt concentrations which are indicative of an unsustainable system. At present, an imbalance exists between sustainable and optimal water use and protection of the water resource.

The Present Ecological State (PES) and Recommended Ecological Category (REC) of quaternary C23D is not included in the DWS' Classes and Resource Quality Objectives of Water Resources for Catchments of the Upper Vaal (2016).

The Wonderfontein Water Quality Objectives (WQOs) (compliance standards) are shown in Table 4-3.

Table 4-3: Wonderfontein compliance standards

Compliance Standards					
Variable	**Water Quality Objectives (WQO) Ideal**	**WQO: Acceptable**	**WQO: Tolerable**	**WQO: unacceptable**	**General Authorisation Discharge Standards**
Conductivity(mS/m@25C)	40-70	71-90	91-110	>110	70
Ammonia (mg/l)	<1	1-2	2-2.5	>2.5	6
Nitrate (mg/l)	5	20	21-25	>25	15
pH	6.5-8.4				5.5-9.5
Phosphates (mg/l)	0,1	0,26	0,35	>0.35	10/2.5
Dissolved Iron (µg/l)	100	1000	1500	>1500	300
Manganese (µg/l)	20	50	80	>100	100
Sulphate (mg/l)	200	400	600	>700	
Chemical Oxygen Demand (mg/l)	<25	25-70	70-90	>90	75
Total Suspended Solids (mg/l)					25
Faecal coliforms (counts/100ml)	0-150	150-350	350-500	>500	1000
Uranium (µg/l)	0-30			>30	
KEY	**- Ideal**	**- Acceptable**	**- Tolerable**	**- Unacceptable**	

4.5.6 Drainage and Wetlands

The general drainage of the project area is in a north-westerly direction towards the Wonderfonteinspruit (Figure 4-8). The 1:50 000 topographical data for the area shows that a non-perennial drainage line occurs to the north-east of the TSF, however, during the site visit, this area was found to be dry, and no defined channel could be located (Hydrospatial, 2024). The Kloof Mine Biodam is located immediately north of the proposed pump station, which has created an artificial seep to the north of it (The Biodiversity Company, 2024). Groundwater dewatered from the underground workings at the Kloof Shaft 10#, is discharged into a canal that conveys water to the Biodam. The Biodam filters and settles out suspended solids, before discharging into a pipeline that connects to the 1m pipeline to the north at the Wonderfonteinspruit. The Wonderfonteinspruit is diverted into a 1m diameter pipeline at the Donaldson Dam, which conveys the

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flow of the Wonderfonteinspruit for a distance of approximately 30 km across the dewatered Venterspost, Bank and Oberholzer dolomitic compartments, discharging back into the Wonderfonteinspruit near the town of Carletonville. The 1m pipeline was constructed in 1977, to prevent recharge of the underlying dolomitic compartments, and thereby reducing pumping costs associated with dewatering. As mentioned previously, a vast number of sinkholes occur in the area, specifically along the Wonderfonteinspruit, and therefore, very little surface water runoff occurs, as it is mostly lost to the underlying dolomite. For this reason, as well as due to the 1m pipeline, the Wonderfonteinspruit to the north of the Proposed Project is dry.

4.5.7 Surface Water Runoff

Due to the large number of sinkholes that have formed along non-perennial drainage lines and the Wonderfonteinspruit, surface water runoff within quaternary catchment C23D is limited, as it is almost entirely lost to the underlying dolomite via sinkholes. For this reason, as well as the 1 m pipeline that conveys the flow of the Wonderfonteinspruit between the Donaldson Dam and Carletonville, the Wonderfonteinspruit to the north of the project is dry.

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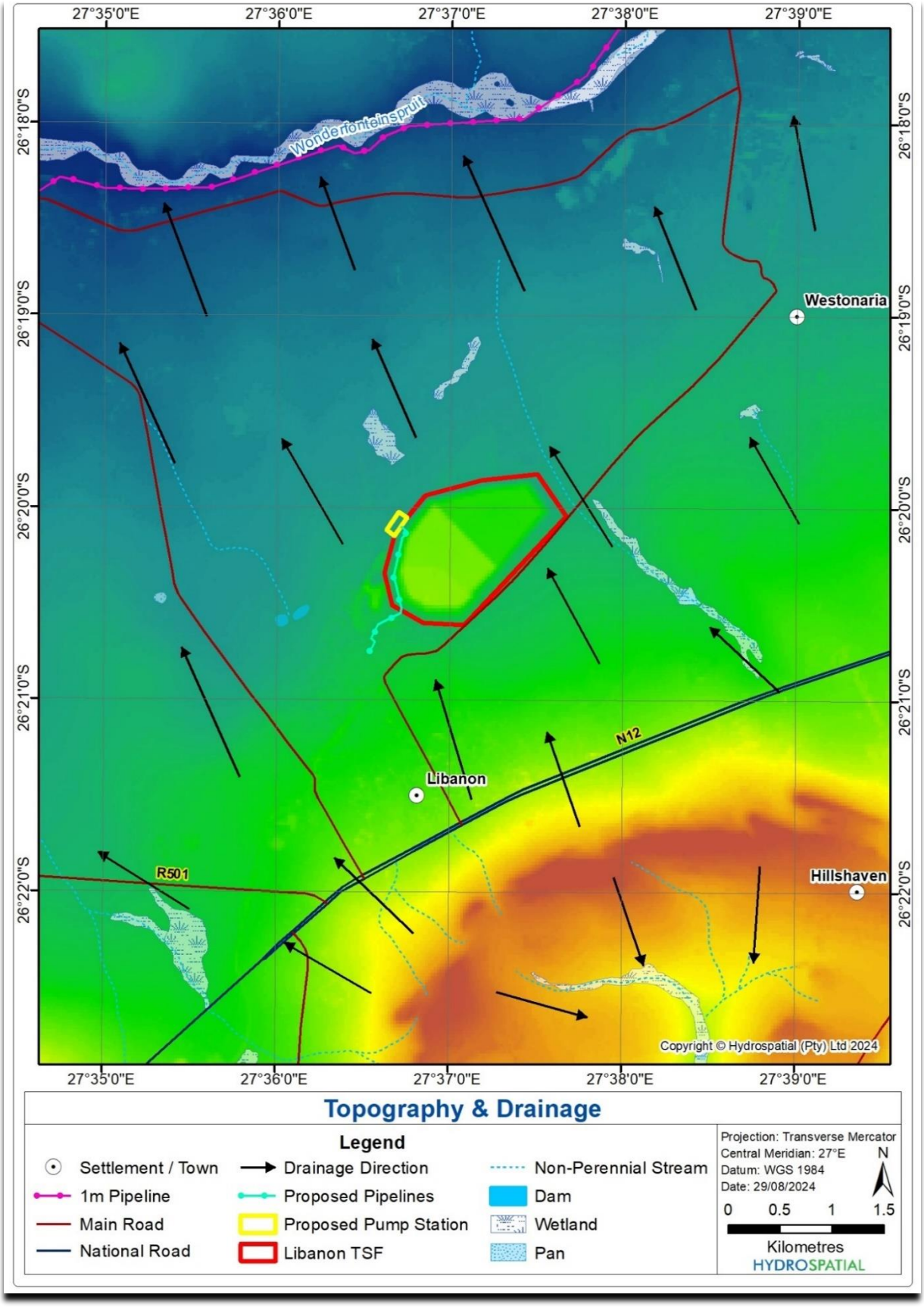


Figure 4-8: Drainage and wetlands

4.5.8 Surface Water Quality

4.5.8.1 Sources of Water Quality Data

The following sources were used to describe the surface water quality for the project:

- Water quality sampling undertaken on the site visit on 14 August 2024 (Hydrospatial, 2024); and
- Water quality data obtained from the report: Surface Water Study for the Sibanye-Stillwater Kloof Operations Environmental Management Programme and Water Use Licence Update (Hydrospatial, 2021 as cited in Hydrospatial, 2024). Sampling points WS001 and WS006 were sampled monthly (31 times) between 2018/01/11 - 2020/08/18, whilst WS107 was sampled weekly (139 times) between 2018/01/03 - 2020/09/07. These sampling points form part of the Sibanye monitoring network for the area.

4.5.8.2 Sampling locations

The sampling locations are indicated on Figure 4-9 and are summarised in Table 4-4 below.

Table 4-4: Description of the surface water quality sampling locations (Hydrospatial, 2024)

Sampling Point	Description	Latitude	Longitude
SW1	Kloof Mine Biodam	26°19'55.27"S	27°36'44.67"E
SW4	1 m pipeline upstream of the project	26°17'19.58"S	27°40'9.18"E
SW5	Wonderfonteinspruit downstream of the project	26°18'14.54"S	27°35'33.34"E
WS001	1 m pipeline upstream of the project	26°17'19.58"S	27°40'9.26"E
WS006	Outlet of the 1 m pipeline near Carletonville	26°19'41.58"S	27°24'25.69"E
WS107	Outlet of the Kloof Mine Biodam	26°19'47.30"S	27°36'40.35"E

4.5.8.3 Sampling method

Water samples obtained on the site visit, were taken approximately 20 centimetres (cm) below the water surface using a grab sampling technique. 500ml plastic bottles provided by the laboratory was used to store the samples. The samples were kept cool and out of direct sunlight and were delivered to Aquatico Laboratories in Centurion for water quality analysis.

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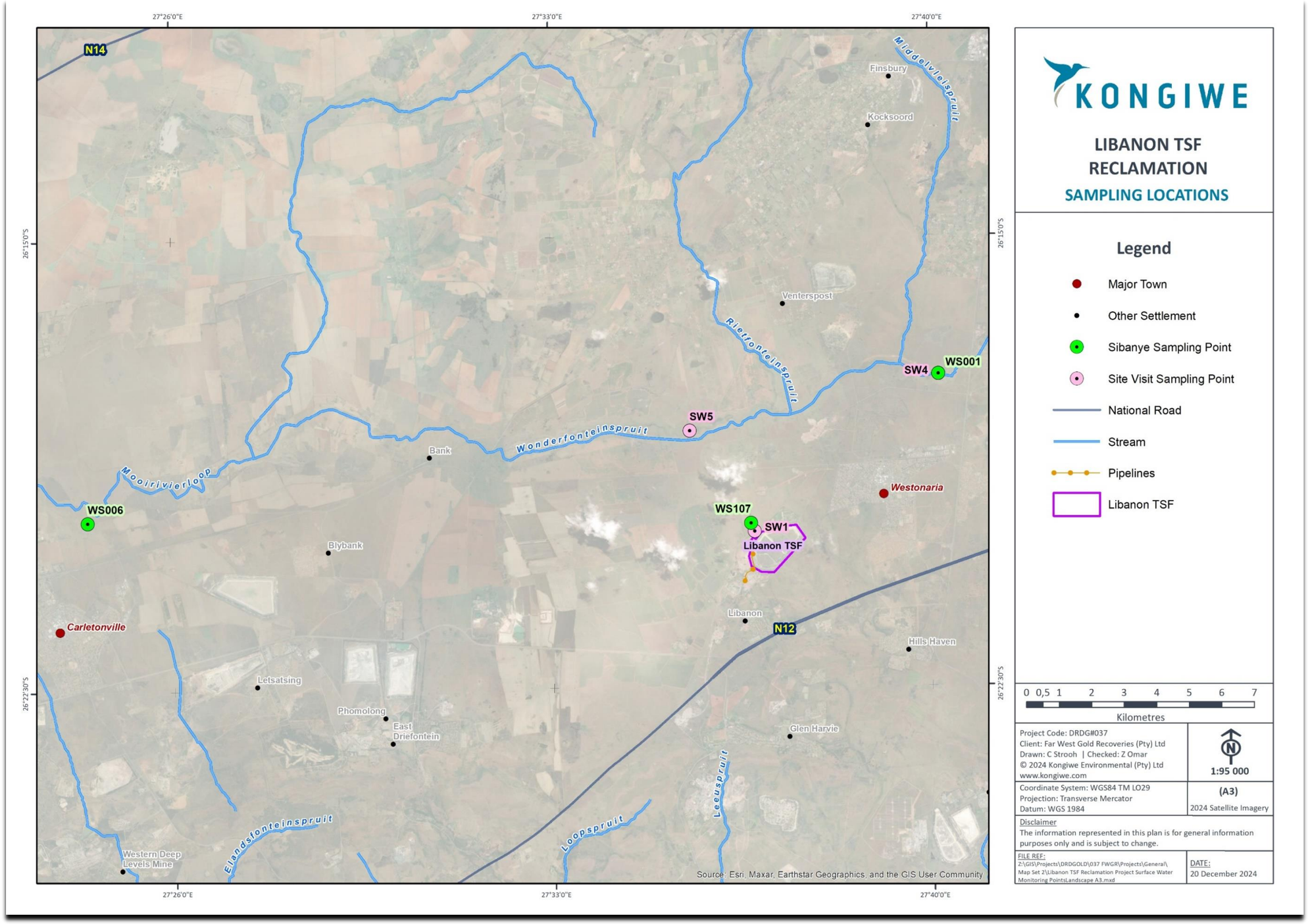


Figure 4-9: Surface water quality sampling location

4.5.8.4 Guideline Limits

The water quality was compared to the RQO limits for the Wonderfonteinspruit. Additionally, the DWS Target Water Quality Range (TWQR) limits for irrigation, livestock watering and aquatic ecosystems were also used for comparison purposes, as the main surface water uses in the region are irrigation and livestock watering. Furthermore, the Kloof Mine WUL limits were included in Table 4-6, as they are applicable to sampling point WS107 at the Biodam. The water quality limits were obtained from the following documents:

- DWS. 2016. Classes and Resource Quality Objectives (RQOs) of Water Resources for Catchments of the Upper Vaal (Government Notice No. 468, 22 April 2016) – coloured in green in Table 4-5and Table 4-6;
- Kloof Mine WUL – coloured in red in Table 4-6;
- DWAF, 1996. South African Water Quality Guidelines (second edition). Volume 4: Agricultural Use: Irrigation – coloured in orange in Table 4-5 and Table 4-6;
- DWAF, 1996. South African Water Quality Guidelines (second edition). Volume 5: Agricultural Use: Livestock Watering – coloured in yellow in Table 4-5 and Table 4-6; and
- DWAF, 1996. South African Water Quality Guidelines. Volume 7: Aquatic Ecosystems – coloured in blue in Table 4-5 and Table 4-6.

4.5.8.5 Results and Discussions

The site visit water quality results are summarised in Table 4-5, whilst the Sibanye monitoring results are summarised in Table 4-6. Parameters exceeding limits are coloured in their respective colours in the above-mentioned tables. It should be noted that the water sampled at SW5, originates mostly from the water discharged from the Kloof Mine Biodam, as a valve was observed to be open on the Kloof Mine pipeline from the Biodam to just before it joins the 1m pipeline. The following provides a summary of the water quality:

- pH exceeded the DWS irrigation limit at SW1, SW4, WS001 and WS006. The high pH values that have been recorded are most likely due to agricultural, livestock and mining activities in the area;
- EC and Total Dissolved Solids (TDS), which provide an indication of the dissolved salts in water, exceeded the irrigation limit at SW4, as well as regularly at WS001 and WS006. Sodium, which contributes to elevated EC and TDS levels, followed a similar trend. The exceedances are likely due to agricultural and mining activities;
- Orthophosphate was elevated at SW4 and SW5, as well as regularly at WS001 and WS006. Nitrate was elevated at SW4. These exceedances are most likely due to sewage runoff from the upstream settlements and Wastewater Treatment Works (WWTW);
- Aluminium exceeded the stringent DWS limit for aquatic ecosystems at SW4, but was regularly within the RQO limit at all sampling points;
- Copper exceeded the RQO limit at SW1, SW4 and SW5, as well as occasionally at WS001 and WS006;

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- Zinc exceeded the DWS aquatic ecosystem limit at SW1, but was within the Kloof WUL limit at this sampling point. Zinc also exceeded the DWS aquatic ecosystem limit at WS001 and WS006 on a number of occasions;
- Manganese exceeded the DWS aquatic ecosystem limit at WS001 and WS006 on a number of occasions; and
- Uranium was within limits at all of the points sampled during the site visit, however, uranium regularly exceeded the RQO limit at WS001 and WS006.

From the above, it is apparent that the water quality of the area is impacted by mining, sewage and agricultural and urban runoff.

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Table 4-5: Site visit surface water quality results (Hydrospatial, 2024)

Parameter	Units	DWS TWQR: Irrigation Limit	DWS TWQR: Livestock Watering Limit	DWS TWQR: Aquatic Eco-systems Limit	RQO Limit	SW1	SW4	SW5
pH	pH	6.5-8.4	-	-	-	8.5	8.81	8.35
Electrical conductivity (EC)	mS/m	90	153	-	111	86.2	88.4	82.6
Total dissolved solids (TDS)	mg/l	585	1000	-	722**	562	618	552
Total Alkalinity	mg $CaCO_3$/l	-	-	-	-	249	181	230
Chloride (Cl)	mg/l	100	1500	-	-	27.6	48.7	28.1
Sulphate (SO_4)	mg/l	-	1000	-	500	180	175	187
Nitrate (NO_3) as N	mg/l	-	100	-	4	<0.194	4.07	0.391
Total oxidised nitrogen as N	mg/l	-	-	-	-	<0.194	4.07	0.391
Ammonium (NH_4) as N	mg/l	-	-	-	-	0.08	0.299	0.063
Orthophosphate (PO_4) as P	mg/l	-	-	-	0.125	<0.009	1.18	0.522
Fluoride (F)	mg/l	2	2	0.75	3	0.387	0.421	0.339
Calcium (Ca)	mg/l	-	1000	-	-	90	80.4	85.4
Magnesium (Mg)	mg/l	-	500	-	-	42.3	25.3	45.4
Sodium (Na)	mg/l	70	2000	-	-	54	85	53
Potassium (K)	mg/l	-	-	-	-	<0.015	7.14	<0.015
Aluminium (Al)	mg/l	5	5	0.01	0.15	0.02	<0.002	<0.002
Iron (Fe)	mg/l	5	10	-	-	<0.004	<0.004	<0.004
Manganese (Mn)	mg/l	10	10	0.18	1.3	0.083	0.02	<0.001
Chromium (Cr)	mg/l	-	-	-	-	<0.003	<0.003	<0.003
Copper (Cu)	mg/l	0.2	0.5	0.0014*	0.008	0.017	0.011	0.016
Nickel (Ni)	mg/l	0.2	1	-	-	0.01	0.009	<0.002
Zinc (Zn)	mg/l	1	20	0.002	0.036	0.005	<0.002	<0.002
Cobalt (Co)	mg/l	0.05	1	-	-	0.006	0.006	0.004
Cadmium (Cd)	mg/l	0.01	0.01	0.0004*	0.005	<0.002	<0.002	<0.002
Lead (Pb)	mg/l	0.2	0.1	0.0012*	0.013*	<0.004	<0.004	<0.004
Total hardness	mg $CaCO_3$/l	-	-	-	-	399	305	400
Total suspended solids (TSS)	mg/l	50	-	-	-	<4.5	7	5
Dissolved Uranium (U)	mg/l	0.1	-	-	0.015	<0.015	<0.015	<0.015

*Below detection limit

**TDS limit calculated by multiplying EC by the DWS recommended value of 6.5

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Table 4-6: Sibanye monitoring water quality results (Hydrospatial, 2021 as cited in Hydrospatial, 2024)

Parameter	Units	DWS TWQR: Irrigation Limit	DWS TWQR: Livestock Watering Limit	DWS TWQR: Aquatic Eco-systems Limit	RQO Limit	Kloof Mine WUL Limit	WS107					WS001					WS006				
							Min	25th Percentile	50th Percentile	75th Percentile	Max	Min	25th Percentile	50th Percentile	75th Percentile	Max	Min	25th Percentile	50th Percentile	75th Percentile	Max
pH	pH Units	6.5-8.4	-	-	-	5.5-9.5	7.3	8.0	8.1	8.2	8.4	7.6	8.2	8.4	8.7	9.5	7.3	7.8	8.4	8.7	9.5
EC	mS/m	90	153	-	111	112	54	87	89	95	102	68	92	101	117	143	68	90	96	113	143
TDS	mg/l	585	1000	-	722**	784	330	561	606	643	780	428	620	690	787	1062	440	590	658	748	1086
SS	mg/l	50	-	-	-	25	0	1	1	1	245	1	1	4	8	27	1	1	1	6	18
Ca	mg/l	-	1000	-	-	100	66	74	77	83	90	65	80	91	102	149	59	74	85	99	148
Mg	mg/l	-	500	-	-	70	10	42	44	47	58	18	25	27	30	36	18	25	27	32	40
Na	mg/l	70	2000	-	-	100	45	58	59	61	94	52	76	96	105	123	52	73	84	103	122
K	mg/l	-	-	-	-	-	3	3	3	3	16	8	9	10	11	17	5	9	9	10	13
F	mg/l	2	2	0.75	3	0.8	0.05	0.31	0.39	0.44	1.57	0.05	0.17	0.23	0.26	0.54	0.05	0.17	0.21	0.30	0.51
Cl	mg/l	100	1500	-	-	100	29	32	34	36	48	30	43	49	53	62	21	40	49	52	62
SO_4	mg/l	-	1000	-	500	400	169	201	216	242	287	186	259	289	346	577	98	224	283	332	571
Ca Hard	mg/l	-	-	-	-	-	164	184	192	207	226	161	200	228	255	372	148	184	213	247	370
Mg Hard	mg/l	-	-	-	-	-	41	173	180	193	237	73	103	109	125	146	73	102	109	132	167
Tot Hard	mg/l	-	-	-	-	-	217	359	371	402	442	234	302	336	380	518	235	297	326	379	518
PO_4 as P	mg/l	-	-	-	0.125	1	0.050	0.098	0.098	0.098	0.978	0.098	0.575	0.768	0.908	1.280	0.098	0.529	0.798	0.925	2.906
NH_4 as N	mg/l	-	-	-	-	-	0.008	0.078	0.078	0.078	0.318	0.078	0.078	0.093	0.365	1.312	0.078	0.078	0.116	0.446	11.570
NO_3 as N	mg/l	-	100	-	4	-	0.023	0.140	0.194	0.358	1.584	0.091	0.672	1.453	2.283	3.664	0.051	0.512	1.201	2.200	3.717
COD	mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malk	mg/l	-	-	-	-	-	158	205	212	226	541	89	147	163	183	217	103	148	165	197	234
Palk	mg/l	-	-	-	-	-	0	0	0	0	16	0	0	0	12	115	0	0	0	13	88
U	ug/l	100	-	-	15	70	1	19	26	36	88	5	36	41	52	93	11	31	36	50	95
Al	mg/l	5	5	0.01*	0.15	0.5	0.024	0.028	0.028	0.035	0.310	0.028	0.028	0.036	0.072	0.198	0.028	0.028	0.028	0.067	0.212
Fe	mg/l	5	10	-	-	0.2	0.005	0.065	0.120	0.182	1.160	0.004	0.033	0.043	0.080	0.253	0.009	0.033	0.046	0.087	0.258
Cd	mg/l	0.01	0.01	0.0004*	0.005	0.01	0.003	0.003	0.003	0.003	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Cu	mg/l	0.2	0.5	0.0014*	0.008	0.1	0.001	0.005	0.005	0.005	0.050	0.005	0.005	0.005	0.005	0.010	0.005	0.005	0.005	0.007	0.050
Cr	mg/l	-	-	-	-	-	0.003	0.007	0.007	0.007	0.070	0.007	0.007	0.007	0.007	0.020	0.007	0.007	0.007	0.007	0.020
Mn	mg/l	10	10	0.18	1.3	0.1	0.002	0.004	0.008	0.017	0.315	0.002	0.029	0.184	0.319	0.526	0.002	0.022	0.101	0.233	0.516
Ni	mg/l	0.2	1	-	-	0.2	0.010	0.015	0.022	0.027	0.087	0.011	0.015	0.015	0.015	0.040	0.015	0.015	0.015	0.017	0.100
Pb	mg/l	0.2	0.1	0.0012*	0.013*	0.1	0.010	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
B	mg/l	0.5	5	-	-	0.5	0.006	0.111	0.119	0.128	0.154	0.006	0.027	0.036	0.040	0.052	0.019	0.030	0.037	0.046	0.089
Zn	mg/l	1	20	0.002	0.036	0.1	0.002	0.002	0.002	0.008	0.082	0.002	0.002	0.002	0.005	0.017	0.002	0.002	0.002	0.006	0.019
T CN	mg/l	-	-	-	-	0.5	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Turbidity	NTU	-	-	-	-	-	0.0	1.0	1.5	2.6	17.3	0.8	1.3	2.1	4.5	8.4	0.4	1.3	2.1	3.3	9.4
Hg	mg/l	-	-	-	-	-	0.000	0.000	0.000	0.001	0.002	-	-	-	-	-	-	-	-	-	-
As	mg/l	-	-	-	-	-	0.002	0.041	0.055	0.060	0.089	-	-	-	-	-	-	-	-	-	-

*Below detection limit

**TDS limit calculated by multiplying EC by the DWS recommended value of 6.5

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4.6. Groundwater

Refer to Specialist Study: Appendix A – Groundwater Study

4.6.1 Site Investigations

Three sets of shallow and deep monitoring boreholes were drilled and tested as part of this project. The locations of the boreholes are indicated on Figure 4-10 and Figure 4-12. The results of the drilling programme indicate the presence of thick residual dolomite, referred to as wad underneath the Libanon TSF footprint. This material has very low permeabilities and act largely as an aquitard. One of the deeper boreholes intersected a cavity in the dolomitic formation, which complicated the drilling process. This is discussed in more detail below.

Due to the presence of the residual dolomite and dewatered environment, aquifer tests could only be completed on two of the boreholes drilled. Slug tests were completed on three of the remaining boreholes. Groundwater samples were collected from two of the boreholes that contained groundwater at the end of the drilling and testing programs.

4.6.2 Hydrocensus

A hydrocensus was conducted across the study area during August 2024. The survey included the Libanon TSF property, plus accessible properties within a 4.5km radius, and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use. Only one borehole was identified on one of the properties on the ridge to the south (Groundwater Abstract , 2024) (Table 4-7).

Fourteen properties that were visited had no boreholes. These include:

- Libanon TSF property.
- Landfill site north of Libanon TSF.
- Westonaria Cemetery.
- Hendrik Van Niekerk Wastewater Treatment Works.
- WESTCOL Westonaria - School.
- Westonaria High School.
- Westonaria Primary School.
- Gerrit Maritz Primary school.
- Rand Water Depot Westonaria.
- Klipfontein Guest House, Wagterskop.
- Libanon Mine Town.
- Eskom Distribution Libanon.
- Kos-Mos – Restaurant.
- Mr Oberholzer’s farm west of Libanon Town.

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A summary of the hydrocensus information is available in Table 4-7. All coordinates were taken with a hand-held Garmin GPS (Global Positioning System) (WGS84).

The extent of the study area, budget and time constraints, and land access limited the hydrocensus in terms of surveying every property in the area. The study aimed to cover the whole area to ensure a data set representative of the study area.

Only one borehole was identified during the hydrocensus, and a groundwater level could not be measured due to security measures installed to safeguard the borehole pump Table 4-7. Detailed information in terms of borehole construction and yield and water strike depths are not known for the identified hydrocensus site. Time series groundwater level or quality data are also not available for the private borehole to determine seasonal groundwater changes for the area. A groundwater sample was collected from the one borehole (see Section 4.6.6).

Locally surface drainage and possibly groundwater flow will be towards the Wonderfonteinspruit. The groundwater table governs water flow and in similar geological terrains a relationship exists between the groundwater table and the topography. This correlation is known as the Bayesian relationship. The borehole collar elevation is plotted against the measured groundwater elevation to test if this relationship is applicable. This was not possible for the Libanon TSF area due to the lack of rest level data.

Generally, a groundwater mound occurs beneath a TSF because of seepage from the TSF, that recharges the underlying aquifer. This results in radial flow from the TSF footprint but assumes regional flow direction again as the distance increases from the TSF.

Table 4-7:2024 Hydrocensus data

Site ID	Lib 1
Lat (WGS84)	26°22'21.26"S
Long	27°37'14.26"E
Elev (mamsl)	1732
Locality	Kobus Oberholzer farm
Water depth (mbgl)	sealed
Collar height (m)	0,15
Water elevation (mamsl)	--
BH depth (m)	100
Yield (L/hr)	good
Casing diameter (mm)	165
Sampled	yes
Pump type	submersible
Use	domestic, gardens
Notes	Only source of water

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4.6.3 Drilling Program

Based on the geophysical survey, three drilling positions were identified around the footprint area of Libanon TSF (Table 4-8 and Table 4-9). The percussion drilling program was carried out during October 2024.

Two groundwater characterisation and monitoring boreholes were drilled at each of the 3 target areas – the one borehole was drilled to a depth of 80m below surface, with the aim of characterising and monitoring the deeper fractured aquifer. The second borehole was drilled 30 m deep, with the aim of monitoring potential groundwater flow, quality and possible connection between the deeper fractured aquifer and the shallow weathered aquifer in the area.

Data collected include the recording of geological formations at 1m intervals, water strike depths, the cumulative final blow yield and final rest water level. A summary of the results is presented in Table 4-8.

The borehole construction details are as follows:

- Deep boreholes (80m) – 177mm diameter solid steel casing from surface to 30 m below surface. Beyond this depth the diameter of the borehole is 165mm.
- Shallow boreholes (30 m) – drill diameter is 203mm with 177mm steel casing installed over the full depth of the borehole. The bottom 12m was perforated.

The geological profiles intercepted by the percussion drilling program are presented in the Groundwater Report (Appendix B).

Two of the six new percussion boreholes produced a measurable groundwater level, post drilling (boreholes Lib BH3s and Lib BH3d). The other four boreholes produced no water and remained dry post closure. There were no measurable blow yields with only seepage water observed for boreholes Lib BH3s and Lib BH3d (Table 4-8).

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Table 4-8: Drilling summary, October 2024 (Groundwater Abstract , 2024)

		Borehole ID	Lib-BH 1s	Lib-BH 1d	Lib-BH 2s	Lib-BH 2d	Lib-BH 3s	Lib-BH 3d
Borehole Location	WGS84	Latitude	26°20'03.12"S	26°20'02.78"S	26°20'25.33"S	26°20'20.09"S	26°20'05.07"S	26°20'04.77"S
		Longitude	27°37'37.77"E	27°37'38.00"E	27°36'40.63"E	27°36'39.13"E	27°36'45.05"E	27°36'45.14"E
		Elevation	1599 mamsl	1598 mamsl	1616 mamsl	1609 mamsl	1602 mamsl	1601 mamsl
Borehole Data	Borehole Depth (m)		30	60	18	50	30	80
	Blow Yield (L/hr)		Dry	Dry	Dry	Dry	Seepage	Seepage
	Water Strike depth (m)		None	None	None	None	None	None
	Main Strike Geology		--	--	--	--	--	--
	Borehole Geology		Clays, chert, dolomite	Quartzite, clays, dolomite Cavity at 48-60m	Quartzite, clays	Sandstone, quartzite, clays	Lava, sandstone, quartzite, clays	Lava, sandstone, quartzite, clays, dolomite
	Solid Steel Casing (170mm ID)		0 – 18m	0 - 48m	0 – 6m	0 - 30m	0 – 18m	0 - 48m
	Perforated Steel Casing (170mm ID)		18 – 30m	none	6 – 18m	none	18 – 30m	none
	Static Water Level (mbgl)		Dry	Dry	Dry	Dry	20.87	77.17
	Depth of Weathering (m)		25	30	18+	35	30+	32

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4.6.4 Aquifer Characterisation

Following completion of the drilling programme, an aquifer test programme was initiated to determine the hydrogeological characteristics of the local aquifers, where possible.

Only five of the six boreholes were available for yield testing, consisting of shallow (30m) and deep (80 m) boreholes (Groundwater Abstract , 2024). Borehole Lib BH1d (deep borehole) intercepted a cavity at depth and was not tested.

The aquifer test program includes defining:

- Borehole drawdown and recovery characteristics.
- Aquifer hydraulic parameters:
  - Transmissivity (T) defined as the product of the average hydraulic conductivity (K) and the saturated aquifer thickness. It is a measure of the rate of flow under a unit hydraulic gradient through a cross-section of unit width over the whole saturated thickness of the aquifer. The unit of measurement is m2/day.
  - Characterisation of aquifer flow boundaries such as low permeable, no-flow or recharge boundaries. No-flow or low permeable boundaries refer to a lower transmissive structure (e.g., fracture with a lower conductance or low permeable dyke) or aquifer boundary (limit of aquifer – no-flow boundary) that results in an increase in groundwater drawdown during borehole abstraction. Recharge boundaries relate often to leakage from surface water bodies.

Prior to the aquifer test, static groundwater levels are measured in the pumping boreholes to enable drawdown calculations during test pumping. During the test, the abstraction rate is continuously monitored by means of electronic flow meters and calibrated by manually measuring the time it takes to fill a container of known volume, with a stopwatch and drum.

The testing methodology and results were received upon completion of the test program. The aquifer test data and drawdown graphs are presented in Groundwater Report (Appendix B).

For this project maximum drawdown pump tests were conducted on the two low yielding boreholes (boreholes Lib BH3s and Lib BH3d), followed by a recovery test after each test. Slug tests were conducted on three of the dry boreholes (slug in / infiltration tests) (Lib BH1s, Lib BH2s and Lib BH2d). These processes are discussed in more detail below.

A slug test is a controlled field experiment performed to estimate the hydraulic properties of aquifers and aquitards in which the water level in a control environment is caused to change suddenly (rise or fall) and the subsequent water-level response (displacement or change from static) is measured through time in the borehole. Slug tests are also referred to as rising-head or falling-head tests to describe the direction of water-level recovery in the borehole following test initiation (HydroSOLVE, Inc as cited in Groundwater Abstract, 2024).

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The goal of a slug test, as in any aquifer test, is to estimate hydraulic properties of an aquifer system such as hydraulic conductivity. Aquifer properties are estimated from a slug test by fitting mathematical models to displacement data using curve matching. Curve matching may involve fitting type curves or straight lines to the measured data (HydroSOLVE, Inc as cited in Grounwater Abstract 2024).

Table 4-9: Summary of the aquifer parameters (hydraulic conductivity in m/day) based on the slug tests (Groundwater Abstract , 2024)

BH ID	Slug In/Out	Aquifer properties (Slug Test)			
		Bouwer-Rice		KGS Model	
		K-value	*Yo-value*	*K-value*	*Ss-value*
BH2B	In	0.0035	4	0.000140	1.00E-02
BH2A	In	0.0025	0.7	0.0021	5.00E-04
BH1B	In	0.00057	3.2	0.00003	2.00E-04

The **maximum drawdown test** is a method developed as a rapid means of assessing the potential yield of boreholes (Groundwater Abstract , 2024). The results may indicate whether it is feasible to perform other tests on the borehole. The test involves measuring the water level response in a borehole to the rapid abstraction of water until pump inlet is reached. The flow rate / pumping rate is then reduced and continuously adjusted until a stable pumping level is maintained.

The **recovery test** follows directly after pump shut down, at the end of the SDT and CDT (Groundwater Abstract , 2024). The residual drawdown over time (water level recovery) is measured in production and observation boreholes until approximately 90% recovery is reached, or equal to test duration. Aquifer parameters and sustainable borehole yields can be derived from the time drawdown data by application of a variety of analytical methods.

Although these short-term tests cannot be considered as the ideal way of evaluating the long-term sustainability of a groundwater resource, it does provide a quick and simple way of evaluating the short-term performance characteristics of a borehole. It must be emphasised that calculations done from test pumping data are only representative of the aquifer characteristics in the immediate surrounding of the borehole. Factors such as aquifer transmissivity as well as the length of a test, will determine the area of influence reached during testing (the longer the test, the greater the area of influence and more accurate the predictions).

A summary of the test programme is given in Table 4-10. The pumping test data is used during the calibration of the groundwater numerical model.

The recovery of the groundwater table after abstraction, or introduction of the slug is a good indicator of the aquifer's transmissivity and recharge. The recovery data (for the tested boreholes) indicate that the recovery is slow, and that full recovery (100%) was not achieved within the predetermined testing timeframe (Table 4-10).

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Table 4-10: Summary table of the yield testing results (Groundwater Abstract , 2024)

Borehole ID	Lib-BH 1s	Lib-BH 1d	Lib-BH 2s	Lib-BH 2d	Lib-BH 3s	Lib-BH 3d
Borehole Depth (m)	30	60	18	50	30	80
Static Water Level (m bgl)	Dry	Dry	Dry	Dry	20.87	77.17
Test pump depth (m bgl)	No test. No water level. No slug test due to sinkhole	Slug Test (Slug In)	Slug Test (Slug In)	Slug Test (Slug In)	29.5	79.0
Available drawdown (m)					7.01	4.77
Steps (60 minutes)					1 (20 min)	1 (40 min)
Max step yield (L/hr)					648	108
Constant Discharge Duration (hrs)					--	--
Maximum drawdown					Full, 6.55 m	Full, 4.79 m
Pumping level at end of test					29 m below surface	79 m below surface
Slug test rise in water level (m) (Slug In)		3.1	0.76	5.40	--	--
Recovery Time		2% in 50 min.	25% in 1 hr	42% in 1 hr	81% in 20 hrs	6% in 3 hrs
Potential Yield		--	--	--	0 L/hr	0 L/hr
T value (m2/day)		--	---	--	0.5	0.1
Bouwer-Rice K-value (m/d)		0.00057	0.0025	0.0035	--	--
Water Sample	No	No	No	No	Yes	Yes

Groundwater samples were collected from two of the new boreholes during the aquifer test programme. The results are presented in Section4.6.6.

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4.6.5 Groundwater Availability Assessment

No information could be recorded during the hydrocensus on the volumes of groundwater used in the borehole identified (Lib 1)

The Libanon TSF is underlain by dolomite, which typically forms major aquifers. The former Department of Water Affairs and Forestry (DWAF) (now the DWS) published 1:500 000 scale hydrogeological map borehole yield classification is summarised below. The map considers all available data, including blow yields. The regional distribution of borehole yield on the published maps indicates the following:

- Karst aquifers: Yields in these aquifers are often more than 5 litres per second (L/s). However, data from the boreholes drilled around the Libanon TSF suggest much lower yields – less than 0.5 L/s in the residual dolomite (wad) intersected.
- Intergranular and fractured aquifers: Groundwater occurs in intergranular interstices and in fractures, notably associated with crystalline rocks, but also with sedimentary rocks. These types of aquifers are associated with the Hekpoort andesite as well as the Timeball Hill and Strubenkop Formations. The yields of these aquifer typically vary between 0.5 to 2 L/s.

4.6.6 Groundwater Quality

During the August 2024 hydrocensus only one borehole was identified, and a groundwater sample was collected (borehole Lib 1) Table 4-12. Another two groundwater samples were collected during the aquifer test program Table 4-12.

A sterilised 500ml sample bottle was used and filled to the top, for each borehole sampled. Samples were stored in a cooler box during the site assessment. The water samples were analysed for basic inorganic parameters and the results were compared against the SANS 241:2015 Drinking Water Standards.

The water samples were submitted to Aquatico Laboratories for analysis. Aquatico is a South African National Accreditation System (SANAS) accredited laboratory. The water samples were analysed for basic inorganic parameters and the results were compared against the SANS 241:2015 Drinking Water Standards. The DWS's Drinking Water Standard was also considered.

The samples were taken using a single valve, decontaminated bailer, during the aquifer test program (prior to testing). The hydrocensus sample was collected from the pump discharge line.

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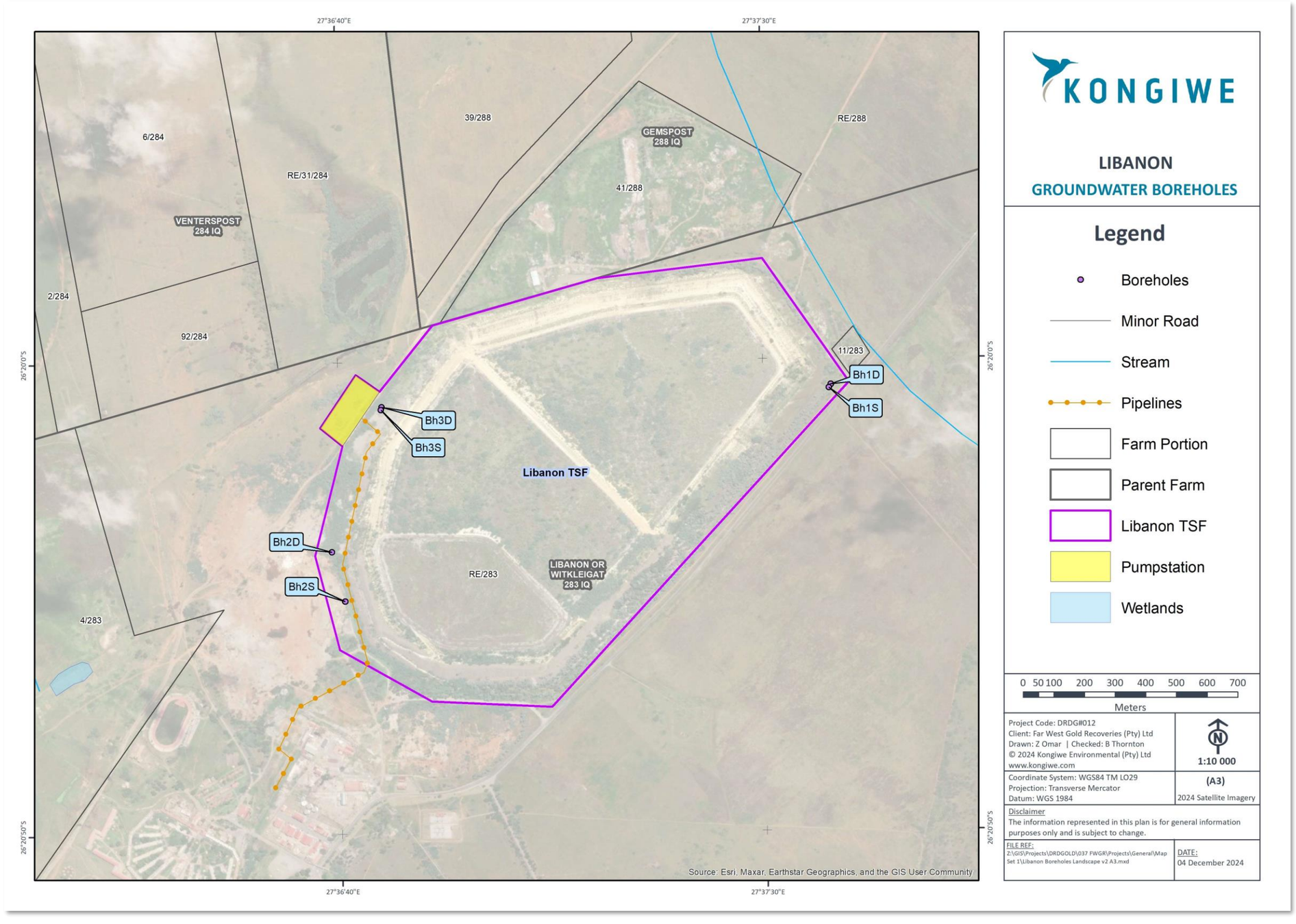


Figure 4-10: Groundwater borehole locations

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The water quality results are presented in Table 4-12 and the laboratory certificates are presented in the Groundwater Report (Appendix B). Refer to Figure 4-10 for borehole localities. Based on the water quality results the following conclusions were drawn (SANS 241:2015 comparison):

- Chronic Health effects:
  - Total Iron – The speciation of iron is also related to the pH and Eh of water. An elevated iron concentration (exceeding the chronic health limits) was recorded for borehole Lib-BH3s (7.62 mg/L), with the SANS limit set at 2 mg/L Table 4-12. The concentration of dissolved iron in water is also dependent on the occurrence of other heavy metals or could be related to the local Karoo and dolomite geology or leaching from the TSF. Borehole Lib-BH3s is on the downstream side (west) from Libanon TSF. The total iron concentrations were below the detection limit for the other two sampled sites.

  - Manganese – Manganese is a relatively abundant element, constituting approximately 0.1% of the earth's crust. Borehole Lib-BH3s measured a manganese concentration that could result in chronic health effects (22.2 mg/L) (Table 4-12). The health impact limit is set at 0.4 mg/L. Manganese tends to precipitate out of solution to form a black hydrated oxide which is responsible for staining problems.

    The manganese concentration could be related to the local Karoo and dolomite geology or leaching from the TSF. The manganese concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.

  - Sulphate – Sulphate forms salts with various cations such as potassium, sodium, calcium, magnesium, barium, lead and ammonium (DWAF, 1996). Sulphate is a common constituent of water and arises from the dissolution of mineral sulphates in soil and rock. Since most sulphates are soluble in water it tends to accumulate to progressively increasing concentrations. Contamination by sulphate is to be expected in waters contaminated by processing activities, due to the oxidation of sulphides in the ore and waste.

    Borehole Lib-BH3s exceeds the health guideline limits for sulphate with a measured concentration of 1623 mg/L. The health limit set at 500 mg/L) (Table 4-12).

    The sulphate concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.

  - Nickel – An elevated nickel concentration was recorded for Lib-BH3s (0.136 mg/L). The maximum SANS guideline health limit is 0.07 mg/L. The nickel concentrations were below the detection limit for the other two sampled sites.

  - Aesthetic / Operational effects:
    - Ammonium – The chemistry of ammonia is very complex, especially where transition metals are present in water, and while ammonia itself is of relatively low

toxicity, this is not necessarily the case for some of its organometallic complexes. Taste and odour complaints are likely to occur if the ammonia concentration exceeds 1.5 mg/L. High concentrations of ammonia can also give rise to nitrite, which is potentially toxic, especially to infants. The ammonium concentration for borehole Lib-BH3s exceeds the aesthetic limits for drinking water (13.0 mg/L) with the aesthetic limit set at 1.5 mg/L.

- Total hardness – Very hard total hardness values were measured at the two downstream boreholes at Libanon TSF – Lib-BH3s and Lib-BH3d. Scaling is likely to occur in water heating appliances.

The DWS uses a water classification system where the water is defined in different classes based on a fitness for use classification (refer to Table 4-11). The element concentrations are like the SANS guideline limits, but with the DWS system a classification is assigned to the water sample, e.g., Class 2 water.

Table 4-11: DWS water quality "fitness for use" classes

Water use	Categorisation	Description
Domestic	Class 0	Water of ideal quality, which has no health or aesthetic effects, and which is suitable for lifetime use without negative effects. No treatment necessary.
	Class 1	Water of good quality, suitable for lifetime use with few health effects. Aesthetic effects may be apparent. Home treatment will usually be sufficient.
	Class 2	Water which poses a definite risk of health effects, following long term or lifetime use. However, following short-term or emergency use, health effects are uncommon and unusual. Treatment will be required in order to render the water fit for continued use.
	Class 3	Water is unsuitable for use, especially by children and the elderly, as health effects are common. Conventional or advanced treatment necessary

Based on the DWS classification system, the sampled water is categorized as:

- Hydrocensus borehole Lib 1 – Class 0 water (Water of ideal quality).
- Libanon TSF Downstream borehole Lib-BH3s – Class 4 water (water is unsuitable for use) due to the sulphate and manganese concentrations and then Class 3 (water is unsuitable for use) due to the total iron concentration.
- Libanon TSF Downstream borehole Lib-BH3d – Class 1 (Water of good quality) due to the Total Hardness, and the calcium and fluoride concentrations. The rest of the parameters measured were in the Class 0 range.

The chemicals of concern for the Libanon TSF project area, associated with the recent sampled results are Manganese, Iron, Sulphate and Nickel (Groundwater Abstract , 2024). Based on the SANS241 drinking water guidelines and on the sampled water results, the groundwater from borehole Lib-BH3s is not fit for human consumption (unless treated).

A groundwater study by Rösner et al, 1998 (WRC Report K5/797/0/1) (as cited in Groundwater Abstract, 2024) concluded that groundwater near tailings dams is affected by salt loads. The groundwater quality

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improved with increasing distance down gradient from the pollution source, mainly because of dilution and solid speciation. Once contaminants have migrated through the unsaturated zone, into the groundwater zone, the rate of lateral movement increases by orders of magnitude. The implication of this is that although there is a dilution effect because of contact with groundwater, the potential impact on the environment is extended in a spatial and temporal sense.

A TSF can potentially add sulphate, iron, chloride, calcium, magnesium, manganese and aluminium to the local groundwater system, if the management of contaminated water on site is not effective, but also through seepage to the underlaying aquifers. Metals like cobalt, copper, nickel and zinc are often elevated. In general, sulphate concentrations around the tailings complexes vary between 417 and 4700 mg/L.

The pyrite present in the tailings and sand material is oxidised in the presence of oxygen and water to form ferrous sulphate and sulphuric acid. Both reactions result in an acidic pH, and high sulphate and metal concentrations, leading to Acid Mine Drainage; often measured in leachate from these TSFs. The rate at which pyrite oxidation takes place within the TSF varies and decreases with depth. The addition of lime during the gold recovery process raises the pH to neutral conditions when tailings are deposited on the facilities. Negative quality impacts are expected when the material is disturbed again and exposed to oxygen and water.

Libanon TSF is surrounded by mining, residential and agricultural areas. Many pollution sources (mining activities and poor waste and sanitation management) can contribute to groundwater contamination. It will be difficult to define the contaminants and concentration at all point sources in the area.

4.6.7 Date and season of the Investigation

The hydrocensus was completed during August 2024 during the dry, winter season in Gauteng. The 2024 fieldwork programme was completed between October and November 2024, which represents the end of the dry season conditions.

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Table 4-12: Groundwater quality (Groundwater Abstract , 2024)

	DWS Drinking Water Guideline Limits					SANS241:2015 Drinking Water Standard Limits		LIB 1	Lib-BH3s	Lib-BH3d
	Class 0	Class 1	Class 2	Class 3	Class 4	Aesthetic effects	Chronic health effects			
pH	5-9.5	*4.5-5 or 9.5-10*	4-4.5 or 10-10. 5	3-4 or 10.5-11	<3 or >11	≥5 to ≤9.7		6.92	6,24	8,28
Electrical Conductivity	<70	*70-150*	150-370	370-520	>520	Aesthetic ≤170		3.48	**317**	54,8
TDS	<450	*450-1000*	1000-2400	2400-3400	>3400	Aesthetic ≤1200		30.0	**2644**	318
Total Alkalinity								3.30	65,7	219
Bicarbonate Alk.								3.29	65,7	215
Total Hardness	<200	*200-300*	300-600	>600		more than 180 mg/l, very hard		7	**1489**	**276**
Total Nitrogen								1.41	27,2	1,18
Total Kjeldahl Nitrogen								<0.5	26,2	<0,5
Total oxidised nitrogen								1.41	0,996	1,12
Aluminium		*0 - 0,15*	0,15 - 0,5	>0,5		Operational ≤ 0,30		<0.002	<0.002	<0.002
Arsenic	<0,01	*0,01-0,05*	0,05-0,2	0,2-2	>2		Chronic health ≤0,01	<0.006	<0.006	<0.006
Calcium	<80	*80-150*	150-300	>300				0.92	**269**	**42,4**
Copper	<1	*1-1,3*	1,3-2	2-15	>15		Chronic health ≤2	<0.002	<0.002	<0.002
Total Iron	<0,5	*0,5-1*	1-5	5-10	>10	Aesthetic ≤0,3	Chronic health ≤2	<0.004	**7,62**	<0,004
Magnesium	<70	*70-100*	100-200	200-400	>400			1.14	**198**	41,2
Manganese	<0,1	*0,1-0,4*	0,4-4	4-10	>10	Aesthetic ≤0,1	Chronic health ≤0,4	<0.001	**22,2**	0,017
Potassium	<25	*25-50*	50-100	100-500	>500			<0.015	16,8	2,69
Sodium	<100	*100-200*	200-400	400-1000	>1000	Aesthetic ≤200		2.48	**181**	12,7
Chloride	<100	*100-200*	200-600	600-1200	>1200	Aesthetic ≤300		1.92	**275**	33
Fluoride	<0,7	*0,7-1*	1-1,5	1,5-3,5	>3,5		Chronic health ≤1,5	<0.263	0,635	**0,845**
Ammonium						Aesthetic ≤1,5		<0.008	13	0,059
Un-ionized Ammonia	0 - 1	*1 - 2*	2 - 10	>10				<0.005	0,012	0,006
Nitrate	<6	*6 - 10*	10 - 20	20-40	>40		Acute health ≤11	1.40	0,938	1,1
Nitrite							Acute health ≤0,9	<0.065	<0,065	<0,065

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	DWS Drinking Water Guideline Limits					SANS241:2015 Drinking Water Standard Limits		LIB 1	Lib-BH3s	Lib-BH3d
	Class 0	Class 1	Class 2	Class 3	Class 4	Aesthetic effects	Chronic health effects			
Total organic carbon	<5	5 - 10	10 - 20	>20			Chronic health ≤10	1.67	3,21	2,2
Ortho Phosphate as P								0.332	<0,009	<0,009
Sulphate	<200	200-400	400-600	600-1000	>1000	Aesthetic ≤250	Acute health ≤500	<0.141	1623	38,7
Cadmium							Chronic health ≤0.003	<0.002	0,003	<0,002
Total Chrome	0 - 0,05		0,05 - 1	1 - 5	>5		Chronic health ≤0,05	<0.01	<0.01	<0.01
Nickel							Chronic health ≤0.07	<0.002	0,136	<0,002
Cobalt								<0.003	0,483	<0,003
Selenium							Chronic health ≤0.04	<0.002	<0,002	0,004
Uranium							Chronic health ≤0.03	<0.015	<0.015	<0.015
Zinc	0 - 5	5 - 10	10 - 50	50 - 700	>700	Aesthetic ≤5		<0.002	<0.002	<0.002
Boron							Chronic health ≤2.4	<0.013	<0.013	<0.013
Barium							Chronic health ≤0.7	<0.002	0,024	0,056
Beryllium								<0.005	<0.005	<0.005
Molybdenum								<0.004	0,223	0,073
Strontium								<0.007	1,21	0,082
Tungsten								<0.000001	0,0431	<0.000001
							DWS Classification	0	4	1

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4.6.8 Acid Generation Capacity

The potential for risk of AMD resulting in increased heavy metal and sulphate concentrations in local surface water and groundwater was flagged as a risk in the Scoping Report for the Proposed Project (Kongiwe, 2024 as cited in Groundwater Abstract, 2024). It is thought that the risk of AMD would specifically be influenced if runoff from the TSF reclamation operations is not adequately managed through efficient stormwater management structures. To assess this risk, a comparison between electrical conductivity (EC) and pH in the three available groundwater samples was made and is presented in Figure 4-11. EC is an indication of the ability of water to conduct electrical current in the presence of dissolved ions. High EC indicates elevated ion and by comparison salt content in the water and hence contamination. Also shown in Figure 4-11 are the SANS241:2015 drinking water standards for pH (>5; <9.7) and EC (170mS/m) for comparison.

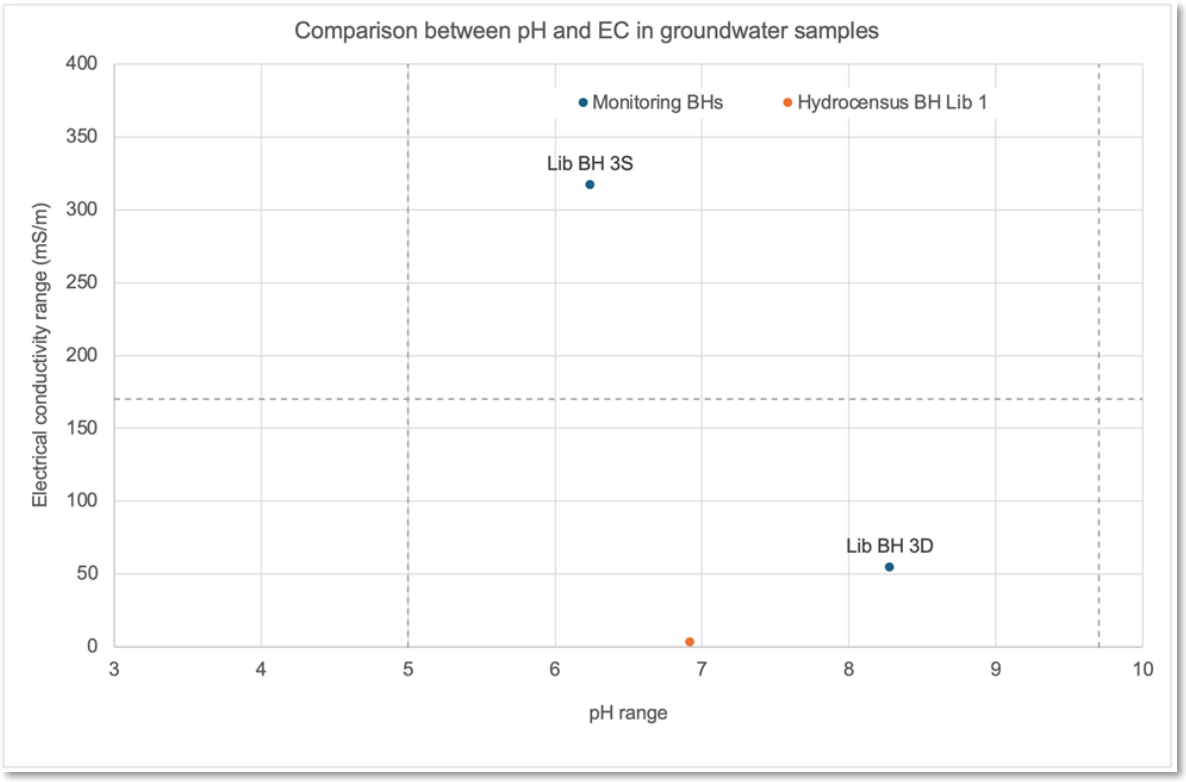


Figure 4-11: Comparison between pH and EC in groundwater samples

The results indicate that the hydrocensus borehole (Lib 1) and the deep monitoring borehole sampled at the Libanon TSF footprint (Lib BH3d) have good quality water with neutral to alkaline pH conditions and low dissolved salt content. The pH conditions are controlled by the effect of the dolomitic aquifer, which is alkaline in geochemical composition, on groundwater quality. The data suggests that groundwater not affected by tailings deposition has a low risk of acidification.

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Borehole Lib BH3s, the shallow borehole located northwest of the Libanon TSF indicates the impact of the facility on groundwater quality. This borehole has a slightly acidic pH, but elevated dissolved salts. Groundwater quality pertaining to the modelling presented in this report are discussed later.

The information presented above are based on groundwater quality data and not acid base accounting of the tailings material. It is however noted that reclamation of the TSF will remove the potential source of acidification.

4.6.9 Hydrogeological Conceptualisation

4.6.9.1 Unsaturated Zone

The depth to groundwater in this area is deep because the dolomitic aquifer is largely dewatered in the Venterspost Compartment. Jones & Wagener (2013) (as cited in Groundwater Abstract, 2024) reports that the groundwater table in the dewatered compartments are more than 100m below surface. The unsaturated zone on a regional scale therefore comprises of residual dolomite (wad) and weathered Karoo sediments located in deep solution cavities or grykes to relatively fresh fractured dolomite pinnacles between major solution cavities that extend to depth. It is further reported that the lag between rainfall events and a response in groundwater levels is between 12 and 18 months. This suggests that rainwater does percolate through the unsaturated zone towards the deeper regional groundwater table in the dewatered compartments.

The field data obtained from the newly drilled monitoring boreholes indicates that the weathered dolomitic aquifer underneath the Libanon TSF footprint is largely dewatered.

Field data from the three sets of shallow and deep monitoring boreholes confirms that the weathered dolomitic aquifer is dewatered to a depth of at least 60m east and west of the Libanon TSF. Both the shallow and deep boreholes (Lib BH1 and Lib BH2) in these positions were dry. A dewatered dolomitic cavity was intersected from approximately 48m below surface in Lib-BH1d. Above the cavity, thick residual dolomite (wad) is present to at least a depth of 30 m below surface. The drilling logs for Lib-BH2d does not indicate the presence of a cavity, but thick residual dolomite (wad) was intersected to a depth of at least 35 m in this area. It is likely that these boreholes were drilled into a gryke structure.

The groundwater table in Lib-BH3d is deeper than 70m below surface. Residual dolomite is present to a depth of around 30m in this borehole, but fresh dolomite was intersected below this depth. It is likely that Lib-BH3d and Lib-BH3s are in a pinnacle of fresh dolomite located between grykes that is associated with the Venterspost Dyke. Borehole Lib-BH3d is situated on the eastern side of the Venterspost Dyke and therefore possibly within the Bank Compartment rather than the Venterspost Compartment. The Bank Compartment is not as significantly dewatered along its eastern edge (see Figure 4-13). It is unfortunately impossible to accurately estimate the regional extent of the gryke and fresh dolomitic pinnacle underneath the Libanon TSF. The gravity survey completed by the Council for Geoscience over the dolomitic aquifer (see Figure 4-3 (Jones & Wagener, 2013)) was used to estimate these to some extent. To do this, the major grykes (blue shaded area) were traced as best possible and the remaining areas were assumed to be fresh

dolomite pinnacles and the outcome of this is presented in Figure 4-12. It is shown that the major grykes are orientated roughly parallel to the main compartment-forming dykes and post-Transvaal faults. The hydraulic conductivity (permeability) of the residual dolomites intersected in the new monitoring boreholes is discussed in Section 4.6.9.

4.6.9.2 Saturated Zone

The information that will be used to characterise the local and regional dolomitic aquifer characteristics was inferred from the newly drilled monitoring boreholes around the Libanon TSF as well as from published information for Kloof Mine. The following aquifers are present:

- Weathered dolomitic aquifer: This aquifer was formed as a result of karstification. This happens when rainwater containing carbon dioxide taken up from the atmosphere (and which forms a weak acid) infiltrates along fractures, faults and joints in the dolomite. The weak acid leaches the carbonate minerals creating residual dolomite, wad, grykes and cavities. During the dissolution process, residues such as silica as well as manganese oxides and hydroxides remain behind, often forming thick brown to orange clay, referred to as wad. Karstification is further characterised by sinkholes and cavities, which are often filled with groundwater where the dolomitic compartments are not dewatered. Fault zones facilitate preferential weathering and create preferential flow conduits to groundwater. The vertical extent of the weathering is mostly controlled by the lithostratigraphy but is generally accepted that the base of the dolomite on average about 200 m below surface regionally. The aquifer comprises an extensive cover of residual solution debris and in places younger Karoo sediments. Karstification is however irregular and highly heterogeneous with hydraulic conditions varying from phreatic to confined, as indicated by the gravity survey presented in Figure 4 and its interpretation in Figure 7. There is general agreement that the weathered dolomitic aquifer is the significant source of water within the dolomites (Jones & Wagener, 2013). The Venterspost dolomitic compartment has however been largely dewatered, as discussed above. The depth of weathering underneath the Libanon TSF is at least 30 meters below surface and the groundwater table fluctuates significantly over short distances.
- Fractured dolomitic aquifer: It is anticipated that groundwater occurrence in fresh dolomite will mainly be along fractures and faults, similar to a fractured rock aquifer. At depth karstification will be less pronounced. The fractured aquifer is finely crystalline with little primary porosity. Due to this, the fractured dolomitic aquifer is expected to yield significantly less groundwater compared to the weathered dolomite. It is thought that the comparatively low storage capacity of this aquifer has led to the relatively rapid dewatering of the Venterspost Compartment (Jones & Wagener, 2013). Based on the information presented above, it will be assumed that this aquifer is present at an average depth of below 200 m below surface.
- Fractured Transvaal strata aquifer: This aquifer is located south of the Libanon TSF and is associated with the Hekpoort lavas and Timeball Hill, Strubenkop and Silverton shale (see Figure 3). Jones & Wagener (2013) reports that this aquifer is not hydraulically connected and act independently of the dolomitic aquifers. In addition, this aquifer will not affect groundwater conditions at the Libanon TSF, which is located on the weathered dolomitic aquifers.

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In addition, this aquifer will not affect groundwater conditions at the Libanon TSF, which is located on the weathered dolomitic aquifer.

4.6.9.3 Hydraulic Conductivity and Transmissivity of the Aquifers

The aquifer transmissivities and hydraulic conductivities obtained from the field testing are summarised in Table 4-13. The availability of field measured aquifer parameters allows for the development of a site-specific groundwater model, which improves the confidence in the outcome of the simulations presented in this report. This data also enables more accurate conceptualisation of the geological and geohydrological features that will affect the outcome of the impact predictions presented in this report in this complex geological setting.

It is shown that the permeabilities of the residual dolomite are very low, on average 9.93E-4 m/d and varying between 1.4E-4 and 2.5E-3 m/d. All three boreholes on which tests could be completed were dry with residual dolomite extending at least to an average depth of 26 m.

Aquifer tests could only be completed on boreholes Lib-BH3s and Lib-BH3d. During the tests, the shallow borehole was pumped drying within 16 minutes at a rate of 0.18 L/s (648 L/hr) but recovered by 81% in 20 hours. The deep borehole was pumped dry in 40 minutes at a rate of 0.03 L/s (108 L/hr) and only recovered by 6% in 3 hours. This suggests that the residual dolomite underneath the Libanon TSF has a very low yield, but that some groundwater seeps into the comparatively fresh dolomite pinnacle in this position over time, thus recharging the aquifer. This groundwater probably originates from within the lateral extent of the dolomite pinnacle and is stored in what is perceived to be significant storage capacity contained in secondary porosity as a result of karstification of the weathered dolomite. Borehole yields calculated from the field data vary between 0.01 and 0.03 L/s, which is well below the regional dolomitic aquifer average of 5 L/s.

Table 4-13: Summary of site-specific aquifer parameters obtained from field data

Borehole ID	Lib BH1d	Lib BH1s	Lib BH2d	Lib BH2s	Lib BH3d	Lib BH3s
Borehole Depth (m)	60*	30	50*	18*	80	30
Static Water Level (m bgl)	Dry	Dry	Dry	Dry	71.17	20.87
Aquifer test transmissivity (m2/d)	-	-	-	-	0.1 – 0.5	0.5 – 0.9
Slug test permeability (m/d)		3E-4 - 5.7E-4	2.1E-3 - 2.5E-3	1.4E-4 - 3.5E-3		
Possible borehole yield (L/s)					0.01	0.03

In addition to the site-specific data, regional aquifer parameters are available from Jones & Wagener (2013) (as cited in Groundwater Abstract, 2024). Regional aquifers present and information available for these are listed in Table 4-14. The incorporation of regional aquifer parameters allows for the integration of the regional hydrogeology with more accuracy during simulations.

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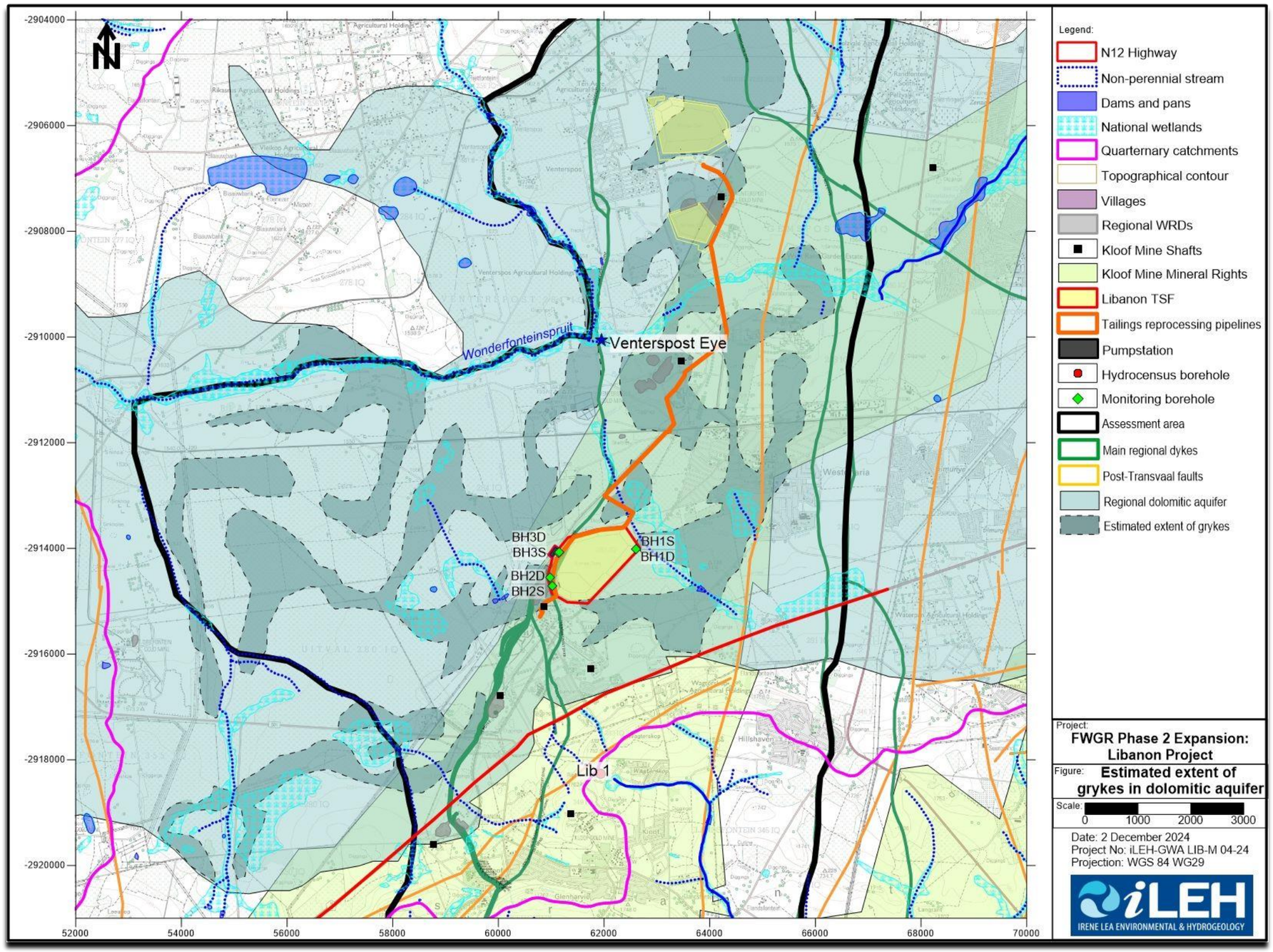


Figure 4-12: Estimated extent of grykes in the weathered dolomitic aquifer

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Table 4-14: Literature-based aquifer parameters used to conceptualise regional aquifers (Groundwater Abstract , 2024)

Aquifer	Horizontal permeability (m/d) or Transmissivity (m2/d)	Porosity %)	Recharge rate (% of MAP)	Source
Weathered dolomite	Dyke contact: 0.02m/d Dyke contact: 0.75m2/d Maximum: 1000m2/d Average: 30m/d Oaktree Fm: 12m/d Monte Christo Fm: 40m/d	10	Venterspost Compartment: 8.5 – 27 Dolomitic aquifer: 12.7%	Jones & Wagener (2013)
Fractured dolomite	100m2/d Average: 1m/d	0.1%		
Weathered Karoo	0.6			
Fractured Transvaal	1	6		

4.6.9.4 Groundwater Levels

The Venterspost Compartment is dewatered, mainly from the Kloof Mine (Groundwater Abstract , 2024). It is reported that the Celemanzi (Kloof No 10) Shaft pumps around 40 ML/d to maintain underground water levels at a depth that would enable regional gold mining in other mining areas. Groundwater levels in the various compartments are demonstrated in the schematic cross section in Figure 4-13 (from Jones & Wagener, 2013 as cited in Groundwater Abstract, 2024). Groundwater level data from the 1950's to the 1980's suggest a decline of between 80m and 120m in the water table in the weathered dolomitic aquifer underneath the Libanon TSF (Groundwater Abstract , 2024). It is estimated that the groundwater level in this compartment is around 1400mamsl based on Figure 4-13. This means the depth to the regional groundwater table is more than 100m below surface at the project location.

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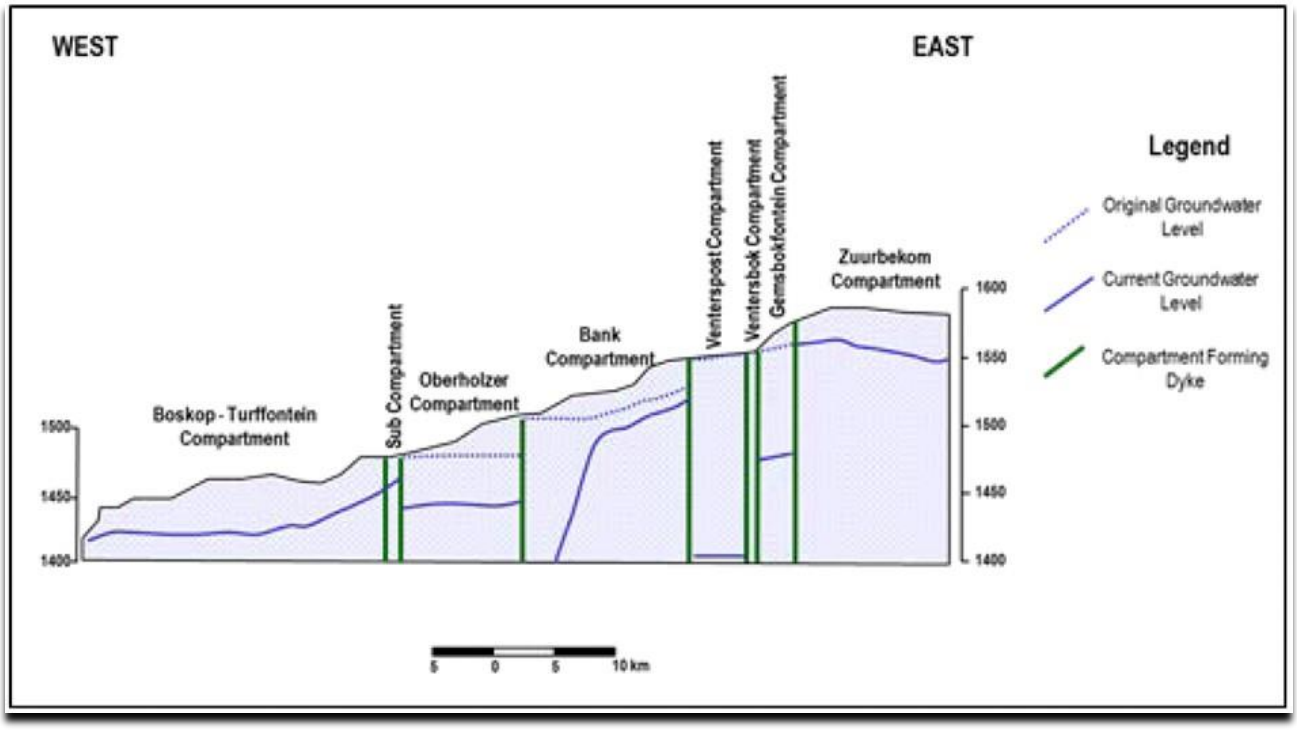


Figure 4-13: Schematic cross section showing groundwater levels in the dolomitic compartments (Groundwater Abstract , 2024)

As discussed above and below, on a local scale perched aquifer conditions are expected in the residual dolomite, as rainwater percolates into the karstified aquifer.

Information presented in Jones & Wagener (2013) (as cited in Groundwater Abstract, 2024) indicates that there is a 77% correlation between groundwater level and topographical elevations in the weathered dolomitic aquifer. If this correlation is high, it implies that groundwater flow patterns follow the topography and that groundwater discharges to local rivers and streams as baseflow. The 77% correlation suggests that there is still some relationship between groundwater elevation and topography in the weathered dolomitic aquifer, but that dewatering has lowered groundwater levels significantly in places, thus skewing this correlation. In comparison for example, the correlation between groundwater and topographical elevation in the Transvaal fractured aquifer to the south is 98%.

The Venterspost Eye is located north of the Libanon TSF. This eye is currently dry due to the dewatering of the compartment. In pre-mining conditions, the natural fountains formed where groundwater decanted from one dolomitic compartment to the next at the lowest topographical elevation. These eyes formed where the compartmentalising dykes pushes groundwater to surface, in the case of the Venterspost Eye, the Venterspost Dyke.

The dewatering of the compartment affects groundwater levels in the weathered dolomitic aquifer. Field data shows that the aquifer is largely dewatered at the Libanon TSF footprint. All but two of the boreholes

drilled were dry. As discussed earlier, it is thought that the dry boreholes are in grykes that could be delineated to some extent from the gravity survey completed by the Council for Geoscience.

The set of shallow and deep boreholes that contained some groundwater are located on a comparatively fresh dolomitic pinnacle, based on the gravity survey, which is probably associated with the position of the Venterspost Dyke. In the deep borehole, the groundwater level is deeper than 70m below surface, reflecting the regional impact of the dewatered compartment. The fact that a groundwater level could be measured in this position probably attributed to the percolation of rainwater into the dolomitic pinnacle and the presence of increased porosity to facilitate storage of this groundwater.

In the shallow borehole, the depth to groundwater is around 20 m, which also suggests percolation of rainwater from surface as well as infiltration from the Libanon TSF that is retarded in the vertical flow direction by the presence of the thick wad. This groundwater probably sits on a pocket of low permeability wad as a perched aquifer near surface.

A groundwater level could not be measured in the hydrocensus borehole Lib 1 as it was welded shut.

With only two groundwater level measurements in one location, it is not possible to generate a groundwater flow map for the Libanon TSF. Groundwater is however expected to regionally flow with the topography in a northeasterly direction towards the Wonderfonteinspruit. Groundwater will also flow vertically down to the regional groundwater table controlled by the dewatering of the compartment.

On a local scale, the presence of shallow groundwater conditions and groundwater flow will be influenced by the presence of dolomitic grykes and pinnacles, the rate of recharge of rainwater, the presence of zones of increase porosity and the vertical retardation of groundwater flow because of the presence of thick zones of wad. This is expected to be a highly irregular pattern, which is difficult to accurately estimate. For this assessment, the extent of the dolomitic grykes and pinnacles as delineated in Figure 7, will be used to approximate this irregular pattern.

4.6.10 Groundwater Potential Contaminants

To identify the potential contaminants to groundwater for this impact assessment, a comparison between major cations, anions, as well as trace metal concentrations for the three boreholes sampled is presented in Figure 4-14. Impacts on groundwater quality associated with the Libanon TSF is demonstrated by groundwater quality information for borehole Lib-BH3s.

In terms of major cations and anions, sulphate is by far the most significant element of concern, with a concentration of above 1500 mg/l for Lib-BH3s. Elevated sulphate concentrations are typical of the impact of gold tailings on groundwater quality, as it is a product of sulphide oxidation.

In terms of metals, manganese and iron concentrations are significantly elevated. Manganese concentrations exceeding 20 mg/L are probably more reflective of the geochemical character of the residual dolomite (wad) than the impact of the Libanon TSF on groundwater quality. Manganese is one of

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the byproducts of dolomite dissolution, as discussed earlier. Iron is also to some extent a byproduct of dolomite dissolution, but it is also a characteristic element of the oxidation of sulphide minerals. For this reason, sulphate and iron will be used as the two indicator elements for this impact assessment.

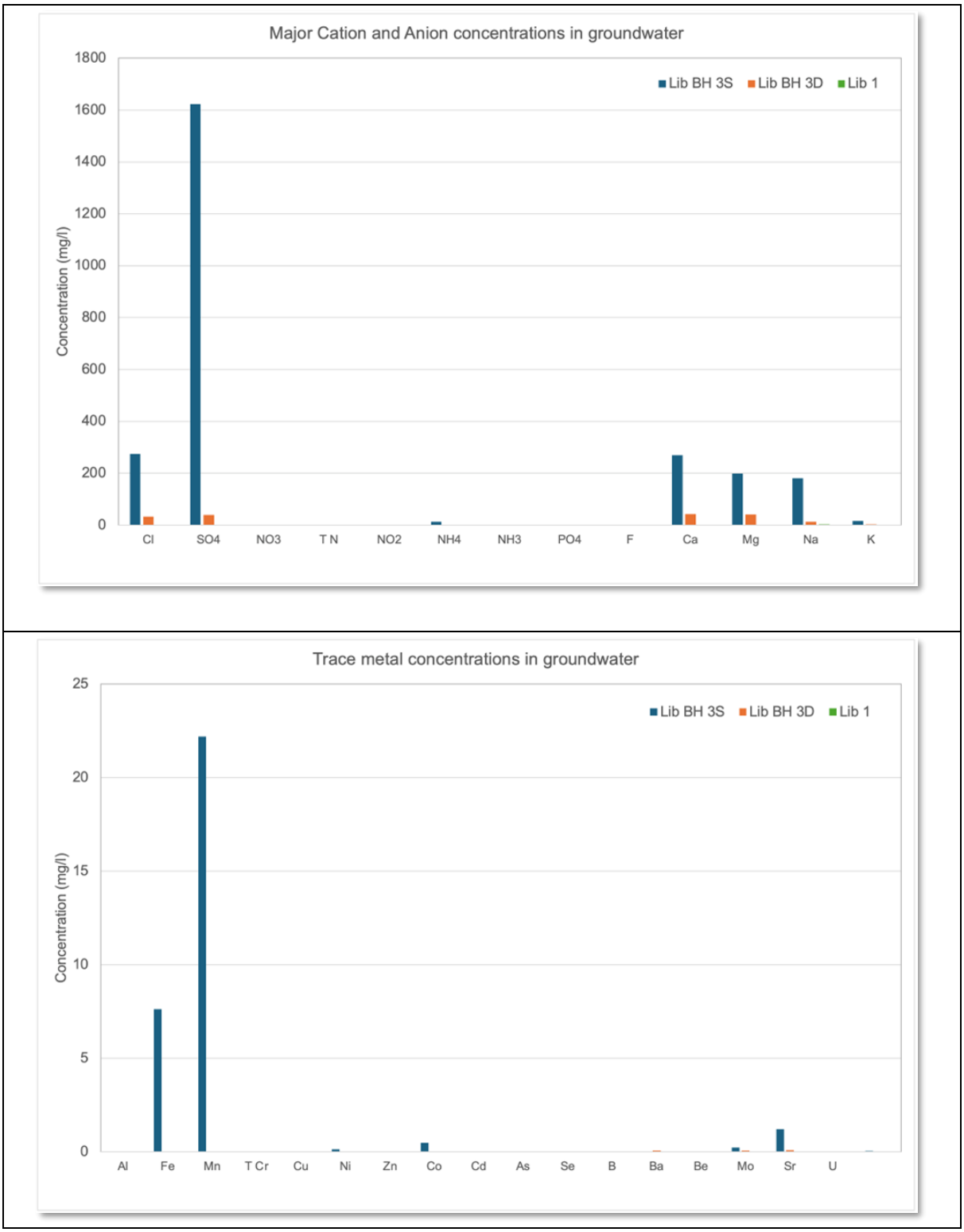


Figure 4-14: Comparison of major and trace elements in groundwater

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The concentrations of iron and sulphate are compared to pH and Electrical conductivity levels in groundwater in Table 4-15. This information will be used to formulate the source term for the project.

Table 4-15: Concentrations of indicator element in groundwater (Groundwater Abstract , 2024)

Element	pH	Electrical Conductivity (mS/m)	Iron (mg/L)	Sulphate (mg/L)
SANS241:2015 Drinking Water Standard	**5.0 - 9.7**	**170**	**0.3 - 2**	**250 - 500**
Lib1	6,92	3	0,004	0
Lib BH2S	6,24	317	7,620	1623
Lib BH3D	8,28	55	0,004	39

4.6.11 Groundwater Modelling

The objectives of the numerical modelling presented are based on the requirements of the IWULA requirements. The following objectives are therefore reported:

- Estimate the impact of the proposed Libanon TSF Reclamation Project at the end of the construction and operational phases of the project on groundwater quality. No significant impacts on groundwater levels are expected;
- Predict the long-term impact of the project on groundwater quality post closure and rehabilitation.
- Evaluate the effect that tailings removal and footprint rehabilitation would have on groundwater quality;
- Develop a groundwater monitoring program based on the outcome of the impact prediction study; and
- Develop a groundwater management program geared at reducing the impacts on groundwater quality identified.

4.6.11.1 Model Construction

The numerical modelling was undertaken according to accepted industry principles and standards, including the South African Department of Water and Sanitation's Best Practice Guideline for Impact Prediction (DWS BPG G4, 2008) (Groundwater Abstract , 2024).

The numerical model for the project was constructed using MODFLOW and MT3DS. MODFLOW is a modular three-dimensional groundwater flow model and MT3DS a modular three-dimensional solute transport model published by the United States Geological Survey (USGS). MODFLOW and MT3DS use finite difference discretisation and flow codes to solve the governing equations. MODFLOW and MT3DS are a widely used simulation codes, which are well documented.

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MODFLOW is used to simulate groundwater flow rate and direction. MT3DS is superimposed on the MODFLOW simulation results and is used to predict the rate and direction of contaminant movement in the aquifers.

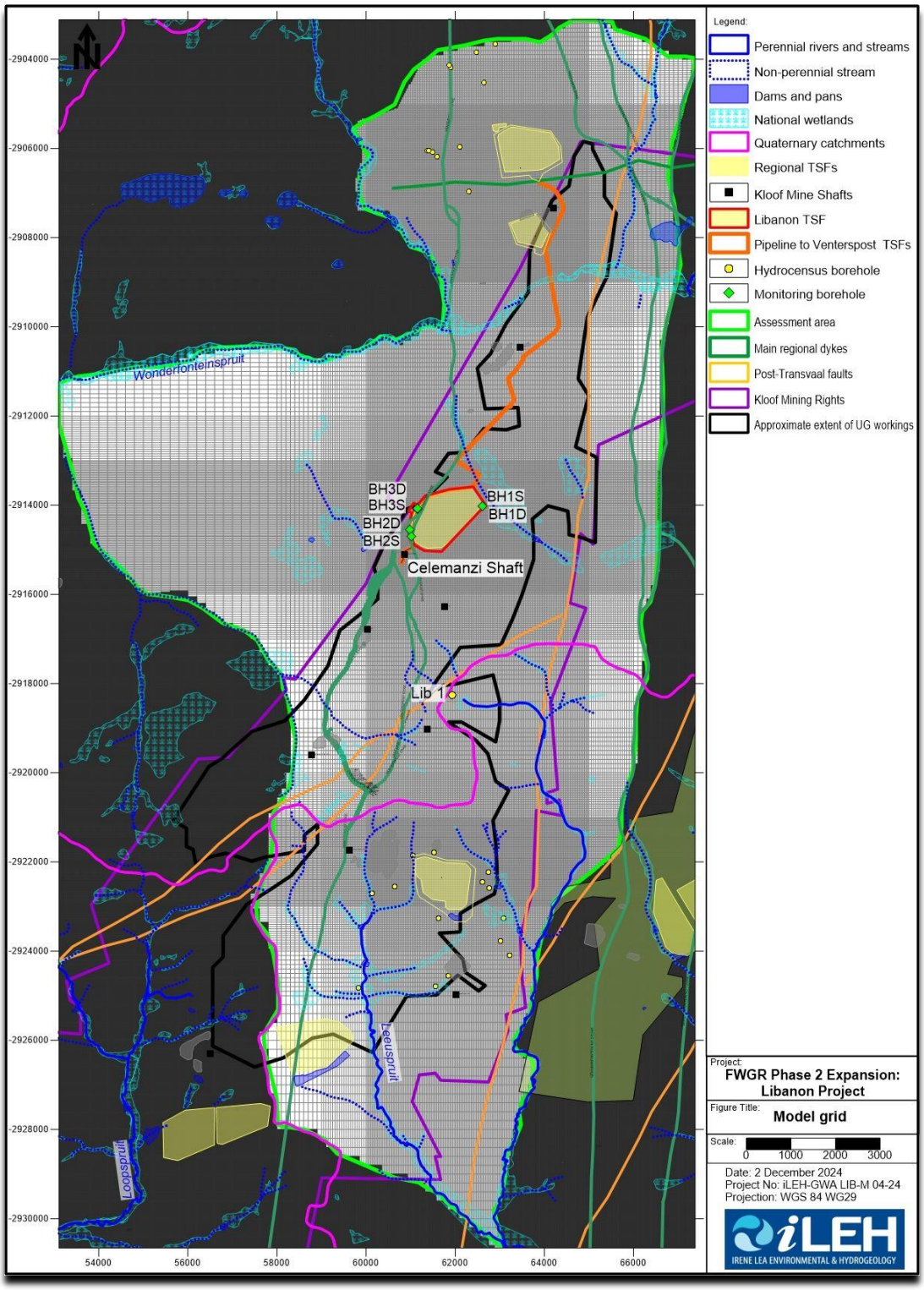


Figure 4-15: Model grid

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4.6.11.2 Groundwater Elevation and Gradient

The 2024 measured groundwater water levels in regional hydrocensus boreholes as well as the newly drilled monitoring boreholes were used to calibrate the model for this assessment. The locations of these boreholes are indicated on Figure 4-15. It is noted that the dolomitic aquifer is largely dewatered in the Venterspost Compartment. This complicates the numerical modelling process, as dry layers can lead to unstable modelling conditions. To mitigate this, pre-mining groundwater levels were generated as the starting water levels for the assessment area. This information was inferred from Jones & Wagener (2013) (as cited in Groundwater Abstract, 2024).

During simulations, the dewatering of the dolomitic aquifer was calibrated through adjustments and water balance calculations to match the reported dewatering rate of 40 ML/d. This is discussed in more detail below. The extent of the underground workings was inferred from maps presented in Jones & Wagener (2013) (as cited in Groundwater Abstract, 2024) as indicated on Figure 4-15, which indicates that the Libanon TSF is undermined at depth.

4.6.11.3 Conceptual Groundwater Model

The parameters that will be used during groundwater modelling, as derived from field data, assumed or obtained from literature, are presented in Table 4-16 and Table 4-17. These will be used as a starting point during model calibration for this phase of the project and will be adjusted to minimise the model calibration error, as discussed below.

4.6.11.4 Numerical Model

The conceptual model discussed above was used to construct the numerical model for the project area. Aquifer parameters from the existing dataset were gradually adjusted during calibration, as discussed below, to enable a model representative of measured and observed conditions within the general constraints of numerical modelling. A numerical model approximates the real system based on aquifer conceptualisation. The level of accuracy depends on the data available, however groundwater models are inherently prone to uncertainty as it is not possible or practical to obtain field data for every aquifer variation that affects groundwater flow and contaminant movement in the aquifers. The field data set indicates a complex hydrogeological setting with significant variations in groundwater levels and aquifer conditions over very short distances superimposed on a regionally dewatered dolomitic aquifer. The occurrence and movement of groundwater will therefore be controlled by a complex set of factors, which were integrated into the model as best possible within the considerable time constraint under which this project had to be completed.

The geometry of the numerical model is based on the conceptualisation of the aquifers and on the regional geological setting. The geological formations are included as discrete zones in the model, as discussed above. This includes the regional dykes and faults that control groundwater availability in the compartment.

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The topographical surface was interpolated from the Digital Terrain Model (DTM) and incorporated into the model to ensure that the elevations of the mechanisms used to simulate the streams reflect actual topography as best possible.

The initial water levels in the model layers were kriged from available information, including field measurements, pre-mining groundwater level conditions and the DTM.

During contaminant transport modelling it was assumed that horizontal and vertical transverse dispersivity is 0.01. The effective molecular diffusion coefficient is 8,64E-5 m^2/d and the longitudinal dispersivity is 50 m. The latter was calculated using the empirical equation developed by Neuman (1990) for the average travel distance of groundwater in this setting.

No chemical reaction was taken into consideration during simulations. As such the contaminant transport simulations are conservative and will therefore represent maximum anticipated travel distances for the plumes that are governed only by the groundwater flow rates. This approach complies with the principles of the precautionary principle.

The timelines considered during modelling are presented in Table 16. No detailed information is available to accurately reflect historical tailings deposition. Some of the dates are therefore assumptions. These are indicated with an asterisk (*).

Table 4-16: Assumed timeline used during simulations (Groundwater Abstract , 2024)

Simulation period	Start date	End date	Time (years)	Description
1	1934	2000's*	>65 years	Historical operational phase
2	1955	Present day	70	Compartment dewatering phase
3	2025	2026	1	FWGR ramp-up period
4	2027	2039	10	FWGR operational period
5	2040	2041	1	FWGR ramp down and rehabilitation period
6	2042	2142	100	Long-term simulation

4.6.11.5 Calibration Results

Calibration of a numerical model refers to the demonstration that the model is capable of reproducing field-measured data, which are the calibration values. Calibration is achieved when a set of parameters, boundary conditions, source terms and stresses are found that produce simulated heads and concentrations that match field measured data within the calibration criteria set for the project. This is an important step in the modelling project, which ensures that model results are reliable.

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Calibration was completed with groundwater level measurements in boreholes identified as part of the regional hydrocensus as well as those obtained from the newly drilled monitoring boreholes. The calibration criteria set for the project are presented in Table 4-17. The complexity of the model setup and the fact that the dolomitic aquifer is dewatered during simulations were taken into consideration in the calibration criteria. These conditions complicate numerical modelling, as discussed earlier.

Table 4-17: Calibration Criteria

Requirement	Acceptability criteria	Compliance
Model convergence	Maximum change in head of 0,1 m	Complied with (see discussion below)
Water balance	Difference between inflow and outflow <1%	Complied with (see discussion below)
Root Mean Square Error	<8 m for targets	Complied with (see discussion below)
Calibration error	At least 80% of targets with <8 m error between simulated and measured head	Complied with (see discussion below)

The calibrated groundwater levels for the residual (shallow groundwater levels) and weathered dolomitic (deeper groundwater levels) aquifers are presented in Figure 4-16 and Figure 4-17. Areas where no contours are drawn indicated sections of the dolomitic aquifer that is dewatered. The contours are based on the conceptual model, including the anticipated groundwater flow in dolomitic grykes and pinnacles. As shown, groundwater flow patterns are irregular and vary significantly over short distances. This complicates the calibration process, especially within the significant time constraints in which to complete this project. The contours presented in Figure 4-16 and Figure 4-17 are however reflective of field measured groundwater levels and are therefore considered sufficient to complete this impact assessment.

The results of the model calibration process are presented in Figure 4-18 and Table 4-18. It is shown that the calibration error (the difference between measured and simulated head) is less than 8 m for all but 4 of the groundwater levels measured in the hydrocensus boreholes. This provides a calibration error target of 80%, which complies with the calibration criteria. This calibration error can be improved if more time is available to spend on model calibration. The sum of the residuals is -18.3 m, which suggests that the model slightly over-estimates groundwater levels. This can be improved by including the impact of dewatering on the Ventersdorp Compartment with more accuracy with more time available to do so.

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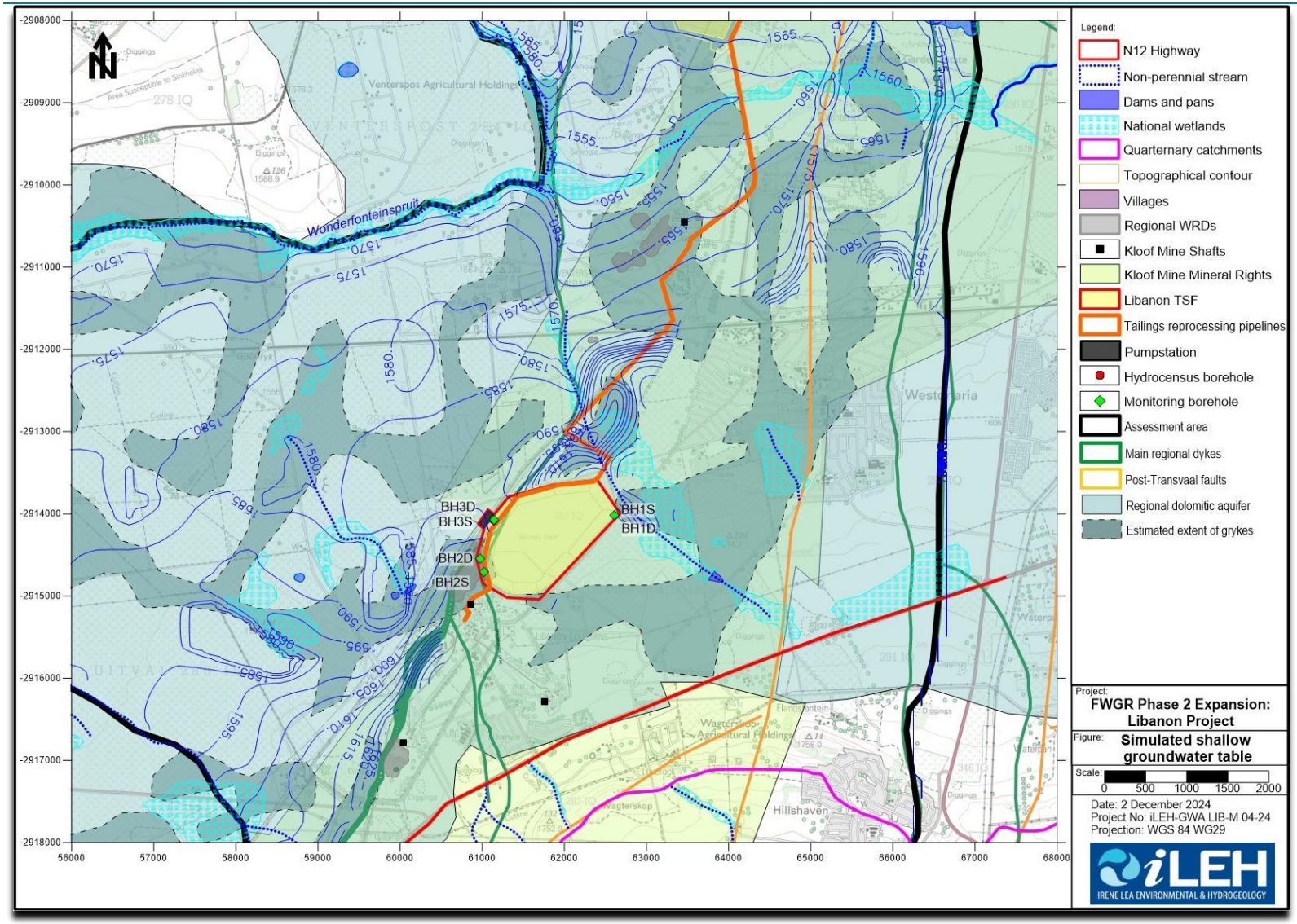


Figure 4-16: Calibrated groundwater levels in the residual dolomitic aquifer

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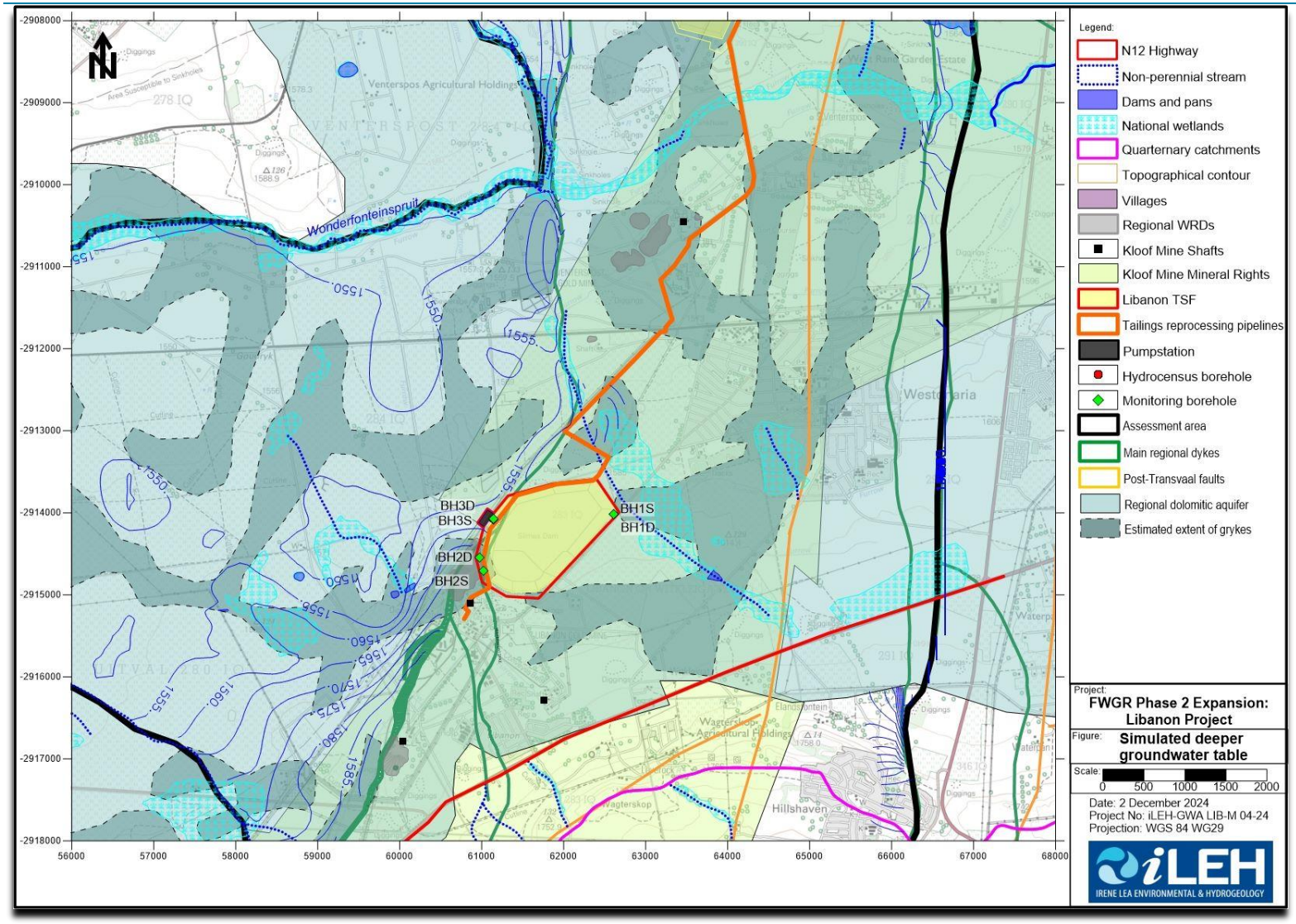


Figure 4-17: Calibrated groundwater levels in the deeper weathered dolomitic aquifer

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The root mean square error, which provides an indication of the goodness of fit during calibration, is 7.59m, which is within the criteria limit of 8m.

The water balance error calculated with the numerical model is 0.1%, which also complies with the acceptable calibration criteria set.

Factors that influence the calibration process and results include the following:

- The time available to spend on model calibration. Due to the complexity of the hydrogeological setting, systematic adjustment of aquifer parameters as well as aquifer conceptualisation is time consuming.
- Discrepancies in the elevations recorded for the hydrocensus borehole. The coordinates for the hydrocensus and monitoring boreholes were recorded with a hand-held GPS.
- The absence of borehole logs with which to characterise the aquifer conditions that the groundwater level in hydrocensus borehole represent.
- The way dewatering of the Venterspost Compartment was included is based on data from Jones & Wagener (2013) (as cited in Groundwater Abstract, 2024) as well as a single 2024 dewatering rate received for the Kloof Celemanzi (Kloof No 10 Shaft). Since dewatering has a significant impact on groundwater levels and flow patterns in the immediate vicinity of the Libanon TSF, it is important to improve the accuracy of the dewatering process. This can be achieved by obtaining more accurate data to delineate the underground workings a well as an improved understanding of the history and extent of compartment dewatering.
- Limited groundwater level data is available around the TSF. This is due to the impact of dewatering of the dolomitic compartment and not because of poor field data. However, the lack of groundwater level data affects the accuracy with which modelling can be completed, as the depth to groundwater in dry boreholes is not known. This is mitigated to some extent through the fact that the level of dewatering in the compartment is known.
- The highly irregular groundwater flow patterns around the TSF are based on the complex geomorphology of the weathered dolomitic aquifer. The extent of dolomitic grykes and pinnacles could be inferred from the gravity survey completed by the Council for Geoscience, but there is a level of uncertainty in this approach.
- As mentioned earlier in this report, the modelling code assumes a continuous porous medium, which means that the aquifers are simulated using average parameters. The heterogeneity of the weathered dolomitic aquifer as well as the regional structural geology was incorporated as discrete zones during simulations, which counters the assumed continuous porous medium theory where data is available.

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Table 4-18: Calibration results

Borehole ID	Measured head (mamsl)	Simulated head (mamsl)	Residual (m)
BH3D	1529,83	1537,32	-7,49
BH3S	1581,13	1586,23	-5,10
KG114	1661,32	1656,13	5,19
KG108	1628,38	1619,35	9,03
BH2 WRD1	1614,72	1618,24	-3,52
BH2 WRD1	1612,22	1618,46	-6,24
KG206	1570,84	1581,45	-10,61
BH2 WRD4	1588,27	1580,58	7,69
BH1 WRD4	1591,80	1581,56	10,24
KG111	1617,21	1609,56	7,65
DP104	1593,81	1598,98	-5,17
DP109	1591,02	1598,56	-7,54
KG105	1630,41	1624,35	6,06
KG106	1625,40	1623,57	1,83
Kloof2	1623,30	1621,36	1,94
KG119	1604,78	1611,37	-6,59
Ven 2	1610,66	1603,57	7,09
Ven 3b	1593,30	1600,38	-7,08
Ven 5	1582,10	1590,58	-8,48
Ven 6	1578,05	1585,26	-7,21

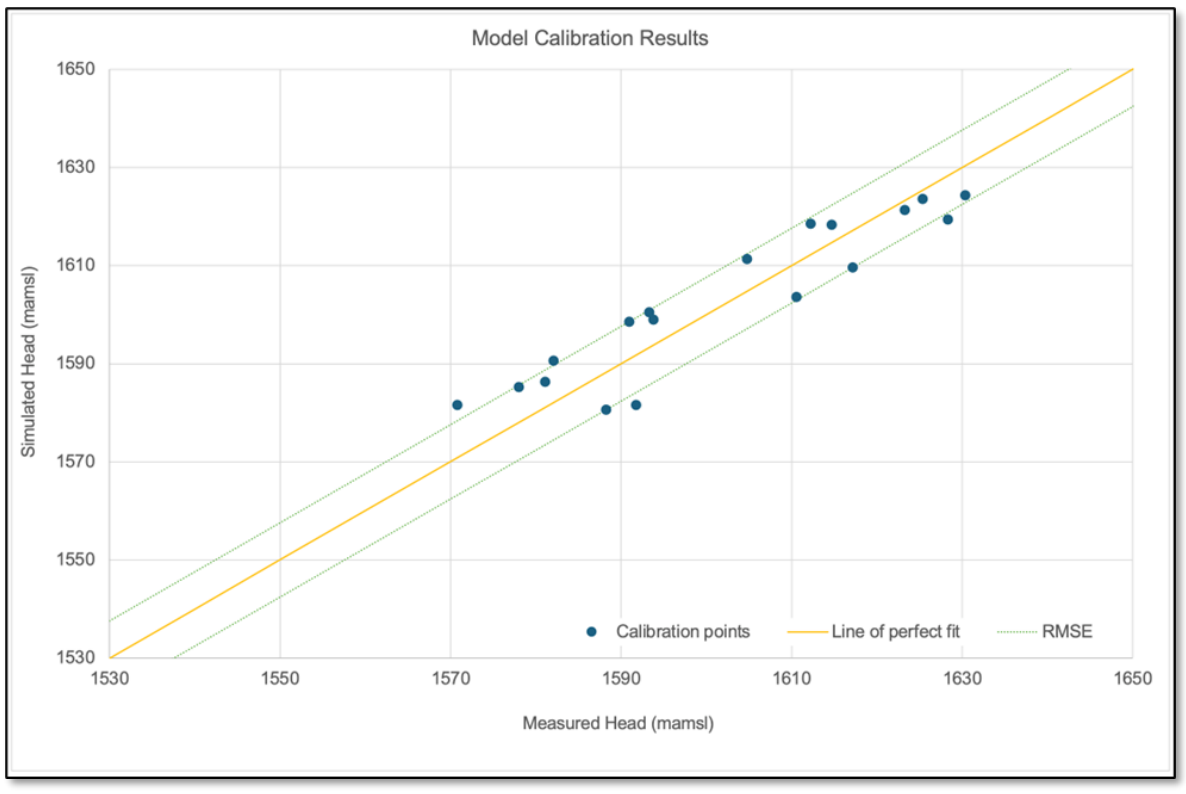


Figure 4-18: Calibration results

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Model calibration can be improved once additional monitoring information becomes available from the proposed monitoring program. Sufficient time should also be allowed to complete model calibration to a high standard. Model-recalibration and verification can be undertaken with additional monitoring data as well as improved data on the mechanisms that affect compartment dewatering. Groundwater monitoring requirements are discussed later in this report.

4.6.11.6 Model Sensitivity

A sensitivity analysis was completed on the model parameters used to simulate the residual and weathered dolomitic aquifers. The purpose of the sensitivity analysis is to quantify the uncertainty in the calibrated model caused by uncertainty in the estimates of aquifer parameters, stresses and boundary conditions. The level of heterogeneity of the aquifer material can never be accurately measured with field data. The uncertainty of the impact of heterogeneity on simulations is therefore assessed as part of the sensitivity analysis.

The results of a sensitivity analysis can be used to identify data gaps and to plan for additional fieldwork, including monitoring requirements, once the modelling has been completed.

The comparative sensitivity for the parameters included during calibration is presented in Figure 15. The comparative sensitivity provides an indication of how sensitive the model is to changes in each parameter, compared to the other parameters tested. A low value indicates a low sensitivity and a high value a high sensitivity. The results indicate the following:

- The model is sensitive to changes in the rate of ambient recharge to the aquifers.
- The model is also sensitive to changes in the permeability of the residual and weathered dolomitic aquifers.
- The model is also sensitive to changes in the specific yield of the residual dolomitic aquifer as well as the storage coefficient for the weathered dolomitic aquifer, but to a lesser extent.

As discussed in the calibration section above, model sensitivity can be addressed through additional calibration with groundwater monitoring data that will become available from the operations once the monitoring program is implemented.

Data from the new monitoring boreholes were used to estimate the permeability of the residual and weathered dolomitic aquifers. It is however likely that this permeability may vary significantly over the project area, based on the depth of weathering, the presence of grykes and the clay content of the weathered zone.

The rate of recharge can be calculated from groundwater level monitoring data, which is analysed against on-site rainfall data. As part of this calculation, the storage coefficients can be estimated with more certainty.

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4.6.11.7 Assessment of Uncertainties

The accuracy of the modelling project depends on the quality of the input data and the available information. Even with an unchanging environment, impacts are difficult to predict with absolute certainty. Predictions were undertaken with the calibrated flow model, which is a simplified version of reality. The model represents a tool that can be used to assess the impact of the proposed tailings reclamation activities on the aquifers and to identify data gaps. The calibration error is discussed above and is acceptable within the limitations of the study. The model should however be updated and verified with site-specific monitoring information, when it becomes available. Calibration against hydrographs (groundwater level fluctuation with time) and on-site rainfall data will be of specific value in improving the current understanding of aquifer parameters.

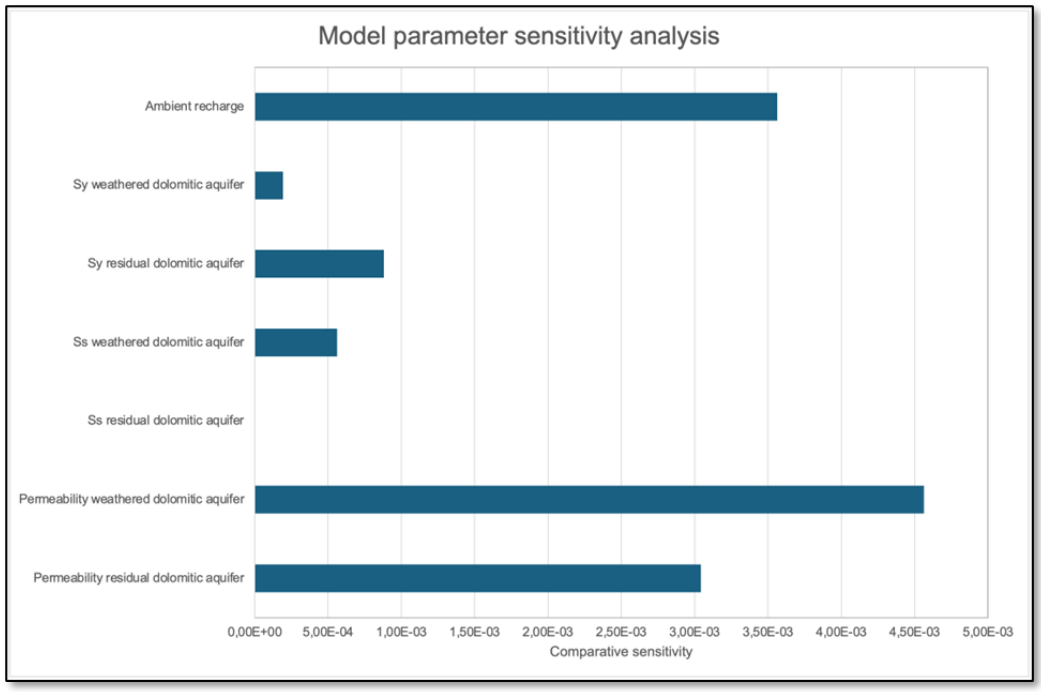


Figure 4-19: Sensitivity Analysis (Groundwater Abstract , 2024)

Uncertainties are approached conservatively, based on the precautionary principle, to ensure that the predictions and impact assessment in this report addresses the maximum potential impact of the proposed development. The uncertainties in the model include:

- **Uncertainties regarding borehole depth, construction and geology intersected:** This information is not available for the hydrocensus borehole. For this reason, it was assumed that the hydrocensus borehole targets the weathered quartzite aquifer.
- **Uncertainties regarding the borehole elevations:** The elevations used during simulations were inferred from hand-held GPS measurements and inaccuracies may occur.

- **Uncertainties regarding the mechanisms and extent of dewatering of the Venterspost Dolomitic Compartment:** The extent of underground mining and the depth of the dewatering in the compartment was approximated from literature-based information.
- **Mathematical modelling uncertainties**: It is not possible with the available information to quantify the heterogeneity present in the aquifers simulated. For this reason, there are inherent uncertainties in the model. The level of confidence in the model can be improved with the incorporation of additional monitoring data, as discussed above.

The uncertainties listed above can be reduced or eliminated through continuation of the groundwater monitoring program at the project. It can further be reduced by integrating the results of the groundwater monitoring

4.7. Wetlands

Refer to Specialist Study: Appendix D – Wetland Study

A single season field survey was undertaken in August 2024, which is considered a suitable (dry) season to undertake a freshwater assessment.

4.7.1 South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) wetland dataset is a recent outcome of the National Biodiversity Assessment (NBA, 2018) and, was a collaborative project by the South African National Biodiversity Institute (SANBI) and the Council for Scientific and Industrial Research (CSIR). The SAIIAE dataset provides further insight into wetland occurrences and extents building on the information from the NFEPA, as well as other datasets. One wetland system identified as an unchanneled valley-bottom (UVB) wetland was identified withing the 500m regulated area of the Proposed Project (The Biodiversity Company, 2024). It should be noted that the project components, i.e., TSF, proposed pipeline, transfer pumpstation, do not traverse the identified SAIIAE system as shown in Figure 4-20.

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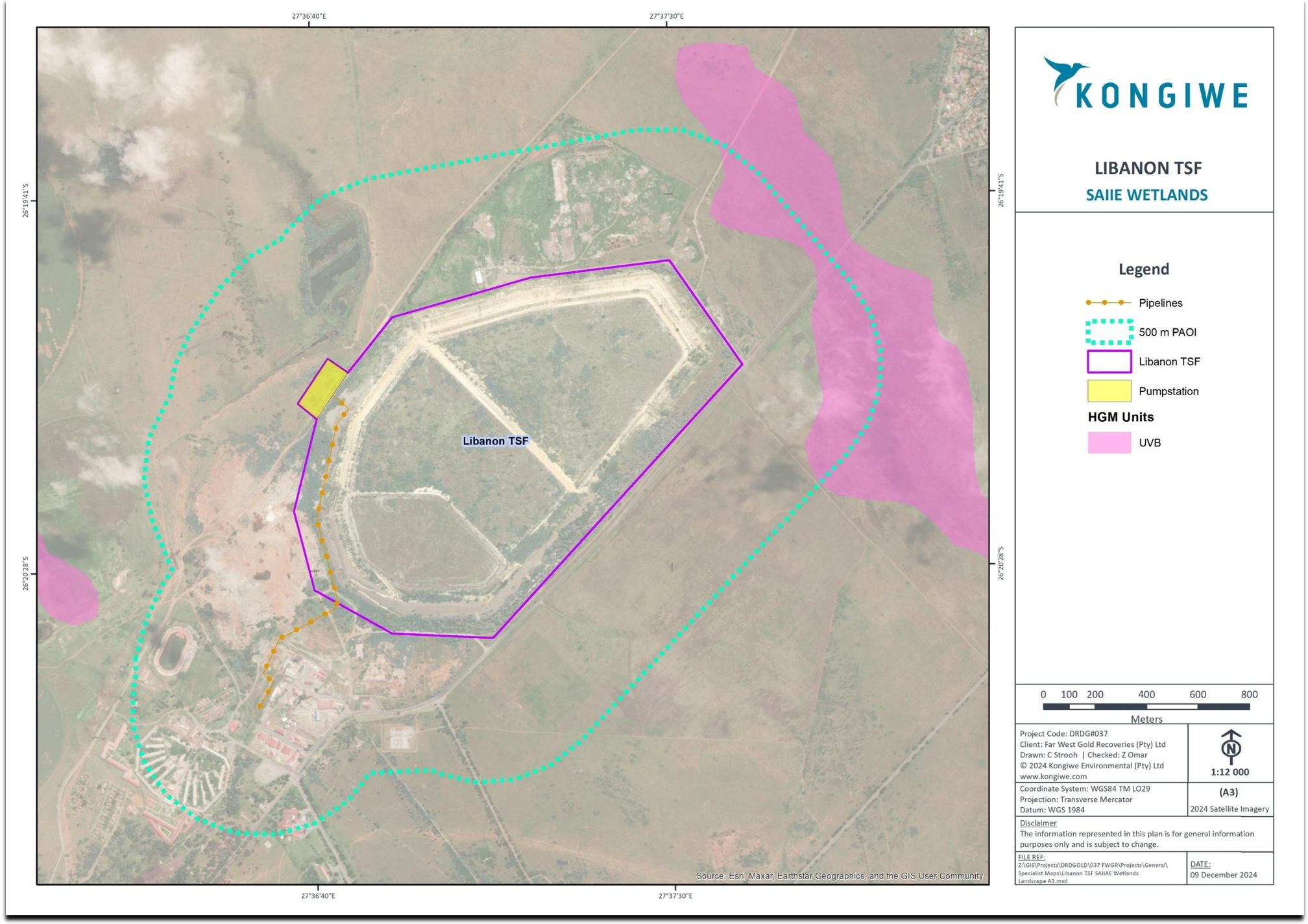


Figure 4-20: SAIIAE system in relation to the Proposed Project

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4.7.2 NFEPA Wetlands

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach to the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the NWA. This directly applies to the NWA, which feeds into Catchment Management Strategies, water resource classification, reserve determination, and the setting and monitoring of resource quality objectives (Nel et al., 2011). The NFEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the biodiversity goals of the NEM:BA, informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act (Nel et al., 2011). Several wetlands are located within the 500m regulated area of the Proposed Project as shown in Figure 4-21 (The Biodiversity Company, 2024). These wetlands are all classified as artificial and unclassified wetlands. The projects components do not traverse any of these wetlands. All artificial wetlands were classified with a condition within the "Z3 – Less than 25% natural land cover remaining" category, as per the dataset.

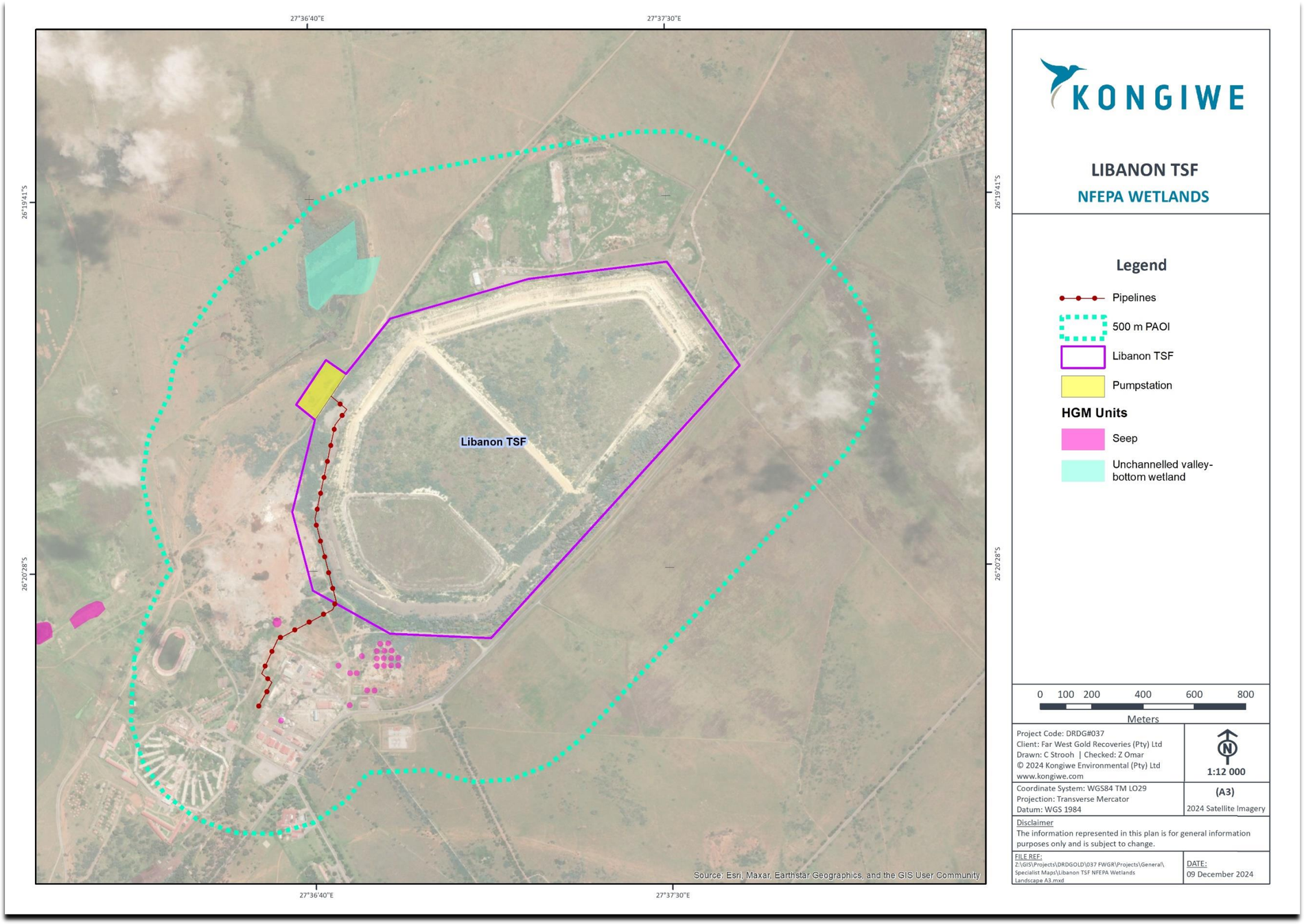


Figure 4-21: NFEPA wetlands in relation to the Proposed Project

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4.7.3 Wetland Delineation

The water resources were delineated in accordance with the DWAF (2005) guidelines. A site visit was conducted on the 5th of August 2024, this would constitute a dry season survey. The Proposed Project area was traversed on foot, with numerous checks being undertaken to identify any soil wetness indicators, and to determine the local soil forms.

During the site visit numerous artificial wet areas, which were created by mining infrastructure, were identified within the project area of influence (PAOI). These include artificial seepage from the biodam, canal and aboveground pipeline, disturbed areas with hydrophyte vegetation, artificial channels, an artificial canal, and a biodam (Figure 4-22, Figure 4-24 and Table 4-19). Furthermore, no natural wetlands or rivers were identified within the 500 m PAOI and does not coincide with what the desktop datasets (SAIIAE and NFEPA) have identified. However, the Department of Water and Sanitation (DWS) has requested that the SAIIAE and NFEPA wetlands be included as part of the assessment. As a result, they have been labelled as HGM 1 (Unchannelled valley-bottom -UVB) and HGM 2 (Seep) in Figure 4-24. Both HGM units have been classified as artificial systems within the SAIIAE and NFEPA datasets. It is the opinion of the specialist that the systems requested to be included in the assessment are not present.

Importantly, the project components (TSF, pipeline and pumpstation and catchment paddock) do not traverse any natural watercourses, ensuring minimal disruption to the natural hydrological environment. The DWS has requested that functional assessments be done for the UVB and the seep wetlands. The delineated seepage areas are artificial systems, which are typically downslope of dams and formed due to dam seepage and overflow. These artificial areas are indicative of water movement through and beneath these artificial containment systems. These seepage areas would cease to exist and become relic wetlands with the removal of these dams. Despite their limited functioning, no further assessment has been undertaken for them.

The seep systems within the project area, as identified by the NFEPA wetland spatial datasets (Figure 4-21), were requested by the DWS to be included in the study. These seeps were historically reservoirs, as evidenced by Google Earth Historic Imagery from 11 March 2003 (Figure 4-23). This imagery confirms that these areas were indeed reservoirs, which have since been decommissioned. Current imagery reveals that these reservoirs have been transformed into seep systems, indicating that they are all artificial in nature.

Since no natural watercourses were identified during the site visit and all watercourses were found to be artificial, no foreseeable impacts from the proposed project were identified.

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Table 4-19: Description of delineated areas (The Biodiversity Company, 2024)

Delineated Areas	Descriptions
Biodam	A biodam is a type of dam that integrates biological elements or ecosystems into its structure and operation. The concept aims to achieve various environmental benefits, including habitat creation, water quality improvement, and enhanced aesthetic and recreational values. Biodams often incorporate features like green roofs, vegetated spillways, or planted embankments, and are designed to work in harmony with the surrounding ecosystem. The aim is to mitigate the environmental impact of traditional dam structures by promoting ecological balance and biodiversity.
Artificial Canal	An artificial canal constructed from active mining areas to an attenuation pond serves as a conduit for transporting excess water, often laden with sediments and potential pollutants, from the mining site to the pond.
Artificial channels	These channels are essential components of stormwater management systems, designed to mitigate flooding and manage runoff in urban, suburban, and rural areas.
Artificial Seepage from biodam, mining canal and pipeline	Artificial seepage refers to the intentional or accidental movement of water through soil or rock, induced by human activities. This can occur in various contexts, such as: Irrigation, Dam and Reservoir Management, Land Reclamation and Drainages, Artificial Recharge of Aquifers and Mining Activities.
Disturbed Area	A disturbed area, previously mined, now supports hydrophytes but lacks wetland status, indicating partial ecological recovery without full wetland characteristics.
HGM 1 - UVB	Unchannelled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows.
HGM 2 - Seep	A typical hillslope seep is located within slopes. Isolated hillslope seeps are characterised by colluvial movement of material. These systems are fed by very diffuse sub-surface flows which seep out at very slow rates, ultimately ensuring that no direct surface water connects this wetland with other water courses within the valleys.

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Figure 4-22: Images of different water resources found within the 500m of the Proposed Project site (The Biodiversity Company, 2024)



Figure 4-23: Google Earth Historic Imagery from 11/03/2003 highlighting the reservoirs that have been labelled as Seep wetlands from the NFEPA spatial dataset

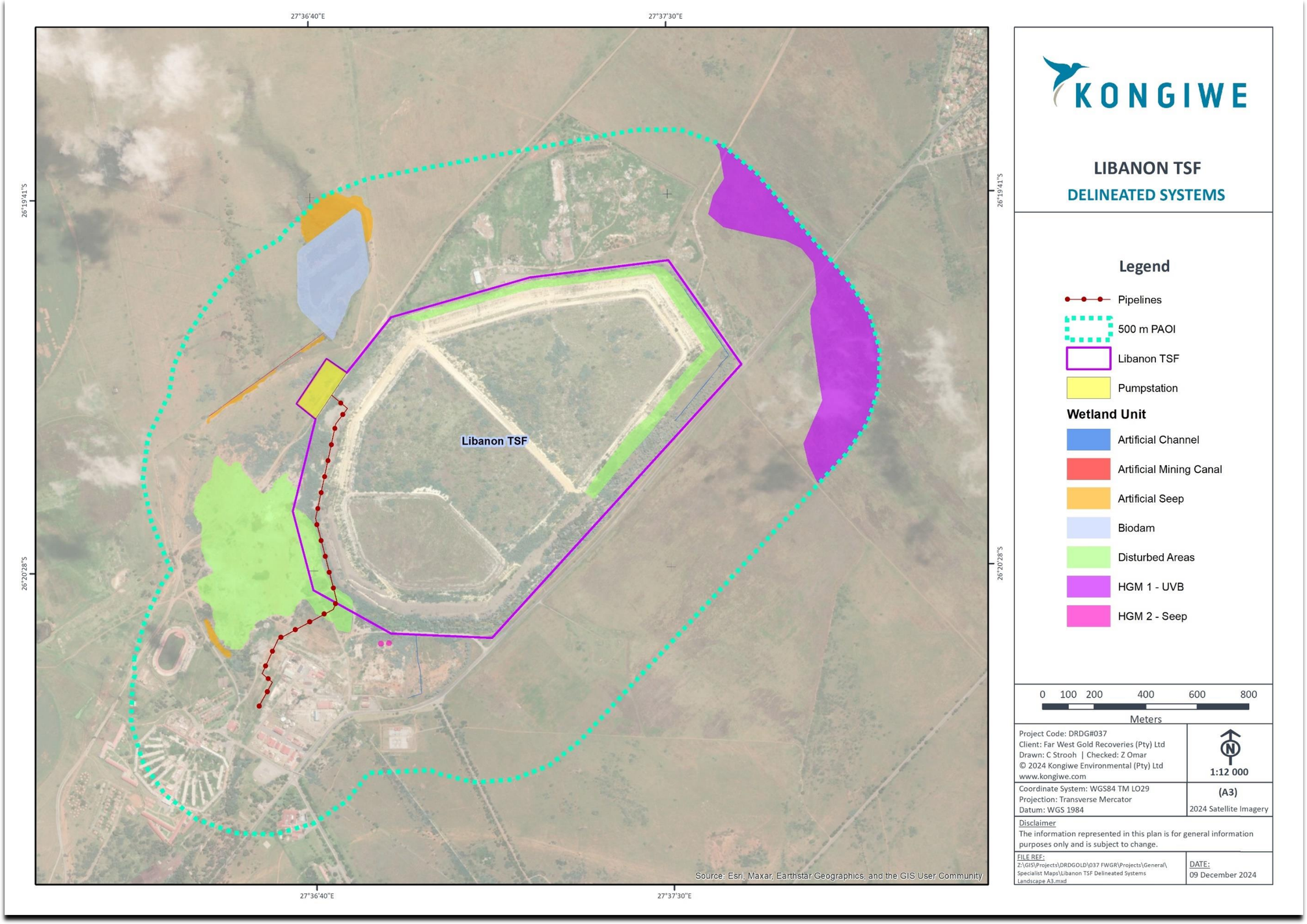


Figure 4-24: The delineated systems of the Proposed Project

4.7.4 uffer Requirements

The “Buffer zone guidelines for wetlands, rivers and estuaries” (Macfarlane et al., 2014 as cited in The Biodiversity Company, 2024) were used to determine the appropriate wetland buffer zone for the proposed project.

Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land-use on another. A buffer zone has been prescribed for this project to serve as a “barrier” between the proposed development and the wetland systems. This buffer area would only be applicable to wetland areas that will not be lost or where infrastructure is required to traverse a system due to the project.

The wetland buffer zone tool was used to calculate the appropriate buffer required for the proposed project. The model shows that the largest risk posed by the project during the construction phase is that of “increased sediment inputs and turbidity”. During the operational phase, the flow patterns being altered (increase flood peaks); increased sediment inputs; and altered water quality are high risks. These risks are based on what could threaten the wetlands and what buffer would be required at a desktop level. A post-mitigation buffer of 15m is recommended for the wetlands (Table 4-20).

Table 4-20: Post-mitigation buffer requirement (The Biodiversity Company, 2024)

Required Buffer after mitigation measures have been applied	
Valley Bottom	15m
Seep	15m

4.7.5 Ecological Sensitivity

The National Web based Environmental Screening Tool has characterised the aquatic theme sensitivity of the development footprint as “Low” sensitivity while the larger regulated area (500 m) traverse “Very High” sensitivity (due to SAIIAE wetland).

Table 4-21 provides a comparison between the Environmental Screening Tool and the specialist determined Site Ecological Importance (SEI) of the project. The specialist-assigned sensitivity ratings are based largely on the SEI process.

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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_Dry Highveld Grassland Bioregion (Valley-bottom)

Figure 4-25: The aquatic biodiversity theme sensitivity for the Proposed Project

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Table 4-21: Summary of the Screening Tool Sensitivity versus the Specialist assigned SEI for the field survey of the Proposed Project Area (The Biodiversity Company, 2024)

Screening Tool Theme	System	Screening Tool rating	Specialist rating	Tool Validated or Disputed by Specialist - Reasoning
Aquatic Biodiversity	Wetland	Very High	Low	Disputed – Much of the area within the wetland has been historically modified through agricultural fields and road developments. Importantly, this was not identified as a wetland during the site visit due to the absence of wetland vegetation and soil mottling. The proposed activities are not anticipated to significantly modify the hydrological characteristics of the entire area; therefore a "Low" sensitivity has been assigned for these areas in relation to freshwater biodiversity.
	Artificial watercourse	Low	Low	Validated - Due to being artificially created, this area is regarded as degraded due to removal of vegetation and excavations. Furthermore, the artificial watercourses provide no ecological function. Therefore, these watercourses were assigned a "Low" sensitivity
	Remaining area	Low	Low	Validated – No natural surface water features were identified within the rest of the project area of influence.

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4.8. Socio-Economic Environment

The Proposed Project has the potential to result in both positive and negative social impacts. As such, it is important that the socio-economic baseline conditions are understood to ensure accurate identification and assessment of potential impacts associated with the Proposed Project.

Gauteng is the largest urban economy if Africa, with a population estimated to be 13.3 million, (Gauteng Spatial Development Framework 2030) (GSDF). In terms of land area, Gauteng is the smallest province in South Africa but also densely populated. Gauteng accounts for only 1.5% of the land area. Table 4-22 below provides an overview of the socio-economic baseline information for Gauteng province.

Table 4-22: Socio-economic baseline information: Gauteng at a glance

Description	Statistics
Demographics	
Population size	15 888 000
Population by size	Majority of the population (54.5%) is made up of the population group between the ages of 16-60.
Language	Isizulu is the most spoken language, approximately 19.8%
Migration	Approximately 93.9% of the population is born in South Africa (slightly less than the rate in South Africa)
Households	
Number of households	5 384 000, with 19.1% of the population reside in informal dwellings
Service Delivery	
Access to water services	98.4% are getting water from a regional or local service provider.
Access to electricity	82.7% have access to electricity.
Toilet facilities	88.7% have access to flush or chemical toilets.
Education	
Educational level	80.2% of individuals aged 5-24 are attending some form of schooling.
Employment	
Employment status	67% stated that they receive salaries as their main form of income
Unemployment status	37%
Economics	
Economic sectors	Manufacturing sector providing 14% of the total provincial output, followed by construction at 3%, mining at 2% and agriculture at under 0.5%.
Average annual income	R57 500 nearly double the amount on South Africa

Information extracted from Stats SA: Census 2011, the Community Survey: 2016, the General Household Survey:2021

4.8.1 Local Municipality Demographics

There are approximately 225 476 people in the Merafong City and 334 773 people in Rand West City Local Municipalities i.e. the area of study. There are on average 54% males and 46% females in the Merafong City Local Municipality (MLM) while there are 52% males and 48% females in the RWLM. Black Africans are more dominant in both municipalities, followed by whites, then coloureds. Indians are the least represented in all communities.

4.8.2 Education and Skills

Only 6.7% of the population in MLM has tertiary education (huge implications in terms of the skills community), and 10.8% of the population in the RWLM has tertiary education. In terms of Matric, 29.4% of the population in MLM has Matric, while 35.4% of the population in the RWLM has Matric.

4.8.3 Social Infrastructure

The provision of houses for low-income earners in both municipalities remains low. This is observed by the high number of people who stay in shacks. Several of these informal settlements have been developed on unsafe dolomitic land. Sibanye, together with the Municipalities and surrounding mines have developed programmes to relocate these persons to safer areas.

The use of electricity for lighting, heating and cooking is more prevalent than the use of other forms of energy, though paraffin and candles are still used in low income, high density residential areas.

On average, 54% of the people have water inside their dwellings, and 27% of the people fetch water from outside their dwellings.

As mentioned previously, the proposed project is likely to pose both negative and positive impacts and these are listed as follows:

Table 4-23: The expected positive and negative impacts of the Proposed Project

Positive impacts	Negative impacts
Job security and career development for existing personnel	Increase in ambient noise levels during the construction phase.
Potential benefits for local communities arising from FWGR's Corporate Social Responsibility (CSR)	Possible increase in dust levels in some areas during operations
Decreased dust levels - Eliminate the TSF's as a source of pollution to the surrounding areas.	Exposure to increased dust levels and the rise in associated health impacts- construction and operational phases.
Availability of alternative post-project land uses.	

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5 Analysis and Characterization of Water Use Activity

5.1. Site Delineation for Characterisation

As previously mentioned, the Libanon TSF is situated approximately 2 km west of the Westonaria, in the RWLM. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine. The extent of the TSF is approximately 170 Ha. Please refer to Figure 5-1 for the Proposed Project's infrastructure map.

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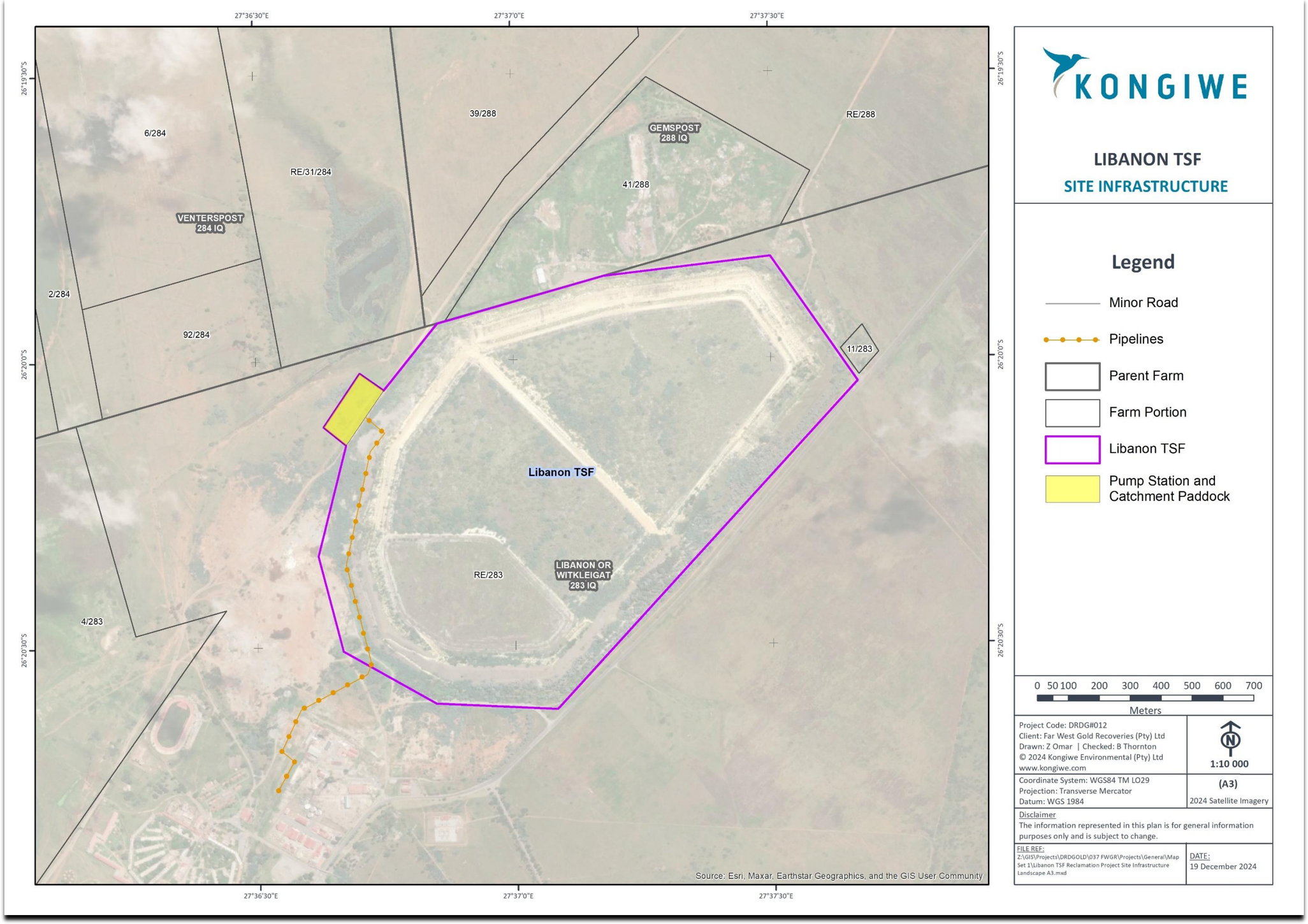


Figure 5-1: Infrastructure map

5.2. Water and Waste Management

5.2.1 Water Supply

In terms of process water, the water cycle operates as a closed circuit, meaning that limited make-up water will be required for the reclamation of the TSF. Water required for the reclamation activity will be sourced from the Kloof Shaft 10# and conveyed through process water pipeline to the project site for reuse in a closed-circuit system.

5.2.2 Water Balance

A monthly water balance was setup in Microsoft Excel spreadsheet format, to estimate the volumes of water for the project. The water balance has been setup to simulate the average yearly, average dry and average wet season volumes. This section details the water balance which has been prepared in accordance with the Best Practice Guideline G2: Water and Salt Balances.

5.2.2.1 Process Flow and Water Balance Components

Water required to reclaim the Libanon TSF will be obtained from dewatering from the Kloof Shaft 10# as well as from return water pumped from the RTSF. According to the Kloof Mine 2021 water balance, approximately 14 736 875 m^3/annum (40 375 m^3/day) is dewatered from the Kloof Shaft 10#, of which FWGR is authorised to use 9 487 500 m^3/annum. The Libanon TSF will be sectioned off into paddocks to ensure that runoff from rainfall is contained on the TSF footprint. Only the working area, which is the area where the TSF is being reclaimed (assumed to be 5 % of the TSF footprint area at any given time), will contribute runoff to the slurry collection sump from the high-pressure water monitors, as well as from any rainfall. A penstock (pipe) will convey the slurry from the collection sump to the pump station, from where it will be pumped to the Driefontein No. 2 Plant. The entrance of the penstock at the collection sump will be fitted with a flapper valve, which can be shut closed under high rainfall events, to contain stormwater runoff from the working area on the TSF, which will be released in a controlled manner to the pump station. A lined catchment paddock will be constructed to capture any emergency spills from the pump station. The catchment paddock will be operated empty, by pumping back into the process or onto the TSF.

Potable water will be purchased from Rand Water Board or the Municipality and will most likely be stored in JoJo tanks at the site.

The water balance components include the following:

- Water inflows:
  - Runoff from rainfall from the working area at the TSF;
  - Runoff from the high-pressure water cannons/monitors; and
  - Potable water supply from municipal sources.
- Water outflows:
  - Evaporation and seepage; and
  - Water in the slurry pumped to the Driefontein No. 2 Plant.

5.2.3 Hydraulic Reclamation Water Requirements

The estimated water requirements and planned water supply for the various projects that form part of the WRTRP were provided by Kongiwe and are indicated in Table 5-1. The Libanon TSF will require 17 363 m^3/day (6 337 495 m^3/annum) to undertake reclamation activities. This will be supplied from dewatering from the Kloof Shaft 10# and return water from the RTSF. According to Table 5-1, the Kloof Shaft 10# will supply 13 851 m^3/day (5 055 615 m^3/annum), whilst the RTSF can supply 69 551 m^3/day (25 386 115 m^3/annum). It is assumed that the Kloof Shaft 10# will supply the bulk of the required water with remaining amount being supplied from the RTSF.

Table 5-1: Estimated water requirements and planned water supply

Facility	Requirement (m^3/d)	Planned Supply (m^3/d)
Supply to Driefontein 3 TSF	16,696	
Supply to Kloof 1 TSF	8,683	
Supply to Libanon TSF	17,363	
Supply to Venterspost North TSF	8,672	
Supply to Venterspost South TSF	8,872	
Supply to Cooke 2 TSF	17,869	
Supply to Cooke 4 South TSF	11,399	
Supply to DP2	2,669	
Supply to CPP	46,812	
Ezulwini Shaft		13,487
Return from RTSF		69,551
Make-up from Driefontein 10 Shaft		8,733
Make-up from Kloof 10 Shaft		13,851
Make-up from Cooke Shaft 1, 2 and 3		14,164
Return from Inherent Moisture within TSFs		15,599
Total	**139,035**	**135,385**

5.2.4 Assumptions and Limitations

The water balance is based on the following assumptions:

- Calculations are based on the values, assumptions and data sources in Table 5-2;
- The working area i.e. the active area at the TSF where hydraulic reclamation is taking place, was estimated to be 5 % of TSF footprint area. It is assumed that runoff from the remaining area of the TSF will be contained and will not report to the pump station;
- Estimated runoff coefficients were fixed for all months of the year;
- The lined catchment paddock will be operated empty;
- It has been assumed that 80 % of the monthly water used for hydraulic reclamation would run off as slurry and that 20 % would be lost;
- It has been assumed that 50 % of the average monthly rainfall from the working area will run off to the slurry sump;
- The wet season scenario is the average volumes for the three wettest months (November, December and January), whilst the dry season scenario is the average volumes for the three driest months (June, July and August). The average yearly scenario are the average volumes over a 12 month period;
- The Kloof Shaft 10# will supply the bulk of the required water with remaining amount being supplied from the RTSF;
- 100 L of potable water per an onsite employee per day has been assumed;
- No water is needed for sanitation purposes as chemical toilets will be used; and
- Any dust suppression requirements were not included in the water balance calculations.

5.2.5 Input Parameters

The parameters and assumptions/sources used in the water balance calculations are provided in Table 5-2.

Table 5-2: Parameters and assumptions/sources used in the water balance calculations (Hydrospatial, 2024)

Parameter	Value	Units	Assumption/Source
TSF area	1 348 000	m²	TSF footprint area
Reclamation working area	67 400	m²	Assumed to be 5 % of the TSF area
Slurry collection sump area	3 000	m²	Assumed
Working area rainfall-runoff coefficient	0.5	-	Assumed 50% of monthly rainfall runs off from the working area to the collection sump
Reclamation water runoff coefficient	0.8	-	Assumed 80% of water used for reclamation runs off as slurry. 20 % losses
Monthly water volume required for hydraulic reclamation	528 125	m³/month	Based on information provided by Kongiwe, 17 363 m³/day of water is required for hydraulic reclamation.
Operational phase	72	months	Project description
Number of employees	10	-	Obtained from Kongiwe
Potable water provision per employee	0.1	m³/day	Assumed 100 litres per employee per day

5.2.6 Water Balance Results

The average yearly, average wet and average dry season scenario water balance for the Libanon TSF is indicated in Figure 5-2. The following provides a summary:

- The reclamation water requirement is 6 337 495 m³/annum. This water will be sourced from the Kloof Shaft 10# (5 055 615 m³/annum), whilst the RTSF can supply up to 25 386 115 m³/annum;
- Runoff from reclamation activities reporting to the collection sump is expected to be in the order of 5 070 000 m3/annum (422 500 m³/month);
- On average, 5 089 296 m³/annum (424 108 m³/month) is estimated to report to the reclamation pump station, which will be pumped to the Driefontein No. 2 Plant; and
- The potable water requirement was calculated to be 372 m³/annum (31 m³/month).

5.2.7 Slurry Sump and Lined Catchment Paddock Sizing

The slurry sump has been sized to contain the 1:50 year runoff for the 24 hour storm event from the working area at the TSF, using the SCS method. This was calculated to be 1 370 m³. The slurry sump should be operated to always have an additional 1 370 m³ available on top of normal operational volumes in the sump, in order to cater for the 1:50 year runoff, and to comply with GN R704 regulations.

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The lined catchment paddock should be sized to contain slurry within the process at the pump station, as well as within the penstock, should any emergency spills occur, or if these facilities need to be drained for maintenance purposes. The lined catchment paddock should be operated empty to ensure sufficient capacity at all times.

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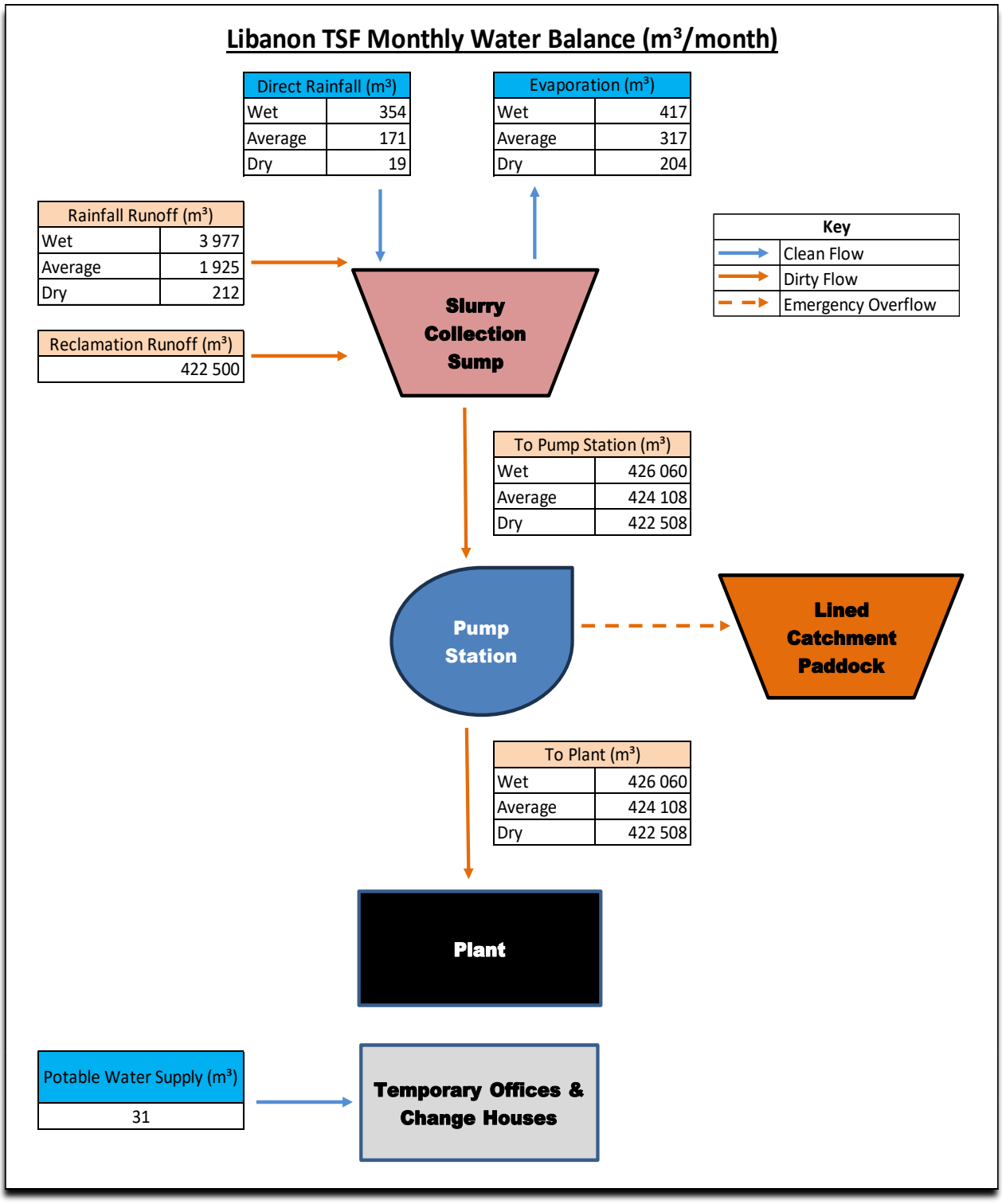


Figure 5-2: Average monthly water balance for the Libanon TSF

5.2.8 Waste Management

Waste management will be uniformly conducted for the project.

5.2.8.1 Domestic Waste

Domestic waste will be stored in clearly demarcated waste skips, in designated areas on the project site. The waste will frequently be disposed of at a local municipal domestic waste handling facility. The waste skips will be demarcated as follows:

- Green: general waste;
- Black: hazardous waste; and
- Blue: steel / scrap waste.

5.2.8.2 Industrial Waste

Industrial waste will be contained in steel skips or bins and removed by licenced contractors and disposed of in a licenced industrial waste disposal site located off the project site.

5.2.8.3 Sewage Effluent

No sewage effluent will be generated on the project site as mobile toilets (honey suckers) will be utilised and replaced on a weekly basis.

5.2.8.4 Un-reclaimable Material

Material found on the TSF that cannot be reclaimed and reprocessed will be stockpiled on an overburden pile, vegetated and cleared of all radiation risk. This overburden will be positioned on site to best suit the land-use requirements.

5.2.9 Reuse and Recycling

The water usage strategy for the project is designed to operate as a closed water system and therefore most of water on site will be captured and re-used as much as possible, thereby creating a complete balance. This water balance operation is required to minimise the water losses that occur during operations and conserve and re-use as much water as possible to attain a closed water system. Adhering to this water balance model will produce a sustainable and socially responsible water balance scheme.

Measures will be taken to ensure that water is re-used/recycled as much as possible, these include:

- Water in the paddocks, as a result of spills or rainfall, will be reused for reclamation activities. This will ensure that the water levels within the paddocks are kept at a minimum at all times.
- Dirty water must, as far as possible, be recycled and reused, or treated and discharged.

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5.3. Conceptual Stormwater (Clean and Dirty) Management

Refer to Specialist Study: Appendix E – Stormwater Management Plan

The purpose of the conceptual Stormwater Management Plan (SWMP) is to ensure that clean and dirty water are adequately separated, by diverting clean water away from dirty areas and ensuring that dirty water from the operation is captured, contained and managed appropriately in accordance with GN R704 regulations and DWS best practice guidelines.

5.3.1 Stormwater Catchment Areas

The Libanon TSF has 3 catchment areas contributing stormwater runoff to it (see Figure 5-3) (Kongiwe Environmental , 2024):

- Clean water areas:
  - Libanon East – the biggest area commencing on the high lying ridge to the south, flowing northwards and concentrating at the eastern corner of the Libanon TSF; and,
  - Libanon West – commencing at the N12 to the south, flowing northwards and concentrating at the western corner of the Libanon TSF;
- Dirty water areas:
  - Libanon TSF – the TSF footprint where stormwater will be contained on the TSF by earth berms constructed as part of the reclamation process; and,
  - Paddocks constructed at the toe of the TSF, to contain stormwater runoff from the side slopes of the TSF and allowing the ponded “dirty” water to either evaporate or infiltrate.

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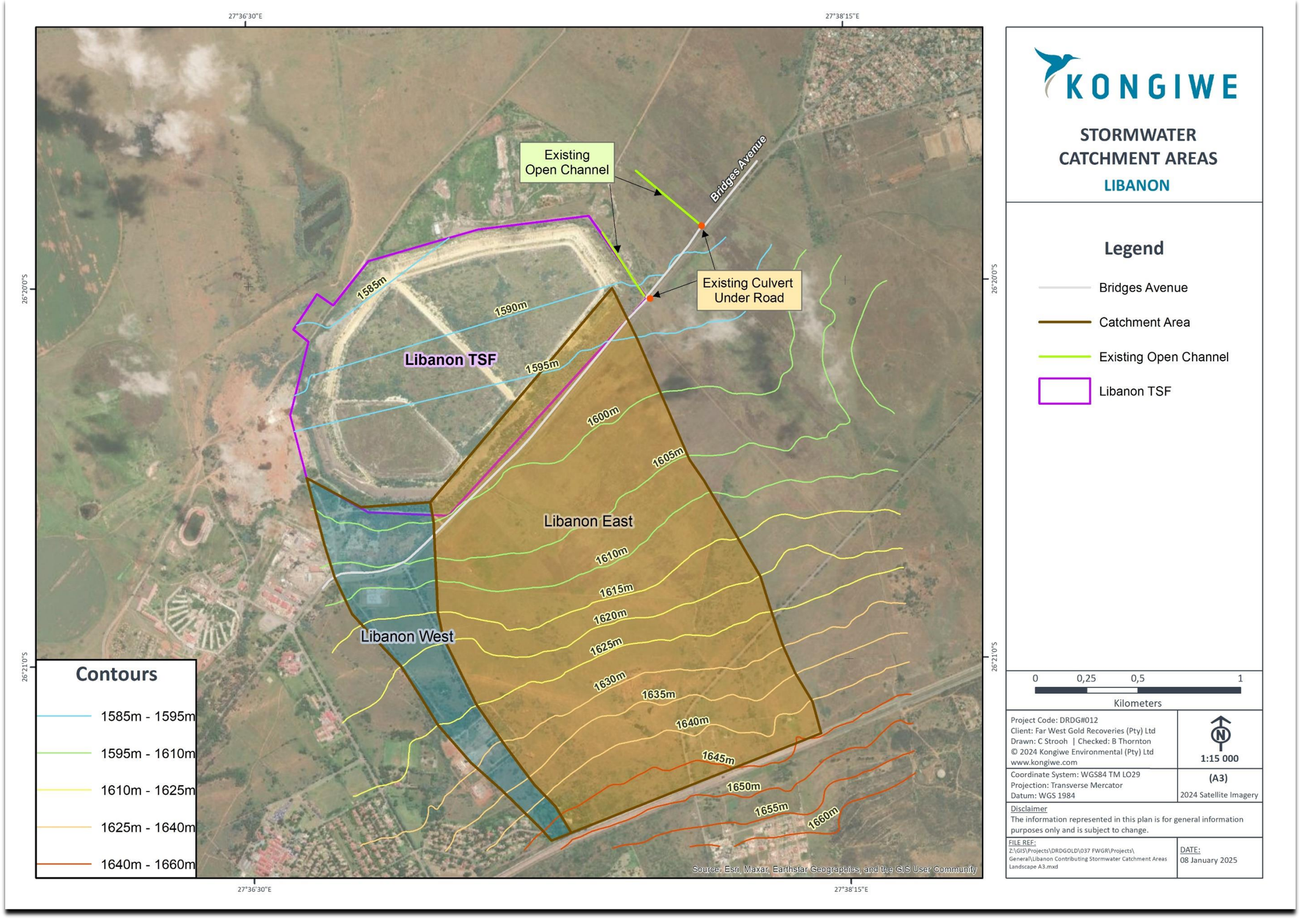


Figure 5-3: Contributing Stormwater Catchment Areas

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5.3.2 Identified Stormwater Issues

5.3.2.1 Libanon East

The runoff concentrates at the northeastern corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 2% (Google Earth), the flow width will be 3.926 m and the velocity of flow is 13 m/s. This far exceeds the acceptable maximum velocity for earth of 1.2 m/s, so excessive erosion will occur. The high flow velocity will also be harmful to life.

5.3.2.2 Libanon West

The runoff concentrates at the northwestern corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 1% (Google Earth), the flow width will be 2.742 m and the velocity of flow is 7.3 m/s. However, inspections on site indicate that the land is degraded after previous developments in the area, and the flow will scatter across the area, thus reducing the velocity.

5.3.2.3 Libanon TSF

With the proposed reclamation method, the stormwater runoff is being collected within the berm on top of the Libanon TSF and allowed to infiltrate or evaporate. In effect this is a dam on top of the Libanon TSF on top of underlying dolomites, so SANS 1936 must be complied with.

5.3.2.4 Libanon Paddocks

The stormwater runoff from the TSF side slopes and the paddocks is collected in the paddocks and allowed to infiltrate or evaporate. In effect this is a dam on top of the underlying dolomites, so SANS 1936 must be complied with.

5.3.3 Proposed Stormwater Measures

5.3.3.1 Libanon East and West

5.3.3.1.1 Earth berm along southern side of Bridges Avenue

The proposed stormwater attenuation measure for the Libanon East and West catchments are shown in Figure 5-5.

It is proposed to construct an earth berm immediately to the south of Bridges Avenue adjacent to the Libanon TSF to the existing culvert under Bridges Avenue, described as follows:

- An earth berm top width 1m, side slopes 1 vertical to 2 horizontal, 1 m high from point A to point B, a length of 1 845m;

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The berm detail is shown in Figure 5-4 below:

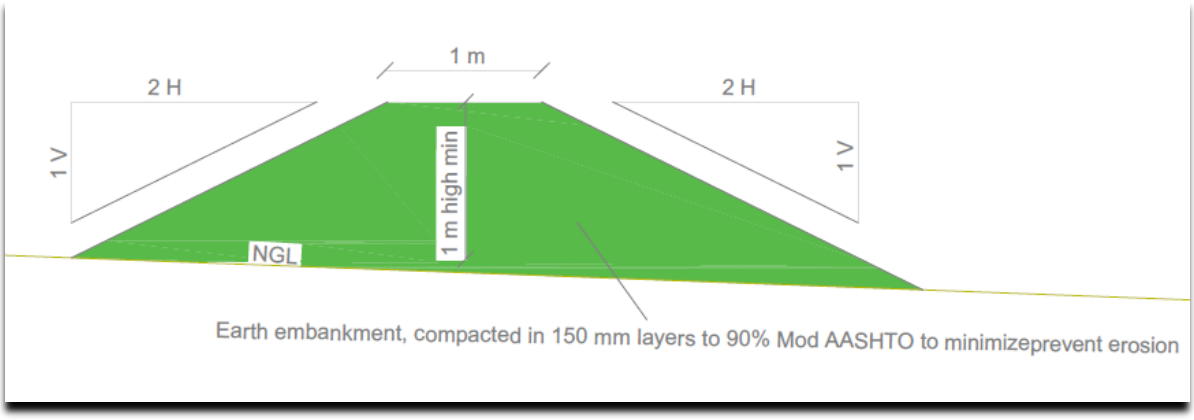


Figure 5-4: Earth berm detail

The above structure will collect all the runoff from the Libanon East catchment, and 60% of the runoff from the Libanon West catchment.

The existing culvert under Bridges Avenue must be cleaned out and reinstated to its original design state. The size of the culvert could not be ascertained, but normally these structures are designed to handle the 1 in 5 year incident. In the event of the 1 in 50 year storm, the balance of the water not going through the culvert will flow across the road surface.

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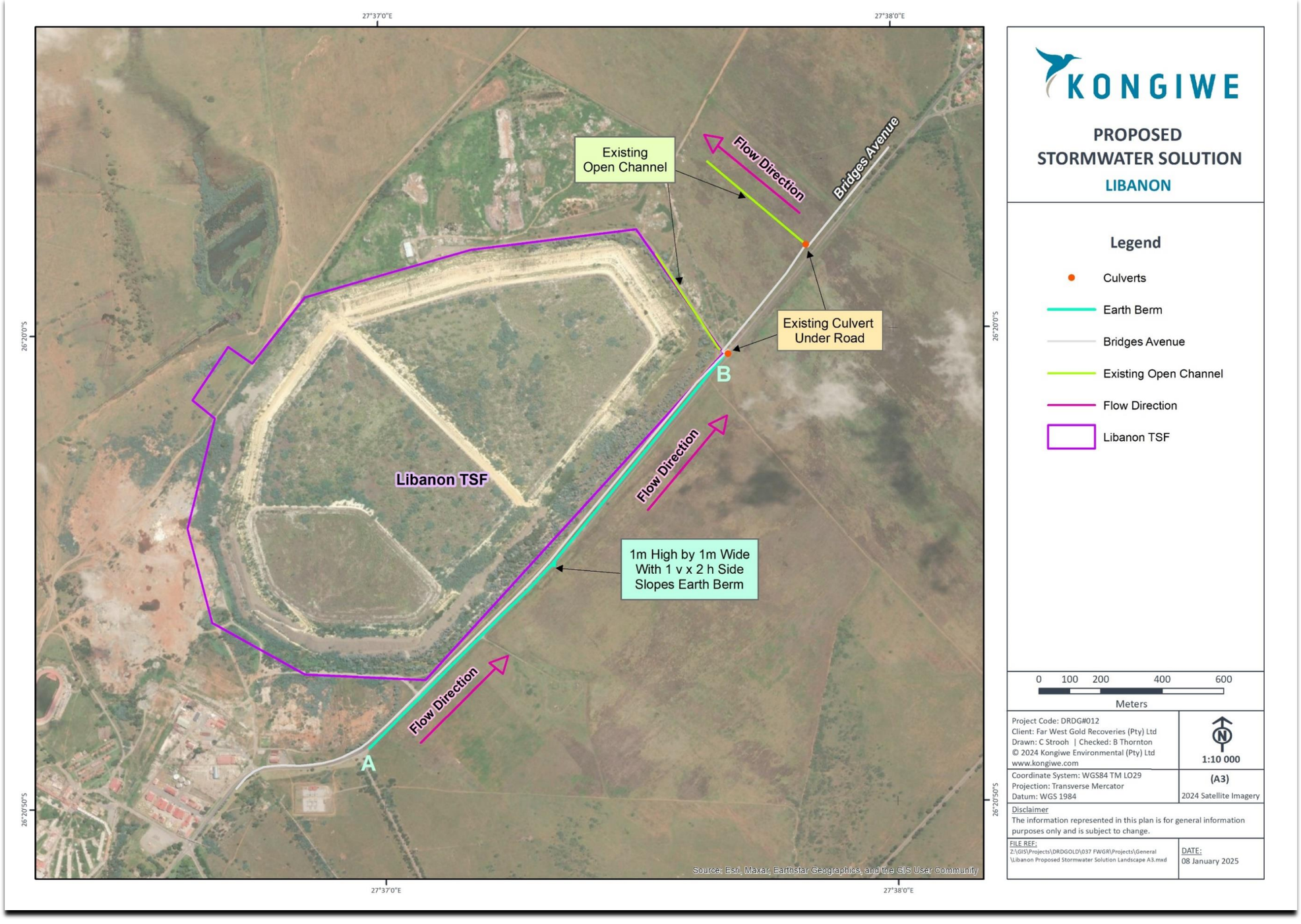


Figure 5-5: Proposed stormwater solution (Kongiwe Environmental , 2024)

5.3.4 Libanon TSF and Paddocks

It is proposed to contain all stormwater falling on the top surface of the TSF within a berm located on the outside edge of the TSF top surface, as well as to contain all stormwater falling on the slopes of the TSF and in the paddocks at the toe of the side slopes of the TSF within these paddocks.

Due to the underlying dolomitic condition, the requirements of SANS 1936 must be adhered to (Kongiwe Environmental , 2024). This will require the following to be carried out:

- Dolomitic stability investigation
  - General
    - Investigations shall conform to the requirements of SANS 1936-2 (4.3.2 and 4.3.3). The investigator/Competent Person (geo-professional) shall, during the investigation, confirm and refine the Inherent Hazard Zone and the associated Dolomite Area Designations and confirm that the mandatory precautions associated with a designation have been observed;
    - The investigator/Competent Person (geo-professional) shall, as a minimum to comply with the above requirements, interact with suitably qualified professionals and the person responsible for the development of the parcel of land or the relevant portions thereof concerning appropriate planning, design of infrastructure, buildings, and structures; and,
    - The investigator/Competent Person (geo-professional) shall develop a risk management plan strategy specific to the development in accordance with the requirements of SANS 1936;
  - Report
    - The investigator/Competent Person (geo-professional) shall prepare a report including the following:
      - a method description of the work undertaken;
      - a drawing indicating the location of the points profiled in the service trenches;
      - records of all profiles, boreholes and tests;
      - records of any geotechnically problematic conditions intercepted, such as paleokarts structures, sinkholes etc.;
      - a description of any additional geotechnical investigations undertaken;
      - a description of any precautionary or remedial measures applied to problematic conditions identified during the design-level inspections;
      - a site/development layout drawing which confirms the Inherent Hazard Classes and Dolomite Area Designations, in accordance with the requirements of SANS 1936;
      - an indication where the dolomite designations have been changed and provide a motivation for such changes;
      - a comprehensive list and description of any ongoing monitoring required;

- an identification of monitoring area designations where a risk management plan has been developed; and,
- an indication that amended water precautionary measures shall apply;

- Additional Requirements for Attenuation Dams, Retention Dams, Reservoirs and Public Swimming Pools:
  - The requirements for dams, reservoirs and public swimming pools shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:
    - a gravity survey over the site at 30 m grid spacing with a minimum of three lines;
    - additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
    - inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
    - investigation of potential paleosinkhole structures wherever they are exposed; and,
    - where justified, supplementary geotechnical site investigations.

Note 1: The proposed site for dams and reservoirs should be at least 100 m from the nearest housing or commercial development.

❖ Compilation of a Dolomite Risk Management Plan:
An appropriate Dolomite Risk Management Plan is to be compiled in accordance with SANS 1936 (Kongiwe Environmental , 2024). The Dolomite Risk Management Plan is to be site specific and based on all data gathered until that time, taking cognisance of final precautionary measures, site layout and shall also contain the final Monitoring Designations. The Dolomite Risk Management Plan (DMRP) shall outline the responsibilities and actions of the relevant Authority and the Client Department. It is a compulsory requirement for the appointed professional service provider to prepare a site-specific Dolomite Risk Management Plan (DRMP) for the development in accordance with the requirements of SANS 1936-4.

5.3.5 Stormwater Drainage on Dolomitic Land

5.3.5.1 Concentrated Stormwater

Concentrated stormwater shall not be disposed of other than in natural water courses unless the land upon which it is discharged is:

❖ not dolomite land; or
❖ dolomite land categorised as having a Dolomitic Area Designation D1 (refer to SANS 1936-1).

5.3.5.2 Surface Ponds

Stormwater drainage shall be such that no surface water ponds other than in natural watercourses save for that associated with the attenuation of stormwater for a period not exceeding **6 hours**;

5.3.5.3 Stormwater Retention and Attenuation Structures

Stormwater retention and attenuation structures should preferably not be constructed on land of Dolomite Area Designation D4 in accordance with SANS 1936. Dolomite Area Designation D4 (Inherent Hazard Classes 5, 6, 7 and 8) may only be considered provided the conditions as prescribed in SANS 1936 are met; and,

5.3.5.4 Precautionary Measures

Appropriate precautionary measures should be specified for Dolomite Area Designation D3 (Inherent Hazard Classes 1, 2, 3 and 4).

5.3.6 Recommendations

The following is recommended:

- The existing berm/channel system around the TSF are reinstated where damaged and maintained. This system acts as the containment of the dirty water from the Libanon TSF side slopes;
- The “clean” runoff from the high lying areas above the Libanon TSF is deviated away from the Libanon TSF by an earth berm constructed immediately to the south of Bridges Avenue, up to the existing culvert under Bridges Avenue to the east of the Libanon TSF. The existing culvert is in a poor state of repair and will have to be reinstated; and,
- A dolomitic stability investigation be carried out around the Libanon TSF to confirm that the proposed reclamation method and stormwater containment on top of the TSF and in paddocks around the TSF is acceptable and in accordance with SANS 1936, and a dolomitic risk management plan must be developed.

5.4. Operational Management

5.4.1 Organisational Structure

The organisational structure applicable to the Applicant is shown in Figure 5-6 below. As of January 2023, Sibanye holds a 50.1% interest in DRDGOLD which wholly owns the subsidiaries FWGR and Ergo. **The activities subject to this application will be operated under the entity FWGR**.

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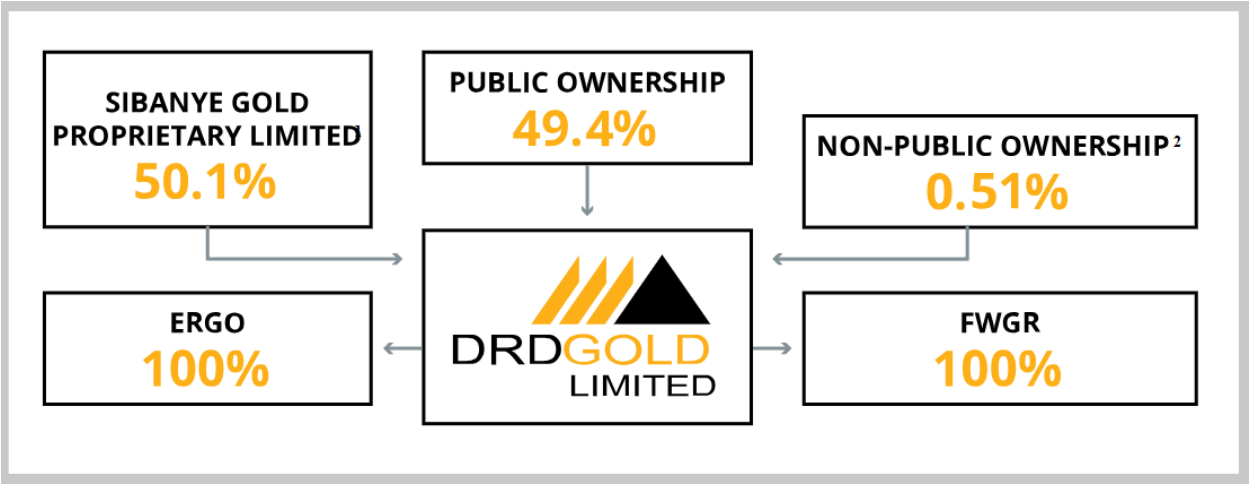


Figure 5-6:Organisational Structure

5.4.2 Environmental Policies and Procedures Relating to the Environment

FWGR has a management procedure and internal communication strategy for identifying environmental training needs and providing awareness and competence training that was developed and successfully implemented as part of the Environmental Management System (EMS) of the mine.

The aim of relative policies and procedures relating to the environment aim to achieve the following:

- Complying with all applicable legislation as a minimum requirement;
- Achieving high standards of environmental care;
- Ensuring proper organisational structure and resources to manage safety, health and environmental matters;
- Continuous hazard identification and risk assessment;
- Establishing competence and awareness through training and awareness;
- Conserving natural resources and reducing environmental burden of waste generation and emissions through re-use and recycling as far as practically possible;
- Reporting of incidents and implementing correct measures accordingly; and
- Maintaining a high level of emergency preparedness and response to manage emergencies.

5.4.3 Resources and Competence

DRDGOLD has extensive experience and is solely focussed on the retreatment of surface gold tailings. The Proposed Project is in line with the company's expertise and a continuation of ongoing operations. The company currently employs over 900 permanent full-time employees with various service providers to assist with the execution of reclamation and tailings deposition.

FWGR also has a competent Environmental Management Co-ordinator who will be responsible for the environmental management on each site.

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5.5. Environmental Communication Strategies

Mine 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 FWGR, as well as contractors. The organisation shall conduct processes for external communication on its significant environmental aspects and record its decision in line with FWGR communication policy as well as conditions stated in any EA or Licence.

5.5.1 Stakeholder Engagement Plan

The SEP needs to provide guidance for engagement with Stakeholders. This SEP has been developed to plan engagement activities for the Proposed Project.

FWGR will follow best practice and provide:

- A description of the regulatory and other requirements for Stakeholder Engagement;
- A summary of the applicable South African legislation;
- A list of potential stakeholders identified for the project;
- Implementation plan for further consultation during the different phases of the project;
- A proposed grievance mechanism; and
- Management functions for the implementation of the SEP and grievance mechanism.

5.5.2 Internal Communication

Internal communication is done within the Administrative Sector.

5.5.3 External Communication Strategies

The following communication channels and media can be used to communicate environmental issues to individuals who are not employed by FWGR or its subcontractors:

- **Environmental stakeholder engagement meeting:** An Environmental Stakeholder Engagement Meeting has been established and used as a forum to keep interested and affected parties (I&APs) informed of the significant environmental aspects identified through the Environmental Impact Assessments and Management Plans. This is also the forum where I&APs get the opportunity to raise environmental concerns. Records are kept of all decisions and concerns. The Environmental Stakeholder Engagement Meeting is chaired by the Manager, 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 FWGR 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 I&APs 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 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.
- **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 three years.
- **Environmental Reports:** Copies of relevant specialist study reports and Environmental Impact Assessments (EIAs) will be available on request from an external party approved by the Mine Manager.
- **Queries from I&APs:** Response to queries about environmental impacts and aspects will be addressed by the relevant department and approved by the Mine Manager.

5.5.4 Evaluation of the Environmental Awareness Plan

The evaluation of the environmental awareness and training plan will be conducted by FWGR's management. This evaluation will entail the auditing of the operation in both the construction and operation phase 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 minimize these risks.

The environmental awareness and training plan indicates that FWGR is serious about the well-being of the environment and empowerment of the local people. Environmental issues will be discussed at monthly meetings scheduled at the mine.

5.5.5 Emergency Incident Reporting

Environmental incident reporting is a vital part of communication in the project. Employees are required to report any and 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.

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5.6. Monitoring and Control

5.6.1 Surface Water Quality Monitoring

A surface water quality monitoring programme is essential as a management tool to detect negative water quality impacts as they arise and to ensure that the necessary mitigation measures are implemented. Should the project be approved, it is recommended that sampling points SW4 and SW5 in Table 4-4, form part of the water quality monitoring programme and that the parameters specified in Table 4-5 are monitored.

Water quality sampling should be done in accordance with the DWS Best Practice Guideline G3: Water Monitoring Systems. Samples must be kept cool (+-4°C), out of direct sunlight, and should be transported immediately to an accredited laboratory for water quality analysis within 24 hours of sampling. The impacts on water quality should be determined by comparing the monitoring results against the guideline limits provided in Table 4-5 and Table 4-6 (or as specified by the DWS), and importantly against previous results, to determine any deviations in trends over time. If the trend analysis indicates any deviations to the baseline monitoring, in terms of deteriorating water quality, then an immediate investigation must be undertaken to determine whether the operation may be responsible. If responsible, urgent action must be undertaken to implement mitigation measures to prevent further contamination.

Reporting should be done on a 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.

5.6.2 Groundwater Monitoring

To monitor and prevent the spread of groundwater contamination, groundwater management procedures and practices have to be implemented that are in line with accepted practices and in accordance with the requirements of the Environmental Management Plan (EMP). It is recommended to implement the groundwater monitoring programme presented in this report. The key objectives of the groundwater monitoring programme are to:

- Detect short and long-term trends;
- Recognise changes in groundwater quality and levels;
- Measure impacts and define mitigation measures; and
- Develop improved monitoring systems.

Groundwater monitoring will be undertaken to establish the extent of contamination in the shallow weathered and deeper fractured aquifers, during and after the reclamation activities.

5.6.2.1 Monitoring Locations

A groundwater monitoring program must be implemented in the six new shallow and deep monitoring boreholes before reclamation commences and be maintained throughout the life of the project. It is not

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anticipated that additional monitoring boreholes will be required, based on the outcome of the impact assessment completed. The three sets of boreholes are close enough to the TSF to enable effective monitoring (Table 5-3). It is acknowledged that two sets of boreholes are currently dry. These should however continuously be checked and sampled if they are rewatered.

Table 5-3: Proposed groundwater monitoring positions

Monitoring ID	X Coordinate (WGTM 29)	Y Coordinate (WGTM 29)	Depth (m)	Purpose
Proposed new monitoring boreholes				
Lib1s and Lib1d* Lib2s and Lib2d* Lib3s and Lib3d	See Table 4-8			New monitoring boreholes, targeting shallow and deep aquifers immediately down gradient of the Libanon TSF

**Even though these boreholes are dry at present, continuous monitoring should be implemented, and the boreholes must be sampled for quality analyses if they are rewatered.*

5.6.2.2 Monitoring Requirements

It is recommended that groundwater levels are monitored in all the boreholes listed in Table 5-3 on a quarterly basis. This information is important to improve the understanding of water level fluctuations and groundwater level rise and fall in response to rainfall. This information will be interpreted at the hand of on-site rainfall figures and will be used to improve the conceptual understanding of the aquifers.

The monitoring program must be used to establish sound baseline conditions against which future impact assessments can be evaluated. To keep continuity with the baseline information presented in this report, it is recommended that the elements listed in the groundwater quality analyses in this report are included in the monitoring program. These represents the most significant elements applicable to the project. The monitoring requirements are presented in Table 5-4.

Table 5-4: Groundwater monitoring requirements

Monitoring parameter	Element for analysis	Monitoring frequency	Monitoring trigger-response criteria
Depth to groundwater level in boreholes	Groundwater level	Quarterly	Variations by more than 3 m for 2 consecutive months should be investigated.
Water quality analysis in all boreholes and surface water monitoring positions listed in Table 5-3.	All elements included in the current analysis	Quarterly	Variations in concentrations by more than 15% for major cations and anions and more than 7% for metal concentrations for more than 2 consecutive months should be investigated. Any result that exceeds specified water quality objectives must be investigated when it occurs.

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Rainfall	Rain depth (mm)	Daily on site	None

The monitoring trigger-response criteria listed in Table 5-4 must be reviewed on an annual basis and updated, based on the outcome of the monitoring programme results. All monitoring information must be entered into a spreadsheet for record keeping and analysis. Copies of the certificates of analyses must be kept on file for inspection. If significant exceedances are recorded during the monitoring programme, the following actions should be taken:

- Log the exceedances in the incident reporting system within 24-hours of it occurring.
- Undertake an investigation to identify causes of the exceedances.
- Implement the necessary remedial actions according to the outcome of the investigation and consultation with the affected parties.
- Report significant exceedances to the Environmental and General Managers as well as to the regulatory authority and track the incident until completion.

The results of the monitoring programme must be reported on a quarterly and annual basis for the purpose of internal FWGR water management. These reports must also be submitted to the authorities for review.

5.6.2.3 Groundwater Monitoring Reports

Monitoring reports must contain the following information:

- Monitoring borehole location map;
- Geology map;
- All coordinates of the groundwater sampling sites;
- Certificates of analysis must be included for quality assurance. Monitoring results will be compared to South African National Standards (SANS241) and the Wonderfontein catchment guideline limits;
- Time-series graphs for key indicator elements (e.g., pH, EC, TDS, Fe, Mn, Al, NO3, SO4);
- A discussion regarding observed trends and potential groundwater contamination; and
- Recommendations regarding possible amendments or additions to the groundwater monitoring programme, based on trends and other information observed.

5.6.3 Waste Monitoring

Waste will be monitored in accordance with FWGR's Waste Policy. Waste streams identified will be separated to monitor the quantities of different waste streams that are generated and disposed of.

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5.7. Risk Assessment / Best Practice Assessment

5.7.1 Construction Phase

5.7.1.1 Groundwater

Historical negative groundwater quality impacts have been observed in the new boreholes drilled at Libanon TSF during 2024. The groundwater presents salt and metal concentrations (e.g., Sulphate, Iron, Nickel and Manganese) that exceed SANS 241 Drinking Water Health Limits, as well as the Drinking Water Quality Objectives of the DWS.

The prescribed groundwater monitoring program in this report must be implemented in the six new shallow and deep monitoring boreholes before reclamation commences and be maintained throughout the life of the project. Based on good time-series monitoring data the impacts can be defined and delineated and additional mitigation measures implemented.

No additional impact is expected on the groundwater quantity and quality during the construction phase. Construction will be conducted in a relatively short period compared to the operational and post-closure phases. Additional impacts on the groundwater environment are therefore rated as Low.

In the long term, the reclamation of the TSF will have a positive impact on the groundwater environment as the current negative pollution source will be removed and with time the contaminant concentrations will reduce.

Table 5-5: Construction Phase water quality impacts

NATURE OF THE IMPACT: Impact on the local 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	Possible
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	Yes. Combined impact with other mining activities in the area, including landfill site activities and waste and sanitation management problems.	

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NATURE OF THE IMPACT: Impact on the local groundwater quality
Mitigation measures ❖ Implement a groundwater monitoring program at Libanon TSF before reclamation starts to effectively measure the groundwater status and impacts of the reclamation activities on the groundwater environment and changes in groundwater qualities and levels. ❖ Develop sound surface runoff management plans to ensure that all dirty runoff is contained and diverted to the paddocks. No pooling of water on surface allowed. ❖ Ensure that paddocks are designed to contain all dirty water generated during the reclamation process, to prevent overflows and spillages.

5.7.1.2 Surface Water

During the construction phase, vegetation will be cleared and temporary infrastructure will be erected. The construction phase will be approximately 1 year. The activities and impacts that are likely to occur during the construction phase are summarised in Table 5-6.

Table 5-6: Summary of activities and impacts for the construction phase

Activity	Impact Description
Removal of vegetation and alteration to the topography.	Erosion and wash off of exposed soils leading to siltation in down gradient watercourses.

The ratings and proposed mitigation measures for the construction phase are provided in Table 5-7.

Table 5-7: Significance rating for the construction phase

NATURE OF IMPACT: The removal of vegetation will expose soils to water erosion that may lead to a deterioration in water quality		
	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)	Short term	Short term
Magnitude (Major, Moderate, Minor)	Moderate	Minor
Probability (Definite, Possible, Unlikely)	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None foreseen		

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NATURE OF IMPACT: The removal of vegetation will expose soils to water erosion that may lead to a deterioration in water quality
Mitigation measures • Clearance of vegetation must be limited as far as possible; • Temporary erosion measures such as sediment nets should be employed around exposed working areas; • The SWMP must be implemented as a first step during the construction phase; and • Water quality monitoring must be implemented upstream and downstream of construction sites.

5.7.1.3 Wetlands

The assessed wetlands exhibit impacts at local scale. These impacts result from present and historical land use relating to agricultural practices, developing in or in near proximity to wetlands and mining activities which have transformed the wetland habitats and has altered their natural hydrological regime and vegetation composition. The list below refers to the present-day local impacts observed within the assessed wetland areas:

- Wetland disturbance from grazing activities and other agricultural practises (crop fields);
- Altered hydrological inputs resulting from changes to the surrounding landscape;
- Altered geomorphology from historical agricultural practices;
- Loss of wetland vegetation from continual disturbances, historical land use and the establishment of alien invasive flora species in some approaches of the wetlands; and
- Wetland degradation from mining activities.

Table 5-8: Mitigated DWS Risk Assessment Matrix for wetlands in relation to the proposed development

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Site clearing and preparation.	Disturbance and degradation of wetland vegetation	**12,6**	**L**	High
		Increased bare surfaces, runoff and potential for erosion	**8,4**	**L**	High
		Introduction and spread of alien and invasive vegetation	**16,2**	**L**	High
	Excavation, levelling and installation of the structures.	Increased sediment loads to downstream reaches	**8,4**	**L**	High
		Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as Contamination and eutrophication of wetland systems with human sewerage and litter.	**18**	**L**	High
		Degradation of wetland vegetation.	**15,6**	**L**	High

	Routine operation and maintenance of the structures	Proliferation of alien and invasive species	**16,2**	**L**	High

5.7.1.3.1 Mitigation Measures

In light of the expected impacts from proposed activities the following mitigation measures have been proposed to lower the intensity of the impacts on the ecological integrity of the wetlands.

The focus of mitigation measures should be to reduce the significance of potential environmental impacts associated with the proposed development and thereby to:

- Prevent the unnecessary destruction and fragmentation of the vegetation community of the wetland areas; and
- Limit the construction area to the defined project areas and only impact those areas where it is unavoidable to do so otherwise.

5.7.1.3.1.1 Development Specific Mitigation Measures

The following pipeline development specific mitigation measures are provided:

- Adherence to the buffer areas. These should be visibly demarcated to avoid encroachment into these areas;
- Silt traps and sediment trapping berms must be in place around drainage lines around the construction site to prevent the movement of contaminated or sediment laden runoff from entering the wetlands;
- Erosion prevention and sediment control measures (wetland and drainage line) are imperative and need to be implemented throughout the entire project footprint area of the proposed development, access roads and temporary laydown / storage sites. Temporary erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching; and
- All removed soil and material must not be stockpiled within the watercourse and buffers. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.

5.7.1.3.1.2 Erosion and Sedimentation of Watercourse

The alteration of surface topography and hydrology for the project infrastructure will inevitably be accompanied by an increase in erosion and sedimentation as rainwater erodes and washes exposed soils (active working and exposed areas) into the watercourses. This is a key consideration for the project due to the current levels of exposed soils within watercourses.

Mitigation:

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- Loose soils are particularly prone to loss due to wind or water. It is therefore preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;
- Practice good soil management across the construction footprint;
- Avoid the creation of concentrated flow paths wherever possible;
- Signs of erosion must be addressed immediately to prevent further erosion of the area to prevent head cut erosion from forming;
- Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching;
- Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;
- Relandscape to gentler gradients and re-vegetate all cleared areas, which includes the areas adjacent to the proposed infrastructure, as soon as possible to limit erosion potential. Sandbags and geotextiles should be used to assist until vegetation has established in these reworked areas;
- Stem any head cut/ erosion gulley as it occurs by bulldozing, filling, re-contouring to gentler gradients and re-vegetating; and
- The rehabilitation of watercourse banks must take place following construction. Key areas where erosion has occurred should be rehabilitated through bank reprofiling to gentler gradients and the revegetation of the wetland periphery areas.

5.7.1.3.1.3 General Mitigation Measures

- It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;
- The wetland areas outside of the specific project site area must be avoided where possible;
- The project should be relocated to outside of the wetland buffer zones, which would significantly reduce potential impacts to the systems;
- The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access;
- Laydown yards, camps and storage areas must be beyond the wetland areas. Where possible, the construction of the road and crossings must take place from the existing paths;
- Prevent uncontrolled access of vehicles through the watercourses that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- All chemicals and toxicants to be used for the construction must be stored outside the watercourse areas and their respective buffers and in a bunded area;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site in a designated area;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;

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- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel within the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems;
- The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;
- All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the watercourse buffers. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Mixing of concrete must under no circumstances take place within the drainage or wetland systems. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished;
- No dumping of construction material on-site may take place;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and
- Consideration should be given to implementing an alien invasive plant management plan post construction to control any current invaded areas and prevent the growth of alien invasive species on cleared areas.

5.7.2 Operational Phase

5.7.2.1 Groundwater

Table 5-9: Operational phase water quality impacts

NATURE OF THE IMPACT: Groundwater pollution during reclamation		
	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 term	Long term
Magnitude (Major, Moderate, Minor)	Major -	Moderate -
Probability (Definite, Possible, Unlikely)	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	

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NATURE OF THE IMPACT: Groundwater pollution during reclamation	
Cumulative impacts (yes or no)	Yes. Combined impact with other mining activities in the area, including landfill site activities and waste and sanitation management problems.
Mitigation measures ❖ Develop sound surface runoff management plans to ensure that all dirty runoff is contained and diverted to the paddocks. No pooling of water on surface allowed. ❖ Commit to remove all tailings material and to monitor the quality of soils in the footprint areas. If soil monitoring suggests unacceptably high salt and metal concentrations, soil amelioration should be considered. ❖ Monitor groundwater quality in all boreholes identified. The groundwater monitoring network efficiency must be assessed and new monitoring boreholes drilled, if required. Additional mitigation measures need to be implemented if pollution is migrating off site. ❖ Ensure that paddocks can contain all dirty water generated during the reclamation process to prevent overflows and spillages.	

Table 5-10: Operational Phase water quantity impacts

NATURE OF THE IMPACT: Reduction in aquifer yield		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (positive or negative)	**Positive**	**Positive**
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Medium Term > 18 months < 5 years	Medium Term > 18 months < 5 years
Magnitude (Major, Moderate, Minor)	Minor -	Minor +
Probability (Definite, Possible, Unlikely)	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Mitigation measures ❖ Develop sound surface runoff management plans to ensure that all dirty runoff is contained and diverted to the paddocks. No pooling of water on surface allowed. ❖ Ensure that paddocks can contain all dirty water generated during the reclamation process to prevent overflows and spillages. ❖ Monitor groundwater levels in all boreholes.		

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5.7.2.2 Surface Water

During the operational phase, hydraulic reclamation will take place. The operational phase will be approximately 6 years.

The mixing of water with the tailings material during hydraulic mining, will add water and oxygen to the material, which could potentially result in acidic water, with leaching of metals and salts. It is therefore imperative that dirty water is kept within the TSF footprint through the implementation of a closed SWMP.

Poor maintenance of stormwater infrastructure such as the silting up of paddocks, as well as the erosion of berms, can result in spills from the operation. It is therefore important that stormwater infrastructure is regularly monitored and maintained as outlined in the EMPr.

The activities and impacts that could potentially occur during the operational phase are summarised in Table 5-11.

Table 5-11: Summary of activities and impacts for the operational phase

Activity	Impact Description
Uncontained runoff from the operational areas at the TSF.	**Impact 1:** Runoff into the downslope watercourses impacting on water quality.
Poor maintenance of stormwater infrastructure.	**Impact 2:** Silted paddocks and channels as well as eroded berms which lead to spills into the downslope watercourses impacting on water quality.

The ratings and proposed mitigation measures for the operational phase are indicated in Table 5-12 and Table 5-11.

Table 5-12: Significance rating of operational impact 1

NATURE OF IMPACT 1: Uncontained runoff from the operational area at the TSF running off into the downslope watercourses impacting on water quality		
	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)	Medium term	Medium term
Magnitude (Major, Moderate, Minor)	Major	Moderate
Probability (Definite, Possible, Unlikely)	Definite	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Medium**

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NATURE OF IMPACT 1: Uncontained runoff from the operational area at the TSF running off into the downslope watercourses impacting on water quality	
Reversibility: (Reversible or Irreversible)	Irreversible
Irreplaceable loss of resources: (Yes or No)	No
Can impacts be enhanced: (Yes or No)	Yes
Residual impacts • None, as the impact will cease provided that rehabilitation is done appropriately.	
Mitigation measures • Implementation of the proposed SWMP. It must be ensured that stormwater measures are designed, constructed and operated, to ensure that stormwater does not spill more than once in 50 years, in order to be compliant with GN R704 regulations; and • Water quality monitoring must be implemented upstream and downstream of the mining activities.	

Table 5-13: Significance rating of operational impact 2

NATURE OF IMPACT 2: Poor maintenance of stormwater infrastructure resulting in silted channels, paddocks and eroded berms, leading to spills into the downslope watercourses impacting on water quality		
	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 term	Medium term
Magnitude (Major, Moderate, Minor)	Major	Moderate
Probability (Definite, Possible, Unlikely)	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	High	**Medium**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None, as the impact will cease provided that rehabilitation is done appropriately.		
Mitigation measures • Implementation of the stormwater monitoring plan detailed in this report.		

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5.7.2.3 Wetlands

The following impacts have been identified during the operational phase:

Table 5-14: Mitigated DWS Risk Assessment Matrix for Wetlands in relation to the proposed development: Operational phase.

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
OPERATIONAL	Routine operation and maintenance of the structures	Degradation of wetland vegetation.	**13,2**	**L**	High
		Proliferation of alien and invasive species	**10,8**	**L**	High

The identified mitigation measures have been discussed in section 5.7.1.3.1.

5.7.3 Decommissioning Phase

5.7.3.1 Groundwater

Groundwater Quality

Table 5-15: Decommissioning and Closure Phase water quality impacts

NATURE OF THE IMPACT: Water quality impacts when TSF has been removed		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (positive or negative)	**Positive**	**Positive**
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Long term	Long term
Magnitude (Major, Moderate, Minor)	Minor +	Moderate +
Probability (Definite, Possible, Unlikely)	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	Yes. Combined impact with other mining activities in the area, including landfill activities and waste and sanitation management problems.	

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NATURE OF THE IMPACT: Water quality impacts when TSF has been removed
Mitigation measures ❖ Monitor groundwater quality in all boreholes. ❖ Maintain sound surface runoff management to ensure that all dirty runoff is contained and diverted to the paddocks.

Groundwater Quantity

Table 5-16: Decommissioning Phase water quantity impacts

NATURE OF THE IMPACT: Reduction in aquifer yield		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (positive or negative)	**Positive**	**Positive**
Extent (Local, Regional, International)	Local	Local
Duration (Short term, Medium term, Long term)	Medium Term > 18 months < 5 years	Medium Term > 18 months < 5 years
Magnitude (Major, Moderate, Minor)	Minor +	Minor +
Probability (Definite, Possible, Unlikely)	Definite	Definite
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	No	
Mitigation measures ❖ Monitor groundwater levels in all boreholes.		

5.7.3.2 Surface Water

As reclamation progresses to ground level, the TSF footprint will continue to be sectioned off into paddocks. This will be a short-term measure to prevent contaminated runoff from flowing offsite. The area will be assessed for contamination (particularly in terms of radiation). Contaminated soil will be removed and backfilled with uncontaminated soil. The land will be levelled to its original functioning topography and will be re-vegetated.

The activities and impacts that are likely to occur during the closure and rehabilitation phase are summarised in Table 5-17.

Table 5-17: Summary of activities and impacts for the closure and rehabilitation phase

Activity	Impact Description
Exposure of potential contaminated soils during the closure and rehabilitation phase once the TSF has been removed.	Erosion and wash off of contaminated soils resulting in water quality issues in the surrounding watercourses.

The ratings and proposed mitigation measures for the closure and rehabilitation phase are indicated in Table 5-18.

Table 5-18: Significance rating of closure impact 1

NATURE OF IMPACT: Erosion and wash off of potential exposed contaminated 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)	Regional	Local
Duration (Short term, Medium term, Long term)	Long term	Medium term
Magnitude (Major, Moderate, Minor)	Major	Minor
Probability (Definite, Possible, Unlikely)	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Low**
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • Possible, unless potential spills are rehabilitated.		
Mitigation measures • Runoff must be contained onsite through the implementation of paddocks until any contaminated soils are removed; • Once contaminated soils are removed, the area must be backfilled with uncontaminated soils, and levelled to its original functioning topography and re-vegetated; and • Water quality monitoring must continue upstream and downstream until the site has been fully rehabilitated.		

5.7.3.3 Wetlands

The following impacts have been identified in the decommissioning phase.

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Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
DECOMMISSIONING	Removal of the structures	Degradation of wetland vegetation and proliferation of alien and invasive species	**10,8**	**L**	High
		Increased bare surfaces, runoff and potential for erosion	**12,6**	**L**	High

The identified mitigation measures have been discussed in section 5.7.1.3.1.

5.7.4 Post-decommissioning Phase

The following activities are expected to occur during the post-closure phase of the project.

5.7.4.1 Groundwater

The preferred remediation strategy for the Libanon TSF is to remove all tailings material. Once the footprint has been cleaned, it must be rehabilitated and made free draining. Soil samples must be taken once rehabilitation has been completed for leach tests. The outcome of these tests must be used to confirm long-term risk of contamination to groundwater quality presented in this IWWMP and the associated Groundwater Impact Assessment.

5.7.4.2 Surface Water

Should rehabilitation be successfully implemented, then it is unlikely that any negative impacts will occur during the post closure phase. The removal of the TSF will result in a long-term positive impact on the surrounding watercourses, provided that rehabilitation is successfully implemented.

5.7.5 Cumulative Impacts

5.7.5.1 Groundwater

Cumulative impacts 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 high salt or metal loads to a river that combine to cause a reduction in the use of the resource 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 and can include both direct and indirect impacts.

The Libanon TSF project is near mining activities, a landfill site, agricultural activities and formal residential developments. Cumulatively all these activities contribute to the surface and groundwater quality

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impacts identified during the Libanon TSF study and could also impact the groundwater resources, especially in terms of quality.

Establishing a groundwater monitoring program is required to assess the implications that reclamation will have on the aquifers and to identify if poor quality groundwater will reach a sensitive receptor. The monitoring data recorded as operations progress must be used to update the monitoring program.

Table 5-19: Cumulative impact rating for groundwater

	OVERALL IMPACT OF THE PROJECT CONSIDERED IN ISOLATION	CUMULATIVE IMPACT OF THE PROJECT AND OTHER PROJECTS IN THE AREA
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	Major
Probability *(Definite, Possible, Unlikely)*	Definite	Definite
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	Reversible
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	Yes	Yes
Mitigation measures ❖ Ensure that contaminated surface and groundwater from the adjacent mining and landfill activities are effectively managed and that polluted water is not allowed to enter the Wonderfonteinspruit.		

5.7.5.2 Surface Water

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 of time and can include both direct and indirect impacts.

The project is located in a catchment that is highly impacted by mining and urban activities. The implementation of a sound SWMP is crucial to contain contaminated runoff from the operational area.

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The monitoring and maintenance of the implemented SWMP is of utmost importance, to ensure that dirty water is contained at the site. The removal of the TSF and the implementation of a rehabilitation plan that ensures that the site is returned to its original topography and re-vegetated, could enhance the catchment water quality. Should the above not be done, then in the long term, the proposed project has the potential to cumulatively add to the already deteriorated water quality of the Wonderfonteinspruit catchment.

The cumulative impact of the proposed project on the surface water quality of the catchment is rated in Table 5-20.

Table 5-20: Cumulative impact rating for surface water quality

NATURE OF IMPACT: Should dirty water runoff not be contained during the operational phase, and an appropriate rehabilitation plan not successfully implemented post-mine closure, 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)	Regional	Local
Duration (Short term, Medium term, Long term)	Long term	Medium 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)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None, provided that the tailings material is removed, and appropriate rehabilitation is undertaken.		
Mitigation measures • Effective stormwater management that captures and contains all site runoff; • Removal of all tailing's material and successful rehabilitation of the area to a vegetated and free draining area; and • Water quality monitoring upstream and downstream of the proposed project until rehabilitation is successfully completed.		

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5.7.6 Unplanned Events, Risks and Management Measures

Table 5-21: Potential risks and management strategies

Potential Project Risk (Unplanned Occurrences)	Aspect Potentially Impacted	Mitigation / Management / Monitoring
Hydrocarbon spills from vehicles and heavy machinery or hazardous materials or waste storage facilities.	Hydrocarbon contamination of surrounding surface water resources through surface water runoff.	❖ Hydrocarbons and hazardous materials must be stored in bunded areas that are sized according to legislated requirements; ❖ Refuelling must take place on lined and contained areas; ❖ Ensure that silt, oil traps and sumps are in good working condition and are serviced regularly; and ❖ Vehicles and heavy machinery should be serviced and checked on a regularly basis to prevent leakages and spills.
Spill/leaks from the proposed slurry pipeline.	Contamination of surface water resources.	❖ Regular inspections of the pipeline for any leaks.
Sedimentation and erosion of storm water management infrastructure.	Overflow of dirty water contaminating clean areas.	❖ Regular inspections of stormwater management infrastructure, especially after large storm events.

5.8. Public Participation

The Public Participation Process (PPP) has been developed to ensure compliance with the IEA and the IWULA processes. The PPP offers stakeholders a fair opportunity to be informed about the Proposed Project, to raise issues of concern and to make suggestions for enhanced project benefits. The project team has considered all relevant issues and suggestions during the IWULA process.

The primary objectives of the PPP include:

- ❖ Meaningful and timeous participation of I&APs;
- ❖ Identification of issues and concerns of key stakeholders and I&APs with regards to the proposed development, i.e. focus on important issues;
- ❖ Promotion of transparency and an understanding of the proposed project and its potential environmental (social and biophysical) impacts;
- ❖ Accountability for information used for decision-making;
- ❖ Serving as a structure for liaison and communication with I&APs;
- ❖ Assisting in identifying potential environmental (social and biophysical) impacts associated with the proposed development; and

- Inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process).

The PPP for this Proposed Project has been undertaken as per the Public Participation Report included in this report as **Appendix C**. Issues and responses documented during the public consultation process can be found in the Comments and Responses Report (CRR) attached as **Appendix C**.

5.8.1 Matters Requiring Attention/Problem Statement

The key issues to be addressed are:

- Dust that could emanate from the reclamation process; and
- Community benefits and local employment opportunities.

5.9. Assessment of Level and Confidence of Information

Detailed specialist studies have been conducted as part of the impact assessment for the Proposed Project development and the level of confidence of the information provided is medium to high level. More detailed information on the surface and groundwater quality impacts can only be determined once the project is operational, with real time data monitoring and information being interpreted.

5.10. Master Layout Plan

The master layout plan inclusive of the proposed water uses, groundwater monitoring points, surface water monitoring points, regulated areas and associated buffers is shown in Figure 5-7.

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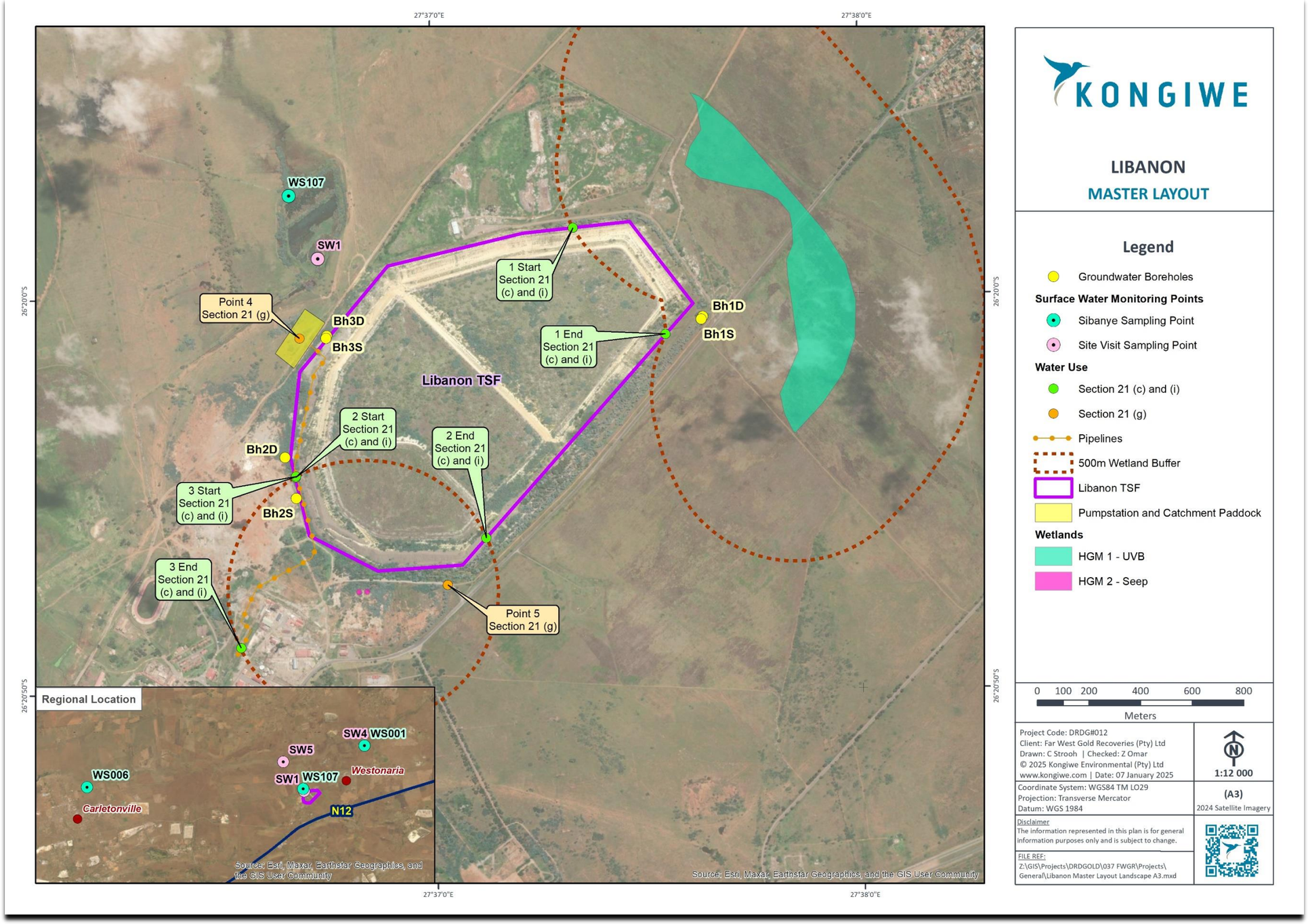


Figure 5-7: Master Layout Plan

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6 Water and Waste Management

6.1. Water and Waste Management Philosophy (Process Water, Stormwater, Groundwater and Waste)

The water and waste management philosophy for the Proposed Project is based upon both FWGR and the Department of Water Affairs and Forestry (DWAF) (now the DWS) principles and guidelines for water and waste management.

BPGs have been provided by the DWAF for the management of water within the mining sector based on international guidelines for the sustainable use of water. The principles contained in the Constitution of South Africa, 1996 govern the BPG. These principles aim at achieving the right to equitable water access, sustainable water use as well as effective and efficient water use for ideal social and economic development. Furthermore, the National Water Policy and National Water Resource Strategy guide the principles and guidelines contained in the BPG. The BPG is a series that currently consists of three separate sections made up of the following groupings: water management hierarchy, general water management strategies and specific water management activities and aspects. The guidelines are based on the precautionary principle aiming at first preventing pollution and/or water use, then minimising water use and/or impacts and finally if the first two cannot be achieved the use, discharge and disposal of waste and/or wastewater. The Integrated Water Resource Management strategy was introduced in the NWA to ensure that all aspects of the water resource is maintained in a sustainable manner. This includes the use of both resource and source directed methods. These strategies aid as a guideline for the planning of the EMPr and WUL, the development and implementation of the IWWMP as well as the post mining closure strategy. Any water use and/or pollution must take into consideration the RQOs, site-specific, regional and national impacts.

FWGR's water and waste management philosophy and practices are embedded in the commitments outlined in DRDGOLD's Sustainability Policy. The policy makes a commitment to actively pursue best practical environmental practice for each activity that may potentially negatively affect the environment and concerned communities. With respect to efficient use of natural water resource it stipulates:

"*… we are committed to reducing reliance on potable water and securing a sustainable supply of recycled water from sewage works and [Acid Mine Drainage] (AMD) treatment facilities*."

And further,

"W*e are committed to effective pollution control and water management; and will be responsible custodians of the land we manage*."

Based on these commitments and underpinning principles for natural resource management, water and waste management practices for the project is aimed at efficient use of water, pollution control and responsible waste generation and management.

FWGR is committed to the following in regard to the Libanon TSF Reclamation project:

- To plan, design, construct, operate, decommission and close the proposed projects in a responsible manner, and in accordance with its policies, strategies and all applicable legislative requirements;
- To minimise the impacts on the receiving environment by limiting the extent of the project footprint and by properly implementing engineered barriers, where possible, to prevent seepage of contaminants.
- To the implementation of long-term water management measures and to conduct the required monitoring during all phases of the project; and
- To implement technically proven and acceptable rehabilitation measures during the operational, decommissioning and closure phases.

6.2. Strategies

To give effect to the water and waste management philosophies discussed in the previous chapters, the following strategies will be implemented:

6.2.1 Surface Water

- Construct and maintain adequate storm water control measures to keep clean and dirty water separate; and
- Monitor water quality at the identified monitoring positions.

6.2.2 Groundwater

- Minimise the impact on groundwater resources through the design and construction of engineered barriers for all potential pollution sources;
- Implement ongoing monitoring of groundwater quality and levels to inform the detailed geochemical impact predictions and to validate groundwater models; and
- Implement long term water management strategies by managing groundwater levels and prevent dirty water seepage.

6.2.3 Stormwater

- Separation of clean and dirty water in accordance with the requirements of the GN R704;
- Collection, containment and conveyance of both clean and dirty water in adequately sized water management infrastructure as stipulated in GN R704; and
- On-going monitoring and measurement of water quantity and quality to support the wide water balance and water management.

6.2.4 Waste

- Implement waste separation;
- Maximise recycling and reuse of waste streams;
- Dispose of waste on authorised waste disposal facilities in accordance with legal requirements;
- Implement on-going waste monitoring to inform waste management; and
- Identification and rehabilitate contaminated land.

6.2.5 Process Water

- Source process water from Kloof Shaft 10# ; and
- Recycle as much water as practically possible during operations to feed FWGR's closed water system.

6.2.6 Potable Water

- Source water from Rand Water or RWLM or existing pipeline infrastructure;
- With a contingency for water storage tanks.

6.3. Performance Objectives

The overall objective of water and waste management is to reduce or mitigate negative environmental consequences resulting from the project and to limit negative impacts as far as possible. The environmental objectives are to ensure that all necessary steps will be taken to ensure the following with regard to the identified reclamation impacts:

- That appropriate pollution control and other environmental protection measures are taken by the applicant, in accordance with all applicable laws and regulations;
- That the applicant will not degrade the degree of environmental setting beyond existing environmental conditions; and
- That socio-economic and bio-physical conditions will be addressed to ensure that negative impacts associated with the project are kept to a minimum.

The following specific performance objectives have been identified for the project:

- Develop and update the water balance annually or as will be required by the WUL;
- Contain dirty storm water;
- Monitor and record ambient water quality in the receiving surface water and various points on site to confirm/ assess the effectiveness of the implemented water pollution control measures;
- Prevent erosion;
- Assess the impact/s that project is having on local groundwater and surface water resources;
- Monitor groundwater levels; and
- Monitor the wetland areas.

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6.4. Measures to Achieve and Sustain Performance Objectives

Management activities and mitigation measures will be implemented during construction, operation and decommissioning/closure phases at both project sites in to achieve the required performance objectives.

The following measures have been identified to achieve the set performance objectives (Table 6-1):

Table 6-1: Performance objectives relevant to Libanon TSF Reclamation project

Performance Objectives	Management Measure
Process Water	
Update water balance	Update water balance annually or implement a water balance model that can be updated as needed
Surface Water	
Contain dirty storm water	Construct and maintain adequate storm water control measures to keep clean and dirty water separate
	Maintain pollution control dams and re-use stored water on site where possible
Minimise the contamination of surface water resources	Monitor water quality at the surface water monitoring points identified and compare them with the baseline water qualities to assess the effectiveness of the implemented water pollution control measures
	Interpret the results and institute remedial action as required
Groundwater	
Minimise the impact on local groundwater resources	Implement dedicated groundwater quality monitoring as required
	Implement the required monitoring to confirm the success of the implemented groundwater protection/mitigation measures
Maintain groundwater levels if possible	Implement dedicated groundwater monitoring to determine water levels compared to baseline water levels
Sensitive Landscapes	
Minimise impact on the wetlands and sensitive areas in and around the reclamation boundary	Implement a wetland monitoring programme to assess the ongoing impacts on the wetlands in and around the reclamation area to determine changes and loss of vulnerable wetland types

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6.5. Option Analyses and Motivation for Implementation of Preferred Options

6.5.1 The Property on which or Location where the Activity is Proposed to be Undertaken

The Proposed Project involves the reclamation and reprocessing of the already existing TSF. Therefore, there are **no alternative sites**.

6.5.2 The Type of Activity to be Undertaken

The only optional activity for FWGR is to reclaim and reprocess the existing Libanon TSF. Gold reclamation and processing is the recovery and treatment of gold surface tailings generated from historical underground mining operations. According to DRDGOLD (2018), the retreatment business is high-volume and low risk. Vast quantities of material are processed monthly through their plants to recover gold from old mine dumps at a recovery rate that varies depending on the material being treated.

The depleting quantity and quality of gold recovered from underground mining operations in the province versus the extensive safety and environmental risks, as well as the labour and electricity costs associated with the activity, has seen an underlining increase in the attractiveness of gold tailings reclamation. This, together with the incentive to find a solution to Gauteng's TSF-related issues, has led to the 'Preferred Activity'.

6.5.3 Reclamation and Reprocessing of Surface Tailings

The reclamation of the Libanon TSF is the "Preferred Activity" and there are no alternatives. The TSF will be reclaimed using hydraulic reclamation. As mentioned in Section 2.1, this technique uses high-pressure water monitor guns (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF.

6.5.4 The Design and Layout of the Activity

The current layout plan alternatives for the Proposed Project are considered as the preferred layout plan. The layout plan is dictated by the existing location of the TSF, its associated infrastructure and the route of the proposed process water pipeline route.

Existing paddocks surrounding the TSF will need to be desilted and/or reinstated. The paddocks are provided to capture storm water flow from the side slopes of the TSF in the event of a rain event. A catchment paddock will be constructed as part of the reclamation station to capture material in the case of an electricity trip out or flooding of the pumpstation due to storm water. The lined catchment paddock below the pump station will be fitted with a slurry pump to pump material back into the reticulation circuit and thus keep this catchment paddock empty so that it can contain unforeseen events. This infrastructure will be lined to prevent any contamination of the surrounding environment.

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6.5.5 The Technology to be Used in the Activity

No alternatives exist for the Proposed Project. The preferred options, in terms of recycling, water and energy have been described below.

6.5.5.1 Recycling

The reclamation project will, in its operational phase, implement recycling policies and measures for optimal utilisation of resources and minimisation of waste generation.

6.5.5.2 Water

Water utilisation will be maximised through recycling of dirty water within the process operations.

6.5.5.3 Energy

Fuel types will be investigated as well as energy conserving measures will be implemented. Where solar energy can be utilised, it will be implemented.

6.5.6 The Operational Aspects of the Activity

The Proposed Project will convey the reclaimed tailings via pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation. The process water required for the operation will be transported to site from Kloof Shaft 10# via a process water pipeline.

The slurry residue will be deposited onto the RTSF.

6.5.6.1 Processing Plant Options

There are no alternatives to the processing plant as all reclaimed slurry will be processed at the existing Driefontein No. 2 Plant.

6.5.6.2 Transport Options

There are no alternative means of transporting the reclaimed slurry and process water because all pipelines are already in existence.

6.5.7 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 implies that both negative and positive impacts would not take place. As such, the short-term negative impacts on the environment would not transpire; equally so, the long-term positive impacts such as environmental pollution source removal, economic development,

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employment creation, skills development, poverty alleviation and the availability of land for redevelopment would not occur. The “No-Go” Option also assumes the continuation of the current land use of the proposed reclamation area, implying the absence of any additional waste treatment activities and associated infrastructures.

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6.6. IWWMP Action Plan (Priority Actions and Other Short, Medium and Long Term Actions)

Table 6-2: Proposed Project's action plan

Performance Objectives	Management Measure	Responsible Department	Timeframe
Process Water			
Update water balance	Update water balance annually or implement a water balance model that can be updated as needed	Hydrology	Annually or as instructed by the DWS
Surface Water			
Contain dirty storm water	Construct and maintain adequate storm water control measures to keep clean and dirty water separate	Engineering / Environmental	Ongoing after authorisation
	Maintain pollution control dams and re-use stored water on site where possible		
Minimise the contamination of surface water resources	Monitor water quality at the surface water monitoring points identified and compare them with the baseline water qualities to assess the effectiveness of the implemented water pollution control measures	Environmental / Geology	Ongoing
	Interpret the results and institute remedial action as required	Geology/Hydrology	Ongoing
Groundwater			
Minimise the impact on local groundwater resources	Implement dedicated groundwater quality monitoring as required	Hydrology/Environmental/Management	Ongoing
	Implement the required monitoring to confirm the success of the implemented groundwater protection/mitigation measures		
Maintain groundwater levels if possible	Implement dedicated groundwater monitoring to determine water levels compared to baseline water levels		

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Performance Objectives	Management Measure	Responsible Department	Timeframe
Sensitive Landscapes			
Minimise impact on the wetlands and sensitive areas in and around the reclamation boundary	Implement a wetland monitoring programme to assess the ongoing impacts on the wetlands in and around the reclamation area to determine changes and loss of vulnerable wetland types	Management/Environmental	Ongoing

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6.7. Control and Monitoring

6.7.1 Monitoring of change in Baseline information

Reports of the updated Baseline information (for the project) will be submitted to the appropriate government departments as required and other formal institutions as stipulated by management objectives, conformance targets and applicable legislation and other legal requirements. All of these results will be shared with the DWS.

6.7.2 Audit and Report on Performance of Measures

The IWWMP action plan will be reviewed and updated annually or alternatively as required in terms of the WUL.

6.7.3 Audit and Report on Relevance of Action Plan

An audit on the IWWMP action plan should be conducted at least once annually by an independent external auditor, while internal audits should be conducted bi-annually.

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7 Conclusion

7.1. Regulatory Status of Activity

This is a new development, and the activities applied for are new water uses requiring authorisation. Activities will only commence once approval of all the relevant authorities has been granted. The proposed water uses are set out in Section 3.2.

7.2. Statement of Water Uses Requiring Authorisation, Dispensing with Licensing Requirement and Possible Exemption from Regulation

This is a new application and the water uses requiring authorisation are listed in Table 3-2.

There is no requirement for exemption from the GN 704 Regulations.

7.3. Key Commitments

FWGR is committed to the correct implementation of the IWWMP action plan contained in this report and the water use licence conditions that will be stipulated in the WUL once issued.

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9 Appendices

Appendix A: Surface Water Impact Assessment Report

Appendix B: Groundwater Impact Assessment Report

Appendix C: Public Participation Report

Appendix D: Wetland Impact Assessment Report

Appendix E: Stormwater Management Plan

Appendix A:
Surface Water Impact Assessment Report

Hydrological Study for the Proposed Reclamation of the Libanon Tailings Storage Facility

Project Number:

KON033

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Submission Date	6 December 2024
Author	Andy Pirie (Senior Hydrologist, M.Sc., *Pr.Sci.Nat.114988*)
Author Signature	

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DECLARATION OF INDEPENDENCE

I, Andy Pirie 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 the expertise in conducting the specialist study relevant to this application, including knowledge of the various Acts, regulations and any guidelines that have relevance to the proposed project;
- I will comply with the Acts, 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 71 and is punishable in terms of Section 24F of the Act.



Andy Pirie
Senior Hydrologist
Pr.Sci.Nat (reg no. 114988)

ACRONYMS AND ABBREVIATIONS

BPG	Best Practice Guideline
CV	Curriculum Vitae
DEM	Digital Elevation Model
DWS	Department of Water and Sanitation
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
FWGR	Far West Gold Recoveries
GN R704	Government Notice No. 704
IWULA	Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
km	Kilometres
kV	Kilovolt
kVA	Kilovolt-ampere
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
mamsl	metres above mean sea level
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
m	Metres
m^2	Square metres
m^3	Cubic metres
mm	Millimetres
mbgl	Metres below ground level
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
No.	Number
NWA	National Water Act, 1998 (Act No. 36 of 1998)
Pr.Sci.Nat.	Professional Natural Scientist
RQO	Resource Quality Objective
RTSF	Regional Tailings Storage Facility
TDS	Total Dissolved Solids
SWMP	Stormwater Management Plan
SANS	South African National Standards
SACNASP	South African Council for Natural Scientific Professions
SCS	Soil Conservation Service
TSF	Tailings Storage Facility
TWQR	Target Water Quality Range
WMA	Water Management Area
WRC	Water Research Commission

WR2012	Water Resources of South Africa, 2012 Study
WRTRP	West Rand Tailings Retreatment Project
WUL	Water Use Licence
WWTW	Wastewater Treatment Works

EXECUTIVE SUMMARY

Introduction and Background

Hydrospatial (Pty) Ltd was appointed by Kongiwe Environmental (Pty) Ltd (hereafter "Kongiwe") to conduct a surface water hydrological study for the proposed reclamation of the Libanon Tailings Storage Facilities (TSF) and associated pipeline (hereafter referred to as the "project"). This report provides the surface water hydrological study for the Environmental Impact Assessment (EIA) and Integrated Water Use Licence Application (IWULA) processes, that are being prepared by Kongiwe.

The project is located in the Rand West City Local Municipality, which falls within the Gauteng Province of South Africa. The towns of Westonaria and Randfontein are situated 3 kilometres (km) and 19 km to the north-east of the project, respectively.

It is Far West Gold Recoveries (FWGR) intention to reclaim and reprocess the gold residues of the Libanon TSF, with the slurry being processed at the existing Driefontein No. 2 Plant, and alternatively in the future at other existing gold plants. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised.

The proposed mining method which will be used to remove the Libanon TSF is referred to as top-down hydraulic mining. This technique uses high-pressure water monitors (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate tailings material from the dump. The water from the monitors mixes with the tailings and forms a slurry. The slurry then flows under gravity along trenches to a collection sump which is positioned at the lowest elevation of the bench being mined on the TSF. At the collection sump, finger screens remove debris that may impact the pumping station. The position of the collection sump may change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation pump station located at the topographically lowest available position below the TSF. To control the volume of slurry reporting to the reclamation station, a flapper valve is used to hold and release the slurry from the collection sump. The slurry will then be pumped via pipelines to the Driefontein No. 2 Plant, where the slurry will be prepared and treated for gold extraction and beneficiation. Residue from the gold extraction process will be pumped via approved pipelines to the Regional TSF (RTSF).

The following infrastructure is proposed:

- Reclamation infrastructure consisting of a pump station which include:
  - Slurry sump;
  - Penstock;
  - Vibrating Screen;
  - Water tank;
  - Motor control centre; and
  - Pump.
- A short connecting 600 millimetres (mm) pipeline for process water from Kloof Shaft 10#;

- A short connecting 550 mm pipeline that will connect to the slurry pipeline that goes to Driefontein No. 2 Plant;
- Stormwater management infrastructure that will include:
  - Water infrastructure and stormwater systems;
  - Existing catchment paddocks on the TSF footprint; and
  - Pollution control paddock.
- An 11 kilovolt (kV) overhead powerline capable of transmitting 3 kilovolt-ampere. (kVA) of electricity as well as electricity reticulation;
- Administration buildings, including change houses and ablution facilities;
- Access roads, routed from existing entry points; and
- Construction contractors' yards (temporary facilities).

Power will be supplied by Eskom and potable water will be purchased from Rand Water Board or the Municipality, with a contingency for portable JoJo tanks or a connection to existing water pipeline infrastructure.

Water required for reclamation activities will be sourced from dewatering that currently takes places at the nearby Kloof Shaft 10#, and will be conveyed through an existing process water pipeline to the project site for reuse in a closed-circuit system. FWGR are authorised to use 9 487 500 m^3/annum of water from the Kloof Shaft 10#. Water will also be sourced from the RTSF.

The anticipated life span of the project is approximately 12 years. It is expected that there would be a 1 year construction and ramp-up period, which would include the placement of infrastructure and site preparation, a 6 year operational phase where active hydraulic reclamation and mechanical removal would take place, a 2 year ramp-down period, and 3 years to rehabilitate the reclaimed site.

Once reclamation of the TSF is complete, the area will be assessed for contamination (particularly in terms of radiation). Contaminated soils will be removed, and the land will be levelled to its original functioning topography levels. Following rehabilitation, it is anticipated that the land will be returned to the landowner to use at their discretion. The project will reclaim the historic TSF and remove a pollution source from the area, aiding in the rehabilitation of the mining legacy left behind in the area.

Scope of Work

The scope of work included the following:

- Description of the baseline (current) surface water hydrology in terms of water quality and quantity. The purpose of the baseline is to ensure that a thorough understanding of the pre-mining surface water conditions is provided;
- Development of a water balance according to the DWS Best Practice Guideline G2: Water and Salt Balances. The water balance will provide the water volumes for the proposed project;

- An assessment of the potential surface water impacts and recommended mitigation measures; and
- Development of monitoring plans that can be used to monitor potential impacts resulting from the proposed project.

Baseline Hydrology

Rainfall data for the area was obtained from the DWS weather station C2E007 located at the Zuurbekom pump station, 19 km east of the project. This station is the closest available weather station to the project with a recent rainfall record and a similar altitude. Rainfall data was extracted for the period between October 2002 – September 2020, which was the most recent and complete record available. The area has a Mean Annual Precipitation (MAP) of 685 mm. Rainfall is highest over the summer months of October to April, with January generally being the wettest month. The remaining winter months receive much less rain, with July being the driest month. Symons Pan (S-Pan) evaporation data was sourced from C2E007 and was converted into open water evaporation. The open water Mean Annual Evaporation (MAE) is 1 267 mm, with evaporation being highest over the warmer months of September to March, and lowest over the cooler months of April to August.

The project is located in quaternary catchment C23D which forms part of the Vaal Water Management Area (WMA). Drainage of the site is in a north-westerly direction towards the Wonderfonteinspruit. The 1:50 000 topographical data for the area shows that a non-perennial drainage line occurs to the north-east of the TSF, however, during the site visit, this area was found to be dry, and no defined channel could be located. According to TBC (2024), all wetlands within a 500 m radius of the project are artificially created. The Wonderfonteinspruit to the north of the TSF, which is the main river in the area, is dry all year around, due to the flow being diverted into a 1 m diameter pipeline near the upstream Donaldson Dam. In addition to this, due to dewatering of the underlying dolomite, large sinkholes have formed along the Wonderfonteinspruit and its tributaries, which consume any runoff generated.

The project is located on Malmani Dolomite which has been dewatered for several decades by the mines in the area. The land cover/use of the area is dominated by mining, agricultural, grassland and residential areas. The TSF and associated infrastructure are located within Land Type Ab7, which according to the Land Type database (Land Type Survey Staff, 1972 - 2006), is almost entirely dominated by Hutton soil forms, which are well drained permeable soils with soil depths of between 600 – 800 mm. Surface water in the region is primarily used for livestock watering and irrigation.

Water quality samples were obtained from the Wonderfonteinspruit and the Kloof Mine Biodam near to the Libanon TSF, and were compared to the Resource Quality Objectives (RQOs) for the Wonderfonteinspruit, as well as the DWS guideline limits for irrigation, livestock watering and aquatic ecosystems. The samples were analysed at Aquatico Laboratories in Centurion. In addition to the above, water quality data was also obtained from the report: Surface Water Study for the Sibanye-Stillwater Kloof Operations Environmental Management Programme and Water Use Licence Update (Hydrospatial, 2021). The following provides a summary of the water quality:

- pH exceeded the DWS irrigation limit at the Wonderfonteinspruit and Biodam. The high pH values that have been recorded are most likely due to agricultural, livestock and mining activities in the area;
- Electrical Conductivity (EC) and Total Dissolved Solids (TDS), which provide an indication of the dissolved salts in water, exceeded the irrigation limit along the Wonderfonteinspruit. Sodium, which contributes to elevated EC and TDS levels, followed a similar trend. The exceedances are likely due to agricultural and mining activities;
- Orthophosphate and nitrate were elevated along the Wonderfonteinspruit. These exceedances are most likely due to sewage runoff from the upstream settlements and Wastewater Treatment Works (WWTW);
- Aluminium exceeded the stringent DWS limit for aquatic ecosystems along the Wonderfonteinspruit, but was regularly within the RQO limit at all sampling points;
- Copper exceeded the RQO limit along the Wonderfonteinspruit;
- Zinc exceeded the DWS aquatic ecosystem limit at the Biodam, but was within the Kloof WUL limit at this sampling point. Zinc also exceeded the DWS aquatic ecosystem limit along the Wonderfonteinspruit on a number of occasions;
- Manganese exceeded the DWS aquatic ecosystem limit along the Wonderfonteinspruit; and
- Uranium was within limits at all of the points sampled during the site visit, however, uranium regularly exceeded the RQO limit along the Wonderfonteinspruit from the information obtained from Hydrospatial (2021).

Stormwater Management Plan

Waiting for the engineers to provide the stormwater management plan.

Water Balance

A monthly water balance was setup in Microsoft Excel spreadsheet format, to estimate the volumes of water for the project. The water balance was setup to simulate the average yearly, average dry and average wet season volumes. The following provides a summary of the main outcomes of the water balance:

- The reclamation water requirement is 6 337 495 m^3/annum. This water will be sourced from the Kloof Shaft 10# (5 055 615 m^3/annum), whilst the RTSF can supply up to 25 386 115 m^3/annum;
- Runoff from reclamation activities reporting to the collection sump is expected to be in the order of 5 070 000 m^3/annum (422 500 m^3/month);
- On average, 5 089 296 m^3/annum (424 108 m^3/month) is estimated to report to the reclamation pump station, which will be pumped to the Driefontein No. 2 Plant; and
- The potable water requirement was calculated to be 372 m^3/annum (31 m^3/month).

Surface Water Impact Assessment

The surface water impact assessment showed that the main identified impacts are the following:

- Uncontained runoff of dirty water from the operational area at the TSF running off into the downslope watercourses. This can be mitigated by the implementation of a closed SWMP that captures and contains all dirty water runoff from the site;
- Poor maintenance of stormwater infrastructure such as silted paddocks and eroded berms, that can lead to overflows and spills into the downslope watercourses. This can be mitigated by the implementation of the monitoring plan detailed in this report; and
- Exposure of potential contaminated soils during the closure and rehabilitation phase once the TSF has been removed. This can be mitigated by runoff being contained onsite through the implementation of paddocks until the contaminated soils are removed. Once contaminated soils are removed, the area must be backfilled with uncontaminated soils, and levelled to its original functioning topography and re-vegetated.

Monitoring Plans

Monitoring plans for water quality and stormwater management are provided under section 7.

Conclusions and Recommendations

In conclusion, the most important aspect to prevent negative impacts from a surface water perspective, is to ensure that a sound SWMP is implemented prior to the commencement of reclamation activities, in accordance with the conditions stipulated in GN R704. Monitoring and maintenance of stormwater measures is of utmost importance and should be conducted as outlined in this report. The removal of the TSF is expected to have a positive long-term impact on the surrounding watercourses, provided that rehabilitation is successfully implemented.

Based on the findings of this report, the project can commence provided that the mitigation measures and monitoring plans are implemented.

1 INTRODUCTION AND BACKGROUND

Hydrospatial (Pty) Ltd was appointed by Kongiwe Environmental (Pty) Ltd (hereafter "Kongiwe") to conduct a surface water hydrological study for the proposed reclamation of the Libanon Tailings Storage Facilities (TSF) and associated pipeline (hereafter referred to as the "project"). This report provides the surface water hydrological study for the Environmental Impact Assessment (EIA) and Integrated Water Use Licence Application (IWULA) processes, that are being prepared by Kongiwe.

1.1 Project Location

The project is located in the Rand West City Local Municipality, which falls within the Gauteng Province of South Africa. The towns of Westonaria and Randfontein are situated 3 kilometres (km) and 19 km to the north-east of the project, respectively. Figure 1-1 indicates the location of the proposed project.

1.2 Project Description

Far West Gold Recoveries (Pty) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSFs are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto the Regional Tailings Storage Facility (RTSF).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the existing Driefontein No. 2 Plant, and alternatively in the future at other existing gold plants. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised.

1.2.1 Required Authorisations

The proposed project will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses, the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008), Category B Activities. An 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).

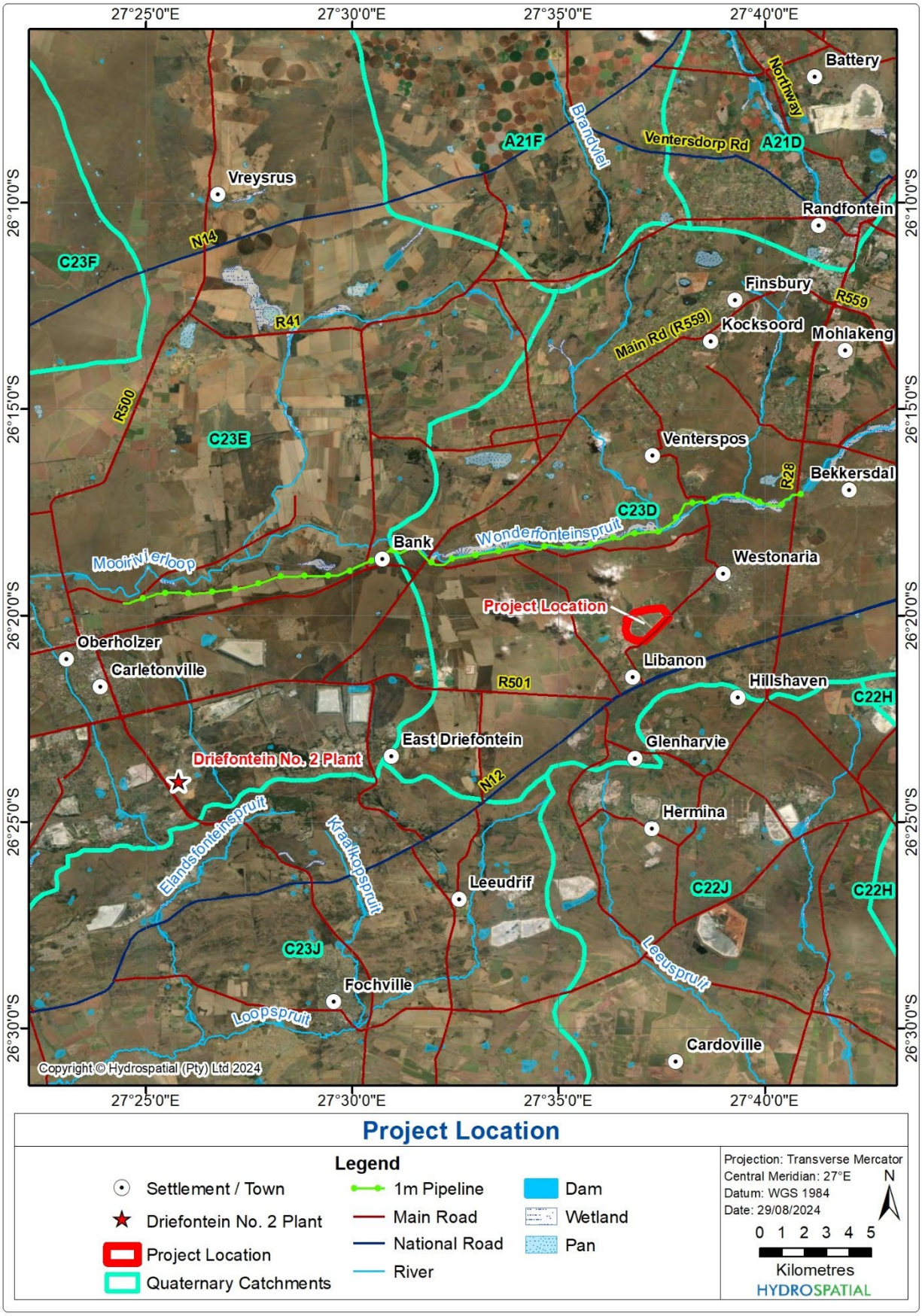


Figure 1-1: Location of the project

1.2.2 Mining Method

The proposed mining method which will be used to remove the Libanon TSF is referred to as top-down hydraulic mining. This technique uses high-pressure water monitors (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate tailings material from the dump (Figure 1-2). The water from the monitors mixes with the tailings and forms a slurry. The slurry then flows under gravity along trenches to a collection sump which is positioned at the lowest elevation of the bench being mined on the TSF. At the collection sump, finger screens remove debris that may impact the pumping station. The position of the collection sump may change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation pump station located at the topographically lowest available position below the TSF. To control the volume of slurry reporting to the reclamation station, a flapper valve is used to hold and release the slurry from the collection sump. The slurry will then be pumped via pipelines to the Driefontein No. 2 Plant, where the slurry will be prepared and treated for gold extraction and beneficiation. Residue from the gold extraction process will be pumped via approved pipelines to the RTSF.

Reclamation will take place in predetermined benches (or cuts) and will move unidirectionally until the entire TSF has been reclaimed. Generally, 15 m to 30 m cuts are made for reclamation as per Figure 1-3 below.



Figure 1-2: Mobile tracked hydraulic monitor on a tailings facility

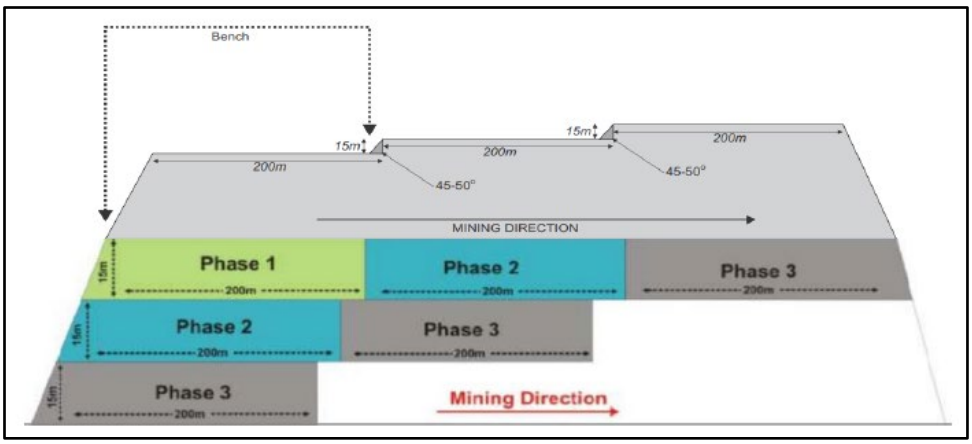


Figure 1-3: Typical bench widths and heights for gold reclamation from tailings facilities

1.2.3 Proposed Infrastructure

The following infrastructure is proposed:

- Reclamation infrastructure consisting of a pump station which include:
  - Slurry sump;
  - Penstock;
  - Vibrating Screen;
  - Water tank;
  - Motor control centre; and
  - Pump.
- A short connecting 600 millimetres (mm) pipeline for process water from Kloof Shaft 10#;
- A short connecting 550 mm pipeline that will connect to the slurry pipeline that goes to Driefontein No. 2 Plant;

- Stormwater management infrastructure that will include:
  - Water infrastructure and stormwater systems;
  - Existing catchment paddocks on the TSF footprint; and
  - Pollution control paddock.
- An 11 kilovolt (kV) overhead powerline capable of transmitting 3 kilovolt-ampere. (kVA) of electricity as well as electricity reticulation;
- Administration buildings, including change houses and ablution facilities;
- Access roads, routed from existing entry points; and
- Construction contractors' yards (temporary facilities).

The proposed infrastructure is indicated on Figure 1-4.

1.2.4 Water Sources and Power Supply

Power will be supplied by Eskom and potable water will be purchased from Rand Water Board or the Municipality, with a contingency for portable JoJo tanks or a connection to existing water pipeline infrastructure.

Water required for reclamation activities will be sourced from dewatering that currently takes places at the nearby Kloof Shaft 10#, and will be conveyed through an existing process water pipeline to the project site for reuse in a closed-circuit system. FWGR are authorised to use 9 487 500 m^3/annum of water from the Kloof Shaft 10#. Water will also be sourced from the RTSF.



Figure 1-4: Proposed infrastructure

1.2.5 Life of the Project

The anticipated life span of the project is approximately 12 years. It is expected that there would be a 1 year construction and ramp-up period, which would include the placement of infrastructure and site preparation, a 6 year operational phase where active hydraulic reclamation and mechanical removal would take place, a 2 year ramp-down period, and 3 years to rehabilitate the reclaimed site.

1.2.6 Access

The main access route is off Bridges Avenue which runs parallel to the south of the TSF. As far as possible, existing access roads will be utilised, and where this is not possible, these will be constructed. Where access roads are to be constructed, they will be 4 m wide gravel roads, with mitre drains to protect the road structure from flood damage. Intersections will be properly designed to provide safe entry and exit in and out of the reclamation area. Approvals from the Provincial Roads authorities will be obtained where necessary.

1.2.7 Rehabilitation

Once reclamation of the TSF is complete, the area will be assessed for contamination (particularly in terms of radiation). Contaminated soils will be removed, and the land will be levelled to its original functioning topography levels.

Following rehabilitation, it is anticipated that the land will be returned to the landowner to use at their discretion. The project will reclaim the historic TSF and remove a pollution source from the area, aiding in the rehabilitation of the mining legacy left behind in the area.

1.3 Legal Requirements and Guidelines

The following key legislative requirements and guidelines are relevant to this study:

- National Water Act, 1998 (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, 4 June 1999);
- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and associated Environmental Impact Assessment (EIA) 2014 regulations;
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA); and
- Department of Water and Sanitation (DWS) Best Practice Guideline (BPG) documents, particularly:
  - BPG G1: Storm Water Management;
  - BPG G2: Water and Salt Balances; and
  - BPG A5: Water Management for Surface Mines.

1.4 Site Investigation

A site investigation of the project area was undertaken on 14 August 2024. The purpose of the site investigation was to assess the hydrological characteristics of the area, and to obtain water samples from nearby watercourses.

1.5 Details of the Specialist

The study was undertaken by Andy Pirie who is a senior hydrologist at Hydrospatial (Pty) Ltd. Andy graduated with a Master of Science (M.Sc.) in Water Resource Management (cum laude). He is registered as a Professional Natural Scientist (Pr.Sci.Nat) (registration number: 114988) in Water Resources Science with the South African Council for Natural Scientific Professions (SACNASP). Work experience includes rainfall – runoff modelling, floodline determinations, development of stormwater management plans, water and salt balance modelling, setup of water monitoring networks and programmes, analysis of surface water quality and quantity, and surface water specialist studies for EIAs and IWULAs. Andy has more than 10 years' experience and has worked on projects in South Africa, Cameroon, Senegal, Mali, Democratic Republic of Congo, Botswana, Zambia and Namibia. His curriculum vitae is provided in Appendix B.

2 SCOPE OF WORK

The scope of work included the following:

- Description of the baseline (current) surface water hydrology in terms of water quality and quantity. The purpose of the baseline is to ensure that a thorough understanding of the pre-mining surface water conditions is provided;
- Development of a water balance according to the DWS Best Practice Guideline G2: Water and Salt Balances. The water balance will provide the water volumes for the proposed project;
- An assessment of the potential surface water impacts and recommended mitigation measures; and
- Development of monitoring plans that can be used to monitor potential impacts resulting from the proposed project.

3 BASELINE HYDROLOGY

3.1 Climate

3.1.1 Rainfall

Rainfall data for the area was obtained from the DWS weather station C2E007 located at the Zuurbekom pump station, 19 km east of the project. This station is the closest available weather station to the project with a recent rainfall record and a similar altitude. Rainfall data was extracted for the period between October 2002 – September 2020, which was the most recent and complete record available. The mean monthly rainfall is depicted in Figure 3-1. The area has a Mean Annual Precipitation (MAP) of 685 mm. Rainfall is highest over the summer

months of October to April, with January generally being the wettest month. The remaining winter months receive much less rain, with July being the driest month.

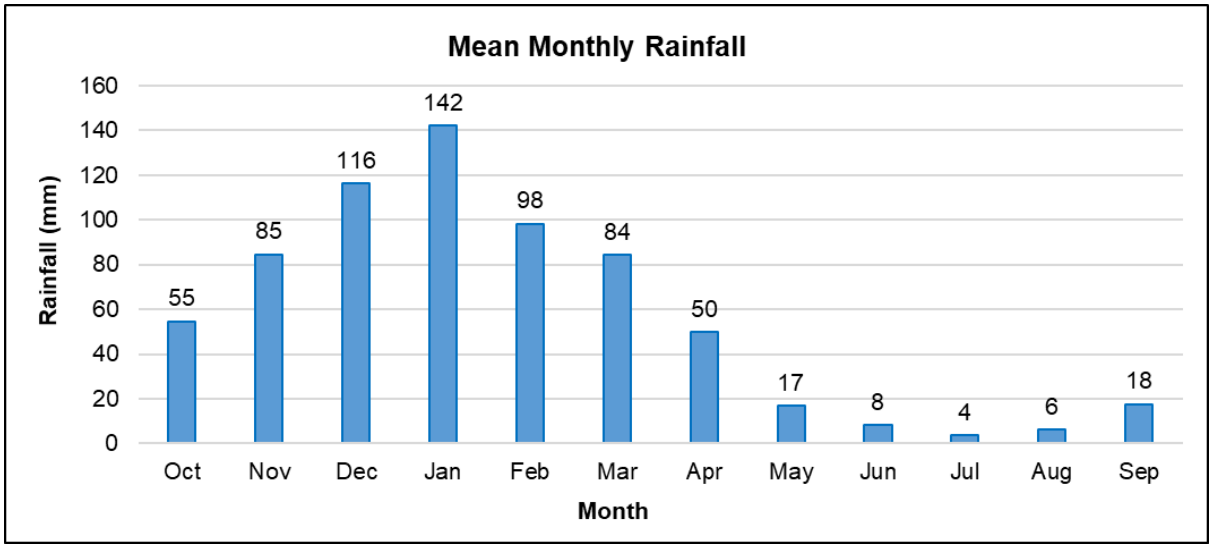


Figure 3-1: Mean monthly rainfall for the area

The storm rainfall depths for the centre position of the Libanon TSF were extracted from the Design Rainfall Estimation in South Africa software programme (Smithers and Schulze, 2002). The programme uses the six closest rainfall stations to a user specified position, to calculate the storm rainfall depths. The extracted storm rainfall depths for various storm durations and recurrence intervals for the project are provided in Table 3-1.

Table 3-1: Storm rainfall depths for the project

Storm Duration	Storm Rainfall Depth (mm)						
	1:2 yr	1:5 yr	1:10 yr	1:20 yr	1:50 yr	1:100 yr	1:200 yr
5 min	9	12	14	16	18	20	22
10 min	13	17	20	23	26	29	32
15 min	16	21	25	28	33	36	40
30 min	20	27	32	36	42	46	51
45 min	23	31	37	42	48	53	58
1 hr	26	35	40	46	53	59	65
1.5 hr	30	40	47	53	62	68	75
2 hr	33	44	52	59	68	75	83
4 hr	39	53	61	70	81	90	98
6 hr	44	58	68	77	90	99	108
8 hr	47	62	73	83	96	106	116
10 hr	49	66	77	88	102	112	123
12 hr	52	69	81	92	106	118	129
16 hr	56	74	86	99	114	126	138
20 hr	59	78	91	104	121	133	146
24 hr	61	82	96	109	126	140	153

Storm Duration	Storm Rainfall Depth (mm)						
	1:2 yr	1:5 yr	1:10 yr	1:20 yr	1:50 yr	1:100 yr	1:200 yr
1 day	53	71	83	94	110	121	132
2 day	65	87	102	116	135	149	163
3 day	74	99	115	131	152	168	184
4 day	80	107	125	142	165	182	200
5 day	86	114	133	152	176	194	213
6 day	90	120	140	160	185	205	224
7 day	94	126	147	167	194	214	234

3.1.2 Evaporation

As with the rainfall, Symons Pan (S-Pan) evaporation data for the area was obtained from the DWS weather station C2E007, which is located at a similar altitude as the project. S-Pan evaporation measurements are not a true reflection of evaporation from natural open water bodies, as the water temperatures in the S-Pan are higher, resulting in higher evaporation rates. To convert S-Pan measurements to open water evaporation, monthly open water evaporation conversion factors were used, which were obtained from the WR2012 study. The adopted monthly evaporation for the project is indicated in Table 3-2. The open water Mean Annual Evaporation (MAE) is 1 267 mm, with evaporation being highest over the warmer months of September to March, and lowest over the cooler months of April to August.

Table 3-2: Evaporation for the area

Month	S-Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
Oct	162	0.81	132
Nov	166	0.82	136
Dec	168	0.83	139
Jan	168	0.84	141
Feb	139	0.88	122
Mar	128	0.88	113
Apr	101	0.88	89
May	84	0.87	73
Jun	67	0.85	57
Jul	75	0.83	62
Aug	106	0.81	85
Sep	144	0.81	117
Total	**1 508**	**N/A**	**1 267**

3.2 Hydrological Setting

3.2.1 Regional Catchments

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, assigned the primary catchment letter within which they are located and a number e.g. A5 (secondary catchment 5 located within primary catchment A). Similarly, tertiary catchments are subdivisions of secondary catchments, represented for example by A53 (tertiary catchment 3 located within secondary catchment A5). Lastly, quaternary catchments are the smallest defined catchments and are assigned the tertiary catchment number, along with a quaternary catchment letter e.g. A53D (quaternary catchment D located within tertiary catchment A53).

Further to the above, the DWS has divided South Africa into 9 Water Management Areas (WMAs). The 9 WMAs consist of the Limpopo, Olifants, Inkomati-Usuthu, Pongola-Mtamvuna, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz and Berg-Olifants.

The project is located in quaternary catchment C23D which forms part of the Vaal WMA (Figure 1-1).

3.2.2 Topography

Figure 3-3 indicates the topography of the site. The general topography of the area is flat, with a very gradual dip in a north-westerly direction towards the Wonderfonteinspruit. The ground level elevation varies from 1 600 metres above mean sea level (mamsl) at the southern corner of the TSF, to 1 582 mamsl along the northern boundary. The TSF is approximately 55 m high and has a maximum elevation of 1 646 mamsl. Steep slopes in excess of 30 % occur along the sides of the TSF. A large number of sinkholes occur in the area, specifically along the Wonderfonteinspruit.

3.2.3 Drainage and Wetlands

The general drainage of the area is in a north-westerly direction towards the Wonderfonteinspruit (Figure 3-3). The 1:50 000 topographical data for the area shows that a non-perennial drainage line occurs to the north-east of the TSF, however, during the site visit, this area was found to be dry, and no defined channel could be located. The Kloof Mine Biodam (Figure 3-2) is located immediately north of the proposed pump station, which has created an artificial seep to the north of it (TBC, 2024). Groundwater dewatered from the underground workings at the Kloof Shaft 10#, is discharged into a canal that conveys water to the Biodam. The Biodam filters and settles out suspended solids, before discharging into a pipeline that connects to the 1 m metre pipeline to the north at the Wonderfonteinspruit. The Wonderfonteinspruit is diverted into a 1 m diameter pipeline at the Donaldson Dam, which conveys the flow of the Wonderfonteinspruit for a distance of approximately 30 km across the dewatered Venterspost, Bank and Oberholzer dolomitic compartments, discharging back into the Wonderfonteinspruit near the town of Carletonville. The 1 m pipeline was constructed in 1977, to prevent recharge of the underlying dolomitic compartments, and thereby reducing pumping costs associated with dewatering. As mentioned previously, a vast number of sinkholes occur in the area, specifically along the Wonderfonteinspruit, and therefore, very little surface water runoff occurs, as it is mostly lost to the underlying dolomite. For this reason, as well as due to the 1 m pipeline, the Wonderfonteinspruit to the north of the project is dry.

According to TBC (2024), all wetlands within a 500 m radius of the project are artificially created.



Figure 3-2: Kloof Mine Biodam located immediately north of the proposed pump station

3.2.4 Land Cover/Use

The land cover/use of the area is indicated on Figure 3-4 (DFFE, 2024). The area surrounding the TSF is dominated by agricultural, grassland and residential areas. The Kloof Shaft 10# is located to the south-west of the TSF, whilst the Libanon Landfill Site is located immediately north of the TSF.

3.2.5 Soils

Land Type data for South Africa was used to obtain the generalized soil patterns for the project area. Land Type data exists in the form of published 1:250 000 maps indicating delineated areas of similar terrain types, pedo-systems (uniform terrain and soil pattern) and climate (Land Type Survey Staff, 1972 - 2006). The TSF and associated infrastructure are located within Land Type Ab7 (Figure 3-4), which according to the Land Type database, is almost entirely dominated by Hutton soil forms, which are well drained permeable soils with soil depths of between 600 – 800 mm.

3.2.6 Geology and Groundwater

The geology of the area is shown on Figure 3-5. The project is located on Malmani Dolomite. Several dykes, which are considered to be impermeable barriers, divide the dolomite into a series of compartments. The project is primarily located on the Venterspost compartment, with the western side being partly located on the Bank compartment. These compartments are dewatered to varying degrees and the groundwater levels may be up to several hundred metres below ground level (mbgl). Due to the deep groundwater water levels, the compartment eyes (springs), which are generally located at the topographically lowest point along the Wonderfonteinspruit, no longer flow.

3.2.7 Surface Water Use

Surface water in the region is primarily used for livestock watering and irrigation.

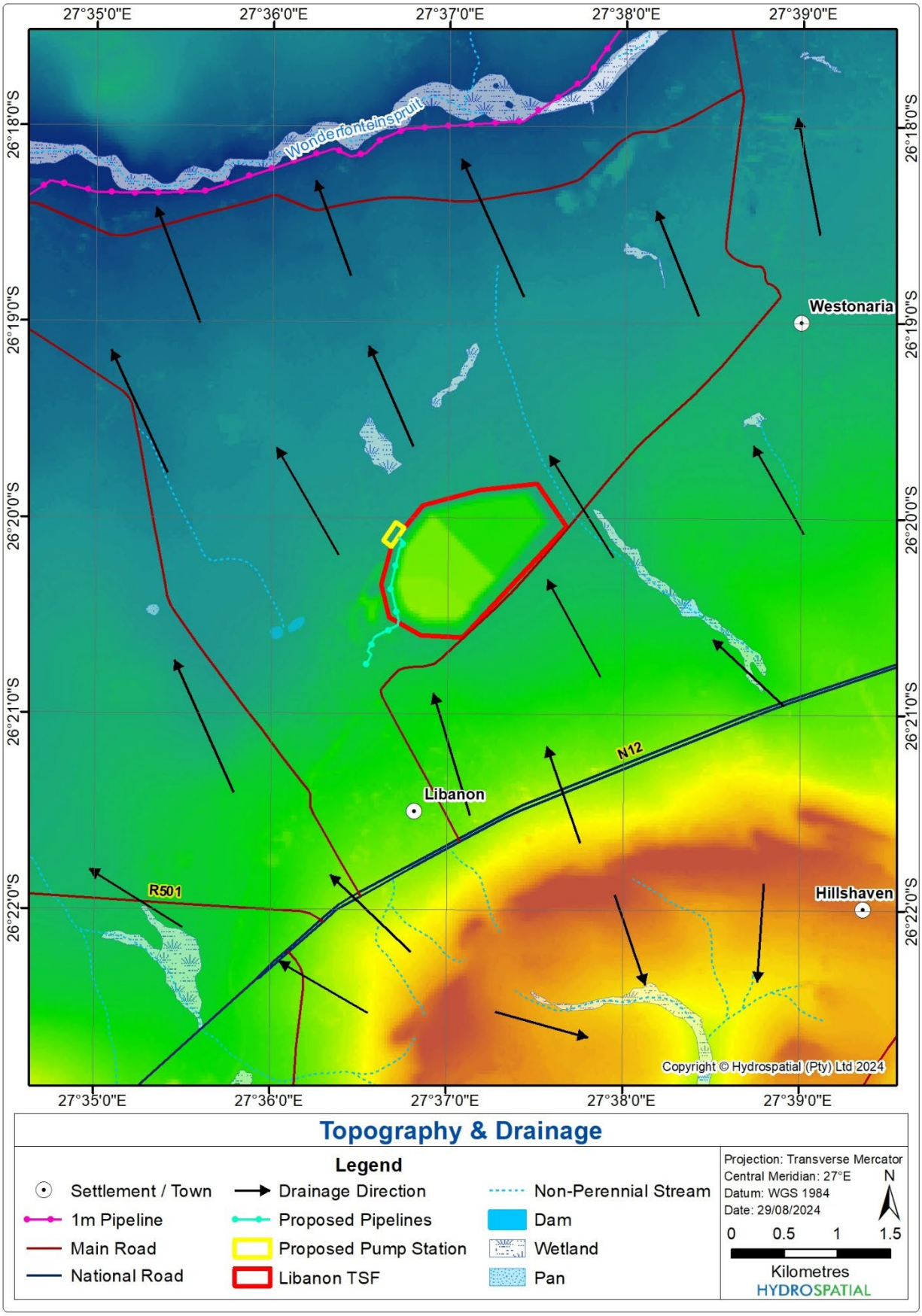


Figure 3-3: Topography and drainage

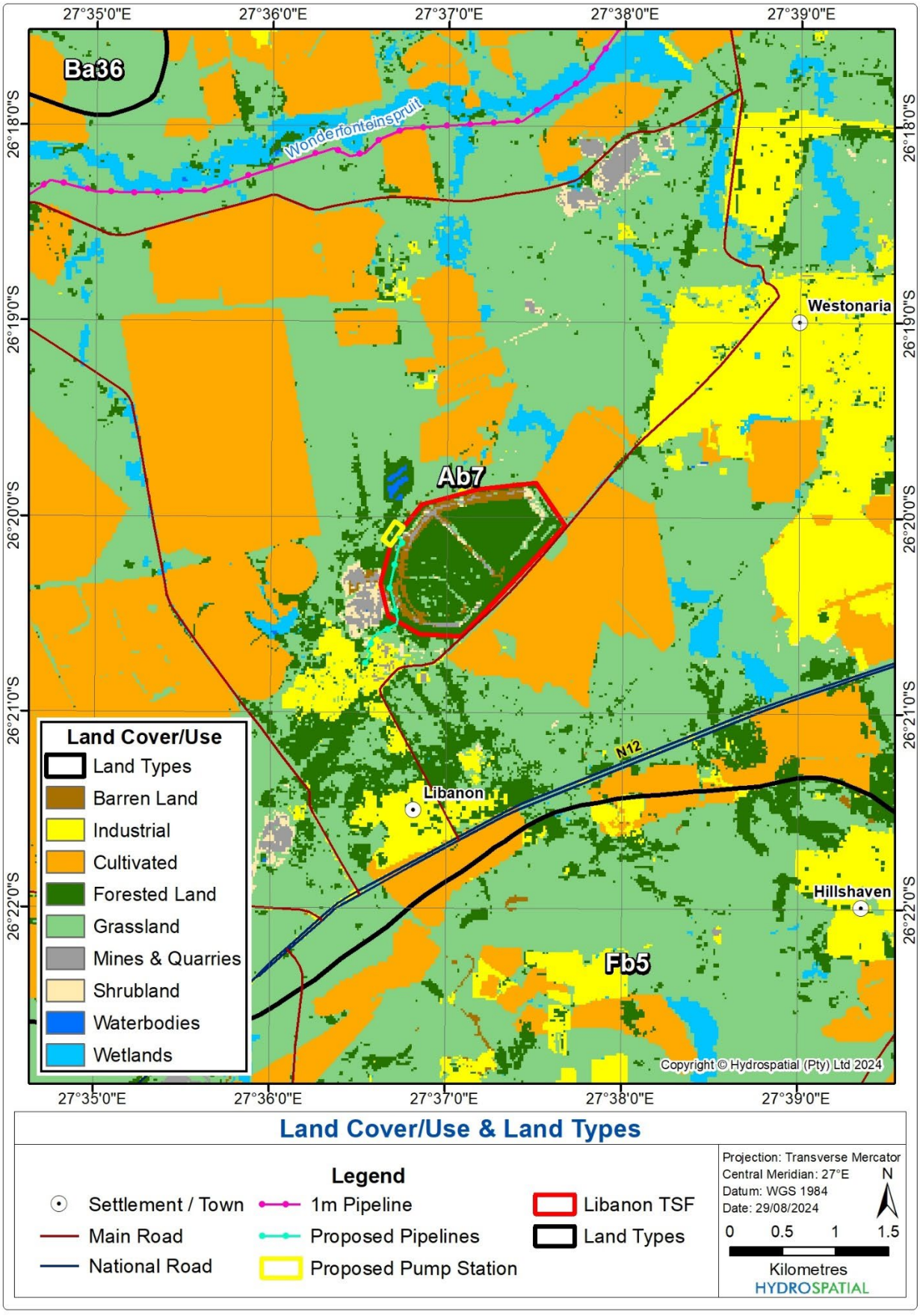


Figure 3-4: Land Cover

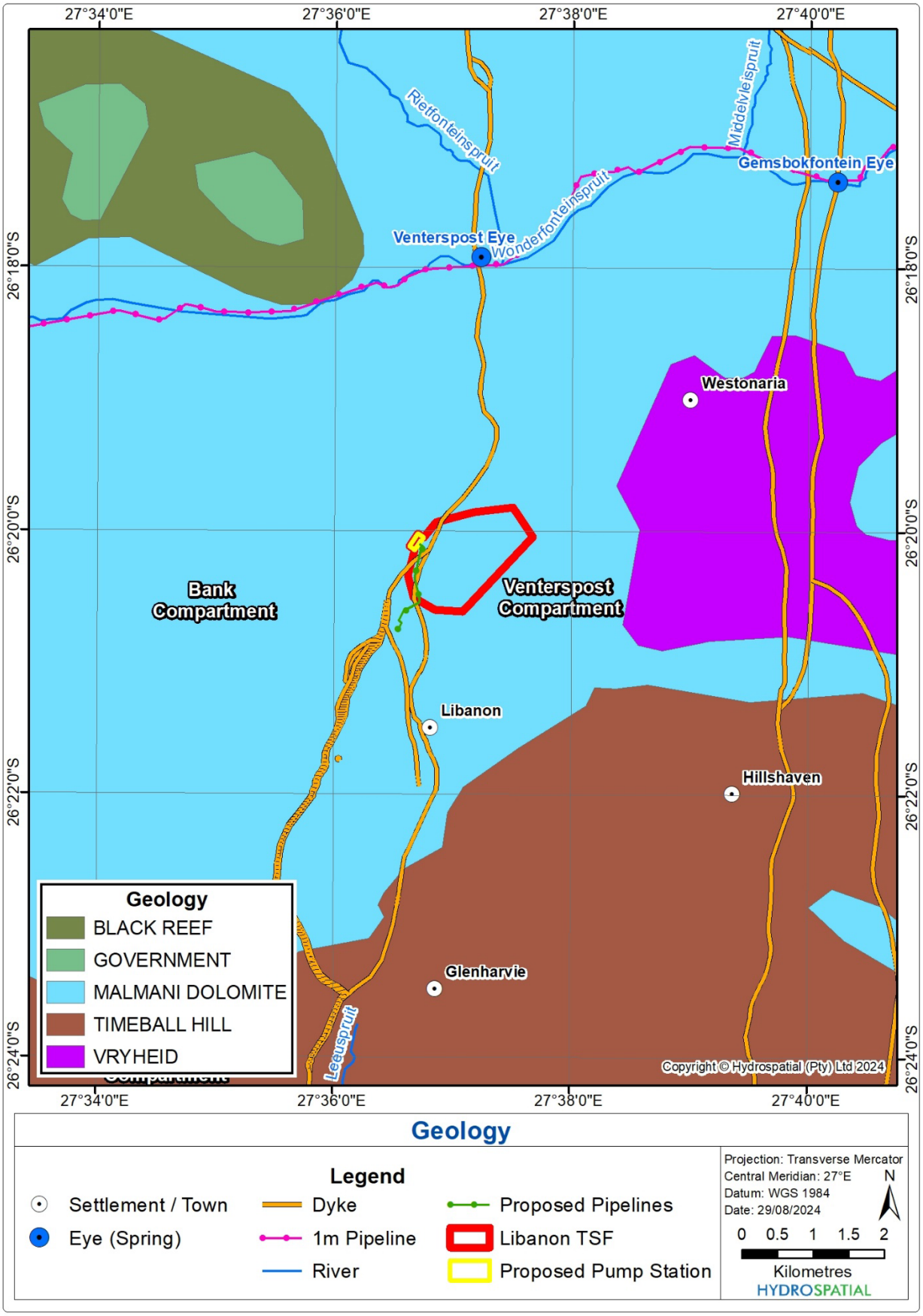


Figure 3-5: Geology

3.3 Surface Water Runoff

Due to the large number of sinkholes that have formed along non-perennial drainage lines and the Wonderfonteinspruit, surface water runoff within quaternary catchment C23D is limited, as it is almost entirely lost to the underlying dolomite via sinkholes. For this reason, as well as the 1 m pipeline that conveys the flow of the Wonderfonteinspruit between the Donaldson Dam and Carletonville, the Wonderfonteinspruit to the north of the project is dry.

3.4 Surface Water Quality

3.4.1 Sources of Water Quality Data

The following sources were used to describe the surface water quality for the project:

- Water quality sampling undertaken on the site visit on 14 August 2024 (laboratory certificate provided in Appendix A); and
- Water quality data obtained from the report: Surface Water Study for the Sibanye-Stillwater Kloof Operations Environmental Management Programme and Water Use Licence Update (Hydrospatial, 2021). Sampling points WS001 and WS006 were sampled monthly (31 times) between 2018/01/11 - 2020/08/18, whilst WS107 was sampled weekly (139 times) between 2018/01/03 - 2020/09/07. These sampling points form part of the Sibanye monitoring network for the area.

3.4.2 Sampling Locations

The sampling locations are indicated on Figure 3-6 and are summarised in Table 3-1.

Table 3-3: Description of the surface water quality sampling locations

Sampling Point	Description	Latitude	Longitude
SW1	Kloof Mine Biodam	26°19'55.27"S	27°36'44.67"E
SW4	1 m pipeline upstream of the project	26°17'19.58"S	27°40'9.18"E
SW5	Wonderfonteinspruit downstream of the project	26°18'14.54"S	27°35'33.34"E
WS001	1 m pipeline upstream of the project	26°17'19.58"S	27°40'9.26"E
WS006	Outlet of the 1 m pipeline near Carletonville	26°19'41.58"S	27°24'25.69"E
WS107	Outlet of the Kloof Mine Biodam	26°19'47.30"S	27°36'40.35"E

3.4.3 Sampling Method

Water samples obtained on the site visit, were taken approximately 20 centimetres (cm) below the water surface using a grab sampling technique. 500 millimetre (ml) plastic bottles provided by the laboratory was used to store the samples. The samples were kept cool and out of direct sunlight, and were delivered to Aquatico Laboratories in Centurion for water quality analysis.

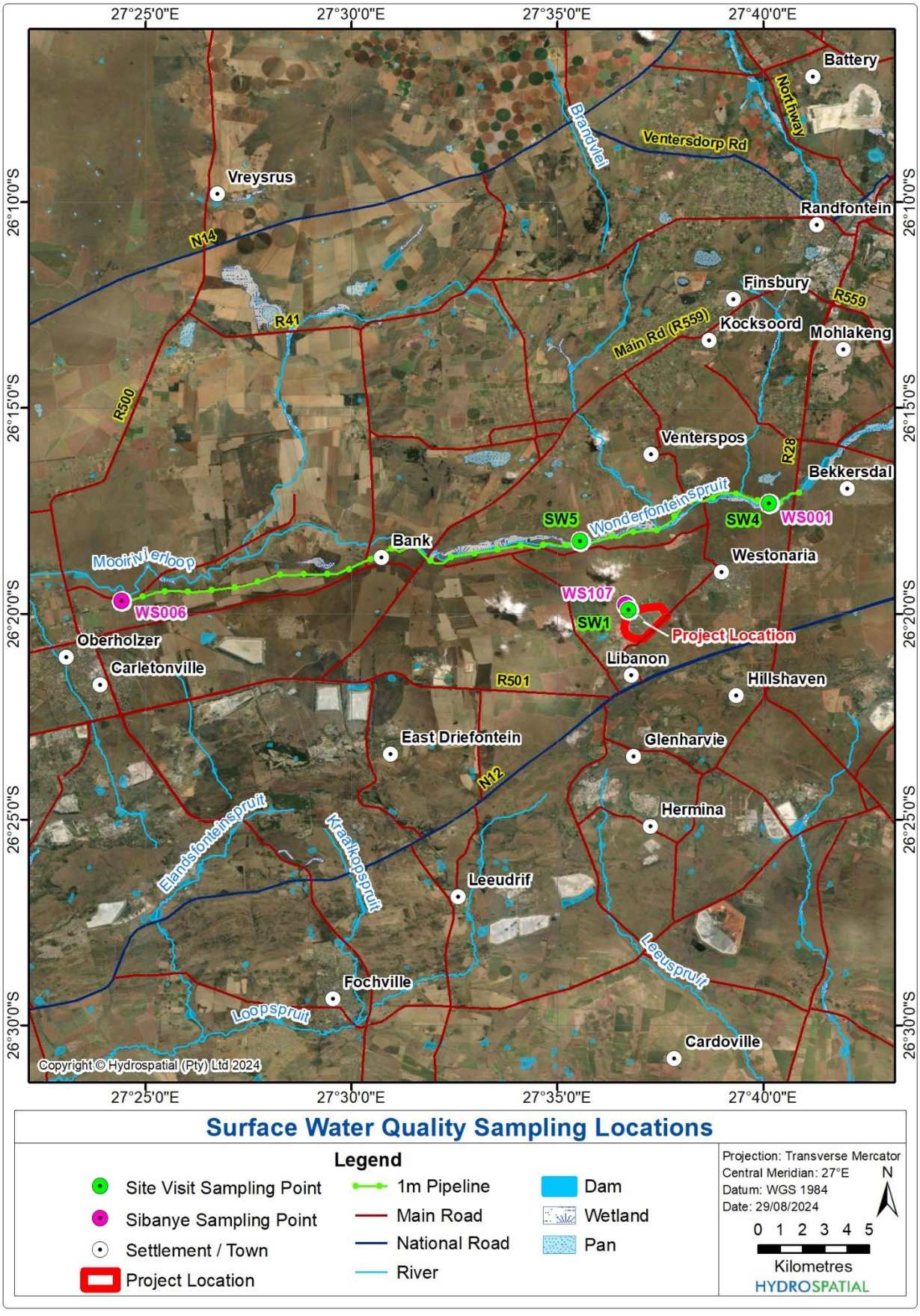


Figure 3-6: Surface water quality sampling locations

3.4.4 Guideline Limits

The water quality was compared to the Resource Quality Objective (RQO) limits for the Wonderfonteinspruit. Additionally, the DWS Target Water Quality Range (TWQR) limits for irrigation, livestock watering and aquatic ecosystems were also used for comparison purposes, as the main surface water uses in the region are irrigation and livestock watering. Furthermore, the Kloof Mine Water Use Licence (WUL) limits were included in Table 3-5, as they are applicable to sampling point WS107 at the Biodam. The water quality limits were obtained from the following documents:

- Department of Water and Sanitation. 2016. Classes and Resource Quality Objectives (RQOs) of Water Resources for Catchments of the Upper Vaal (Government Notice No. 468, 22 April 2016) – coloured in green in Table 3-4 and Table 3-5;
- Kloof Mine WUL – coloured in red in Table 3-5;
- Department of Water Affairs and Forestry, 1996. South African Water Quality Guidelines (second edition). Volume 4: Agricultural Use: Irrigation – coloured in orange in Table 3-4 and Table 3-5;
- Department of Water Affairs and Forestry, 1996. South African Water Quality Guidelines (second edition). Volume 5: Agricultural Use: Livestock Watering – coloured in yellow in Table 3-4 and Table 3-5; and
- Department of Water Affairs and Forestry, 1996. South African Water Quality Guidelines. Volume 7: Aquatic Ecosystems – coloured in blue in Table 3-4 and Table 3-5.

3.4.5 Results and Discussion

The site visit water quality results are summarised in Table 3-4, whilst the Sibanye monitoring results are summarised in Table 3-5. Parameters exceeding limits are coloured in their respective colours in the above-mentioned tables. It should be noted that the water sampled at SW5, originates mostly from the water discharged from the Kloof Mine Biodam, as a valve was observed to be open on the Kloof Mine pipeline from the Biodam to just before it joins the 1 m pipeline. The following provides a summary of the water quality:

- pH exceeded the DWS irrigation limit at SW1, SW4, WS001 and WS006. The high pH values that have been recorded are most likely due to agricultural, livestock and mining activities in the area;
- Electrical Conductivity (EC) and Total Dissolved Solids (TDS), which provide an indication of the dissolved salts in water, exceeded the irrigation limit at SW4, as well as regularly at WS001 and WS006. Sodium, which contributes to elevated EC and TDS levels, followed a similar trend. The exceedances are likely due to agricultural and mining activities;
- Orthophosphate was elevated at SW4 and SW5, as well as regularly at WS001 and WS006. Nitrate was elevated at SW4. These exceedances are most likely due to sewage runoff from the upstream settlements and Wastewater Treatment Works (WWTW);

- Aluminium exceeded the stringent DWS limit for aquatic ecosystems at SW4, but was regularly within the RQO limit at all sampling points;
- Copper exceeded the RQO limit at SW1, SW4 and SW5, as well as occasionally at WS001 and WS006;
- Zinc exceeded the DWS aquatic ecosystem limit at SW1, but was within the Kloof WUL limit at this sampling point. Zinc also exceeded the DWS aquatic ecosystem limit at WS001 and WS006 on a number of occasions;
- Manganese exceeded the DWS aquatic ecosystem limit at WS001 and WS006 on a number of occasions; and
- Uranium was within limits at all of the points sampled during the site visit, however, uranium regularly exceeded the RQO limit at WS001 and WS006.

From the above, it is apparent that the water quality of the area is impacted by mining, sewage and agricultural and urban runoff.

Table 3-4: Site visit surface water quality results

Parameter	Units	DWS TWQR: Irrigation Limit	DWS TWQR: Livestock Watering Limit	DWS TWQR: Aquatic Eco-systems Limit	RQO Limit	SW1	SW4	SW5
pH	**pH**	**6.5-8.4**	**-**	**-**	**-**	8.5	8.81	8.35
Electrical conductivity (EC)	**mS/m**	**90**	**153**	**-**	**111**	86.2	88.4	82.6
Total dissolved solids (TDS)	**mg/l**	**585**	**1000**	**-**	**722****	562	618	552
Total Alkalinity	**mg $CaCO_3$/l**	**-**	**-**	**-**	**-**	249	181	230
Chloride (Cl)	**mg/l**	**100**	**1500**	**-**	**-**	27.6	48.7	28.1
Sulphate (SO_4)	**mg/l**	**-**	**1000**	**-**	**500**	180	175	187
Nitrate (NO_3) as N	**mg/l**	**-**	**100**	**-**	**4**	<0.194	4.07	0.391
Total oxidised nitrogen as N	**mg/l**	**-**	**-**	**-**	**-**	<0.194	4.07	0.391
Ammonium (NH_4) as N	**mg/l**	**-**	**-**	**-**	**-**	0.08	0.299	0.063
Orthophosphate (PO_4) as P	**mg/l**	**-**	**-**	**-**	**0.125**	<0.009	1.18	0.522
Fluoride (F)	**mg/l**	**2**	**2**	**0.75**	**3**	0.387	0.421	0.339
Calcium (Ca)	**mg/l**	**-**	**1000**	**-**	**-**	90	80.4	85.4
Magnesium (Mg)	**mg/l**	**-**	**500**	**-**	**-**	42.3	25.3	45.4
Sodium (Na)	**mg/l**	**70**	**2000**	**-**	**-**	54	85	53
Potassium (K)	**mg/l**	**-**	**-**	**-**	**-**	<0.015	7.14	<0.015
Aluminium (Al)	**mg/l**	**5**	**5**	**0.01**	**0.15**	0.02	<0.002	<0.002
Iron (Fe)	**mg/l**	**5**	**10**	**-**	**-**	<0.004	<0.004	<0.004
Manganese (Mn)	**mg/l**	**10**	**10**	**0.18**	**1.3**	0.083	0.02	<0.001
Chromium (Cr)	**mg/l**	**-**	**-**	**-**	**-**	<0.003	<0.003	<0.003
Copper (Cu)	**mg/l**	**0.2**	**0.5**	**0.0014***	**0.008**	0.017	0.011	0.016
Nickel (Ni)	**mg/l**	**0.2**	**1**	**-**	**-**	0.01	0.009	<0.002
Zinc (Zn)	**mg/l**	**1**	**20**	**0.002**	**0.036**	0.005	<0.002	<0.002
Cobalt (Co)	**mg/l**	**0.05**	**1**	**-**	**-**	0.006	0.006	0.004
Cadmium (Cd)	**mg/l**	**0.01**	**0.01**	**0.0004***	**0.005**	<0.002	<0.002	<0.002
Lead (Pb)	**mg/l**	**0.2**	**0.1**	**0.0012***	**0.013***	<0.004	<0.004	<0.004
Total hardness	**mg $CaCO_3$/l**	**-**	**-**	**-**	**-**	399	305	400
Total suspended solids (TSS)	**mg/l**	**50**	**-**	**-**	**-**	<4.5	7	5
Dissolved Uranium (U)	**mg/l**	**0.1**	**-**	**-**	**0.015**	<0.015	<0.015	<0.015

*Below detection limit

**TDS limit calculated by multiplying EC by the DWS recommended value of 6.5

Table 3-5: Sibanye monitoring water quality results (Hydrospatial, 2021)

Parameter	Units	DWS TWQR: Irrigation Limit	DWS TWQR: Livestock Watering Limit	DWS TWQR: Aquatic Eco-systems Limit	RQO Limit	Kloof Mine WUL Limit	WS107					WS001					WS006				
							Min	25th Percentile	50th Percentile	75th Percentile	Max	Min	25th Percentile	50th Percentile	75th Percentile	Max	Min	25th Percentile	50th Percentile	75th Percentile	Max
pH	pH Units	6.5-8.4	-	-	-	5.5-9.5	7.3	8.0	8.1	8.2	8.4	7.6	8.2	8.4	8.7	9.5	7.3	7.8	8.4	8.7	9.5
EC	mS/m	90	153	-	111	112	54	87	89	95	102	68	92	101	117	143	68	90	96	113	143
TDS	mg/l	585	1000	-	722**	784	330	561	606	643	780	428	620	690	787	1062	440	590	658	748	1086
SS	mg/l	50	-	-	-	25	0	1	1	1	245	1	1	4	8	27	1	1	1	6	18
Ca	mg/l	-	1000	-	-	100	66	74	77	83	90	65	80	91	102	149	59	74	85	99	148
Mg	mg/l	-	500	-	-	70	10	42	44	47	58	18	25	27	30	36	18	25	27	32	40
Na	mg/l	70	2000	-	-	100	45	58	59	61	94	52	76	96	105	123	52	73	84	103	122
K	mg/l	-	-	-	-	-	3	3	3	3	16	8	9	10	11	17	5	9	9	10	13
F	mg/l	2	2	0.75	3	0.8	0.05	0.31	0.39	0.44	1.57	0.05	0.17	0.23	0.26	0.54	0.05	0.17	0.21	0.30	0.51
Cl	mg/l	100	1500	-	-	100	29	32	34	36	48	30	43	49	53	62	21	40	49	52	62
SO_4	mg/l	-	1000	-	500	400	169	201	216	242	287	186	259	289	346	577	98	224	283	332	571
Ca Hard	mg/l	-	-	-	-	-	164	184	192	207	226	161	200	228	255	372	148	184	213	247	370
Mg Hard	mg/l	-	-	-	-	-	41	173	180	193	237	73	103	109	125	146	73	102	109	132	167
Tot Hard	mg/l	-	-	-	-	-	217	359	371	402	442	234	302	336	380	518	235	297	326	379	518
PO_4 as P	mg/l	-	-	-	0.125	1	0.050	0.098	0.098	0.098	0.978	0.098	0.575	0.768	0.908	1.280	0.098	0.529	0.798	0.925	2.906
NH_4 as N	mg/l	-	-	-	-	-	0.008	0.078	0.078	0.078	0.318	0.078	0.078	0.093	0.365	1.312	0.078	0.078	0.116	0.446	11.570
NO_3 as N	mg/l	-	100	-	4	-	0.023	0.140	0.194	0.358	1.584	0.091	0.672	1.453	2.283	3.664	0.051	0.512	1.201	2.200	3.717
COD	mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Malk	mg/l	-	-	-	-	-	158	205	212	226	541	89	147	163	183	217	103	148	165	197	234
Palk	mg/l	-	-	-	-	-	0	0	0	0	16	0	0	0	12	115	0	0	0	13	88
U	ug/l	100	-	-	15	70	1	19	26	36	88	5	36	41	52	93	11	31	36	50	95
Al	mg/l	5	5	0.01*	0.15	0.5	0.024	0.028	0.028	0.035	0.310	0.028	0.028	0.036	0.072	0.198	0.028	0.028	0.028	0.067	0.212
Fe	mg/l	5	10	-	-	0.2	0.005	0.065	0.120	0.182	1.160	0.004	0.033	0.043	0.080	0.253	0.009	0.033	0.046	0.087	0.258
Cd	mg/l	0.01	0.01	0.0004*	0.005	0.01	0.003	0.003	0.003	0.003	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Cu	mg/l	0.2	0.5	0.0014*	0.008	0.1	0.001	0.005	0.005	0.005	0.050	0.005	0.005	0.005	0.005	0.010	0.005	0.005	0.005	0.007	0.050
Cr	mg/l	-	-	-	-	-	0.003	0.007	0.007	0.007	0.070	0.007	0.007	0.007	0.007	0.020	0.007	0.007	0.007	0.007	0.020
Mn	mg/l	10	10	0.18	1.3	0.1	0.002	0.004	0.008	0.017	0.315	0.002	0.029	0.184	0.319	0.526	0.002	0.022	0.101	0.233	0.516
Ni	mg/l	0.2	1	-	-	0.2	0.010	0.015	0.022	0.027	0.087	0.011	0.015	0.015	0.015	0.040	0.015	0.015	0.015	0.017	0.100
Pb	mg/l	0.2	0.1	0.0012*	0.013*	0.1	0.010	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
B	mg/l	0.5	5	-	-	0.5	0.006	0.111	0.119	0.128	0.154	0.006	0.027	0.036	0.040	0.052	0.019	0.030	0.037	0.046	0.089
Zn	mg/l	1	20	0.002	0.036	0.1	0.002	0.002	0.002	0.008	0.082	0.002	0.002	0.002	0.005	0.017	0.002	0.002	0.002	0.006	0.019
T CN	mg/l	-	-	-	-	0.5	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Turbidity	NTU	-	-	-	-	-	0.0	1.0	1.5	2.6	17.3	0.8	1.3	2.1	4.5	8.4	0.4	1.3	2.1	3.3	9.4
Hg	mg/l	-	-	-	-	-	0.000	0.000	0.000	0.001	0.002	-	-	-	-	-	-	-	-	-	-
As	mg/l	-	-	-	-	-	0.002	0.041	0.055	0.060	0.089	-	-	-	-	-	-	-	-	-	-

*Below detection limit

**TDS limit calculated by multiplying EC by the DWS recommended value of 6.5

4 STORMWATER MANAGEMENT PLAN

The Libanon TSF has 3 catchment areas contributing stormwater runoff to it (see Figure 4-1):

- Clean water areas:
- Libanon East – the biggest area commencing on the high lying ridge to the south, flowing northwards and concentrating at the eastern corner of the Libanon TSF; and,
- Libanon West – commencing at the N12 to the south, flowing northwards and concentrating at the western corner of the Libanon TSF;
- Dirty water areas:
- Libanon TSF – the TSF footprint where stormwater will be contained on the TSF by earth berms constructed as part of the reclamation process; and,
- Paddocks constructed at the toe of the TSF, to contain stormwater runoff from the side slopes of the TSF and allowing the ponded “dirty” water to either evaporate or infiltrate

4.1 Identified Stormwater Issues

4.1.1 Libanon East

The runoff concentrates at the north eastern corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 2% (Google Earth), the flow width will be 3.926 m and the velocity of flow is 13 m/s. This far exceeds the acceptable maximum velocity for earth of 1.2 m/s, so excessive erosion will occur. The high flow velocity will also be harmful to life.

4.1.2 Libanon West

The runoff concentrates at the north western corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 1% (Google Earth), the flow width will be 2.742 m and the velocity of flow is 7.3 m/s. However, inspections on site indicate that the land is degraded after previous developments in the area, and the flow will scatter across the area, thus reducing the velocity.

4.1.3 Libanon TSF

With the proposed reclamation method, the stormwater runoff is being collected within the berm on top of the Libanon TSF and allowed to infiltrate or evaporate. In effect this is a dam on top of the Libanon TSF on top of underlying dolomites, so SANS 1936 must be complied with.

4.1.4 Libanon Paddocks

The stormwater runoff from the TSF side slopes and the paddocks is collected in the paddocks and allowed to infiltrate or evaporate. In effect this is a dam on top of the underlying dolomites, so SANS 1936 must be complied with..

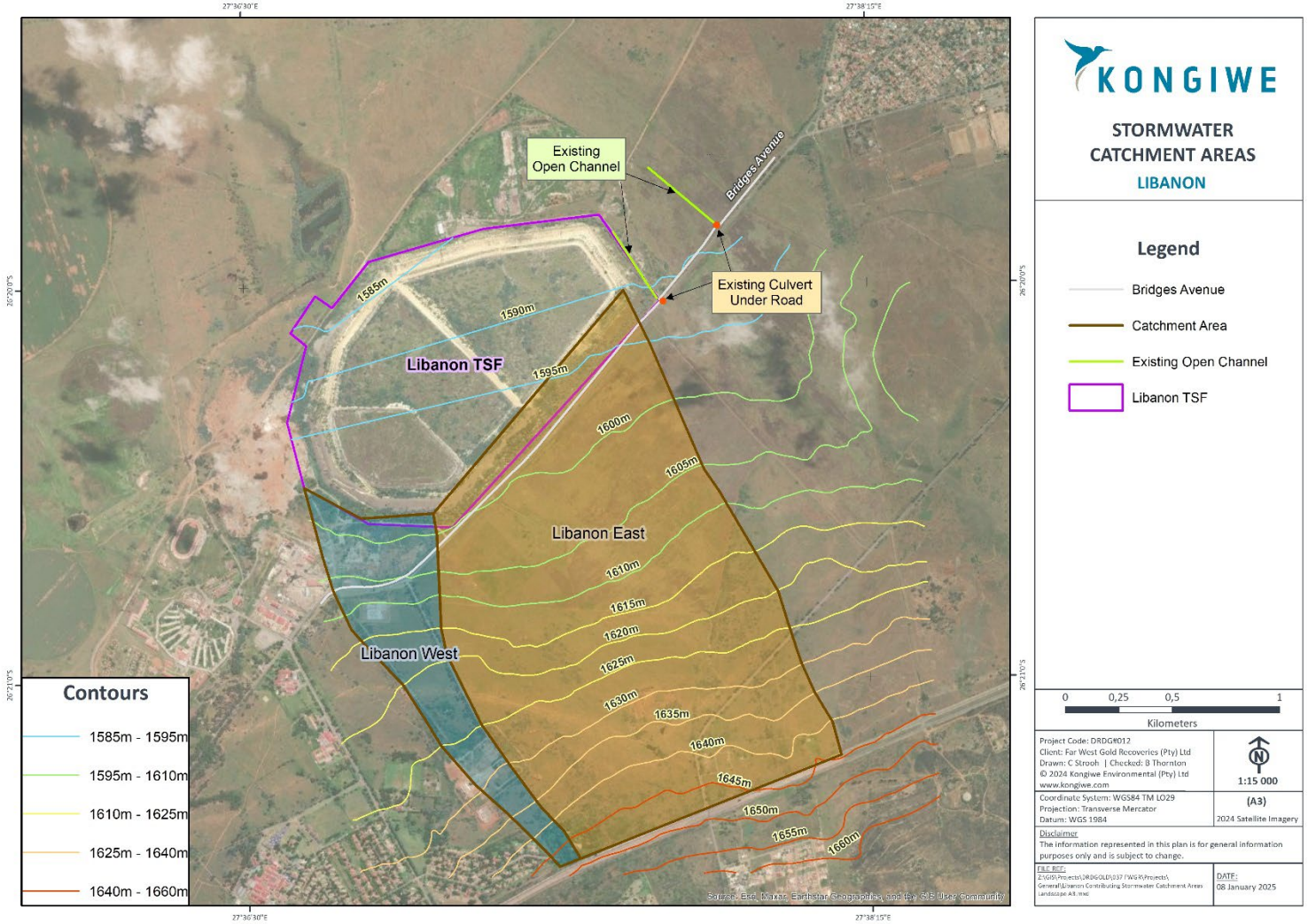


Figure 4-1 - Contributing Stormwater Catchment Areas

4.2 Proposed Stormwater Measures

4.2.1 Libanon East and West

4.2.1.1 Earth Berm along Southern side of Bridges Avenue

The proposed stormwater attenuation measure for the Libanon East and West catchments are shown in Figure 4-3.

It is proposed to construct an earth berm immediately to the south of Bridges Avenue adjacent to the Libanon TSF to the existing culvert under Bridges Avenue, described as follows:

- An earth berm top width 1 m, side slopes 1 vertical to 2 horizontal, 1 m high from point A to point B, a length of 1 845 m;

The berm detail is shown in Figure 4-2 below:

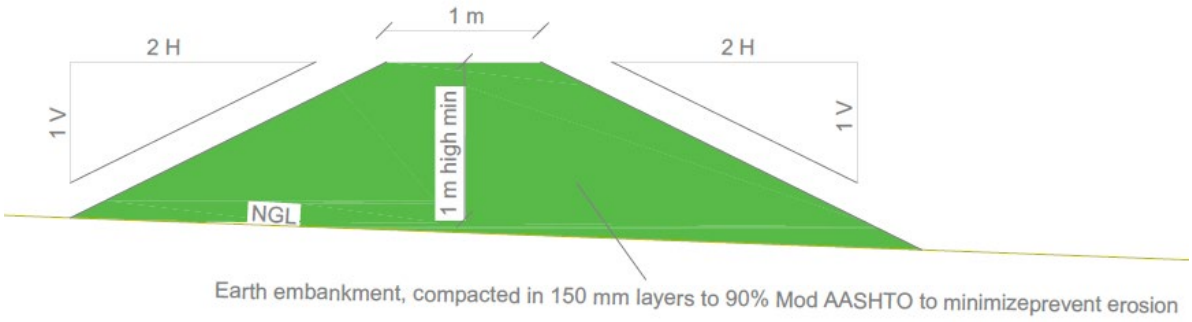


Figure 4-2 - Earth Berm Detail

The above structure will collect all the runoff from the Libanon East catchment, and 60% of the runoff from the Libanon West catchment.

The existing culvert under Bridges Avenue must be cleaned out and reinstated to its original design state. The size of the culvert could not be ascertained, but normally these structures are designed to handle the 1 in 5 year incident. In the event of the 1 in 50 year storm, the balance of the water not going through the culvert will flow across the road surface.

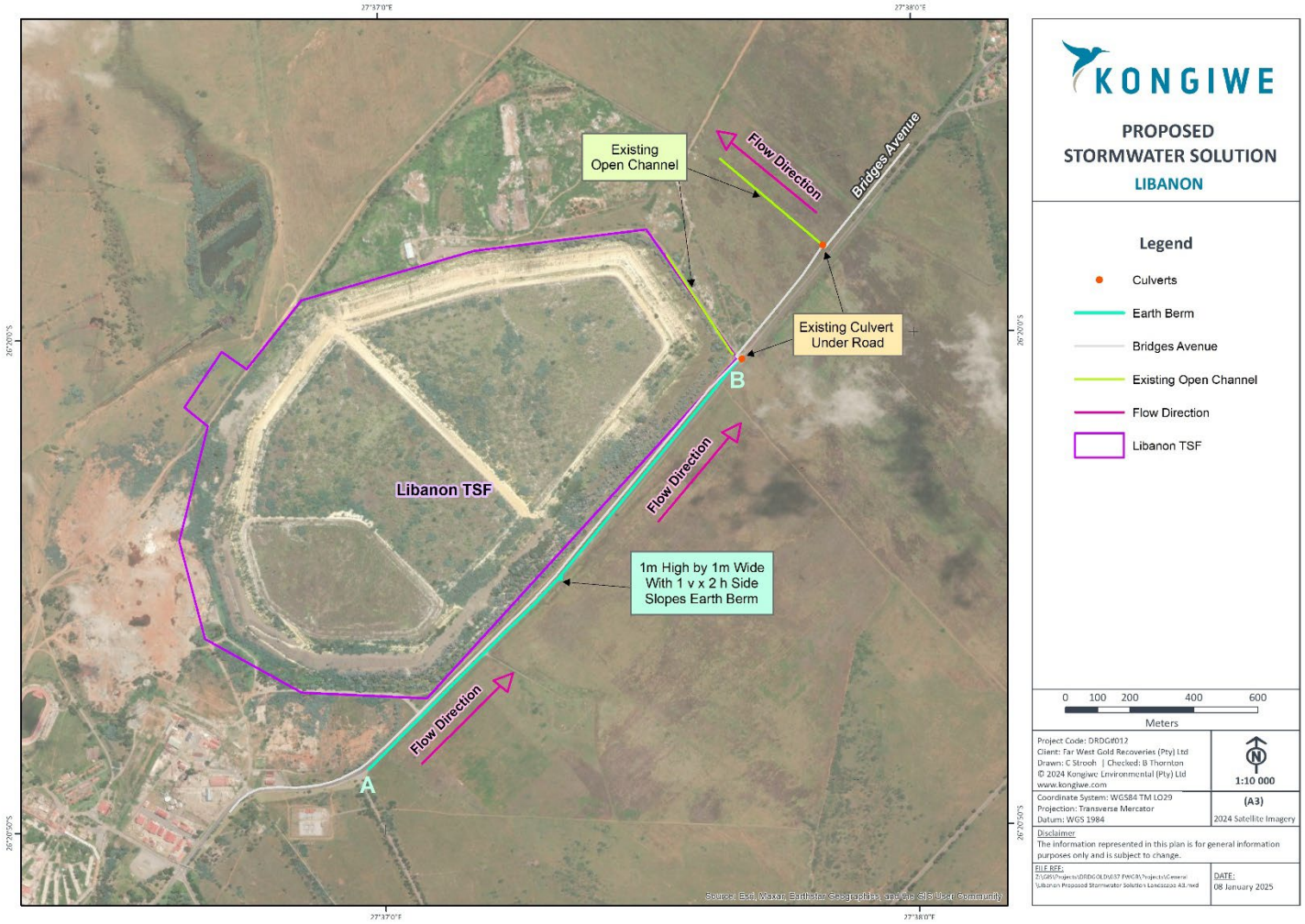


Figure 4-3 – Proposed stormwater solution

4.2.2 Libanon TSF and Paddocks

It is proposed to contain all stormwater falling on the top surface of the TSF within a berm located on the outside edge of the TSF top surface, as well as to contain all stormwater falling on the slopes of the TSF and in the paddocks at the toe of the side slopes of the TSF within these paddocks.

Due to the underlying dolomitic condition, the requirements of SANS 1936 must be adhered to. This will require the following to be carried out:

- Dolomitic stability investigation
  - General
    - Investigations shall conform to the requirements of SANS 1936-2 (4.3.2 and 4.3.3). The investigator/Competent Person (geo-professional) shall, during the investigation, confirm and refine the Inherent Hazard Zone and the associated Dolomite Area Designations and confirm that the mandatory precautions associated with a designation have been observed;
    - The investigator/Competent Person (geo-professional) shall, as a minimum to comply with the above requirements, interact with suitably qualified professionals and the person responsible for the development of the parcel of land or the relevant portions thereof concerning appropriate planning, design of infrastructure, buildings, and structures; and,
    - The investigator/Competent Person (geo-professional) shall develop a risk management plan strategy specific to the development in accordance with the requirements of SANS 1936;
  - Report
    - The investigator/Competent Person (geo-professional) shall prepare a report including the following:
      - a method description of the work undertaken;
      - a drawing indicating the location of the points profiled in the service trenches;
      - records of all profiles, boreholes and tests;
      - records of any geotechnically problematic conditions intercepted, such as paleokarts structures, sinkholes etc.;
      - a description of any additional geotechnical investigations undertaken;

- a description of any precautionary or remedial measures applied to problematic conditions identified during the design-level inspections;
- a site/development layout drawing which confirms the Inherent Hazard Classes and Dolomite Area Designations, in accordance with the requirements of SANS 1936;
- an indication where the dolomite designations have been changed and provide a motivation for such changes;
- a comprehensive list and description of any ongoing monitoring required;
- an identification of monitoring area designations where a risk management plan has been developed; and,
- an indication that amended water precautionary measures shall apply;

▪ Additional Requirements for **Attenuation Dams, Retention Dams, Reservoirs** and Public Swimming Pools:
- The requirements for dams, reservoirs and public swimming pools shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:
  - a gravity survey over the site at 30 m grid spacing with a minimum of three lines;
  - additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
  - inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
  - investigation of potential paleosinkhole structures wherever they are exposed; and,
  - where justified, supplementary geotechnical site investigations.

Note 1: The proposed site for dams and reservoirs should be at least 100 m from the nearest housing or commercial development.

■ Compilation of a Dolomite Risk Management Plan

An appropriate Dolomite Risk Management Plan is to be compiled in accordance with SANS 1936. The Dolomite Risk Management Plan is to be site specific and based on all data gathered until that time, taking cognisance of final precautionary measures, site layout and shall also contain the final Monitoring Designations. The Dolomite Risk Management Plan shall outline the responsibilities and actions of the relevant Authority and the Client Department. It is a compulsory requirement for the appointed professional service provider to prepare a site specific Dolomite Risk Management

Plan (DRMP) for the development in accordance with the requirements of SANS 1936-4.

5 WATER BALANCE

A monthly water balance was setup in Microsoft Excel spreadsheet format, to estimate the volumes of water for the project. The water balance has been setup to simulate the average yearly, average dry and average wet season volumes. This section details the water balance which has been prepared in accordance with the Best Practice Guideline G2: Water and Salt Balances.

5.1 Objectives

The objectives of the water balance included the following:

- Estimate the monthly runoff volumes from the working or active area of the TSF;
- Estimate the monthly volumes of water that would be pumped to the Driefontein No. 2 Plant;
- Estimate the potable water requirements for employees; and
- Estimate the required storage capacity of the slurry collection sump.

5.2 Process Flow and Water Balance Components

Water required to reclaim the Libanon TSF will be obtained from dewatering from the Kloof Shaft 10# as well as from return water pumped from the RTSF. According to the Kloof Mine 2021 water balance, approximately 14 736 875 m^3/annum (40 375 m^3/day) is dewatered from the Kloof Shaft 10#, of which the FWGR are authorised to use 9 487 500 m^3/annum. The Libanon TSF will be sectioned off into paddocks to ensure that runoff from rainfall is contained on the TSF footprint. Only the working area, which is the area where the TSF is being reclaimed (assumed to be 5 % of the TSF footprint area at any given time), will contribute runoff to the slurry collection sump from the high-pressure water monitors, as well as from any rainfall. A penstock (pipe) will convey the slurry from the collection sump to the pump station, from where it will be pumped to the Driefontein No. 2 Plant. The entrance of the penstock at the collection sump will be fitted with a flapper valve, which can be shut closed under high rainfall events, to contain stormwater runoff from the working area on the TSF, which will be released in a controlled manner to the pump station. A lined catchment paddock will be constructed to capture any emergency spills from the pump station. The catchment paddock will be operated empty, by pumping back into the process or onto the TSF.

Potable water will be purchased from Rand Water Board or the Municipality, and will most likely be stored in JoJo tanks at the site.

The water balance components include the following:

- Water inflows:
  - Runoff from rainfall from the working area at the TSF;
  - Runoff from the high-pressure water cannons/monitors; and

- Potable water supply from municipal sources.

- Water outflows:
  - Evaporation and seepage; and
  - Water in the slurry pumped to the Driefontein No. 2 Plant.

5.3 Hydraulic Reclamation Water Requirements

The estimated water requirements and planned water supply for the various projects that form part of the WRTRP were provided by Kongiwe and are indicated in Table 5-1. The Libanon TSF will require 17 363 m^3/day (6 337 495 m^3/annum) to undertake reclamation activities. This will be supplied from dewatering from the Kloof Shaft 10# and return water from the RTSF. According to Table 5-1, the Kloof Shaft 10# will supply 13 851 m^3/day (5 055 615 m^3/annum), whilst the RTSF can supply 69 551 m^3/day (25 386 115 m^3/annum). It is assumed that the Kloof Shaft 10# will supply the bulk of the required water with remaining amount being supplied from the RTSF.

Table 5-1: Estimated water requirements and planned water supply

Facility	Requirement (m^3/d)	Planned Supply (m^3/d)
Supply to Driefontein 3 TSF	16,696	
Supply to Kloof 1 TSF	8,683	
Supply to Libanon TSF	17,363	
Supply to Venterspost North TSF	8,672	
Supply to Venterspost South TSF	8,872	
Supply to Cooke 2 TSF	17,869	
Supply to Cooke 4 South TSF	11,399	
Supply to DP2	2,669	
Supply to CPP	46,812	
Ezulwini Shaft		13,487
Return from RTSF		69,551
Make-up from Driefontein 10 Shaft		8,733
Make-up from Kloof 10 Shaft		13,851
Make-up from Cooke Shaft 1, 2 and 3		14,164
Return from Inherent Moisture within TSFs		15,599
Total	**139,035**	**135,385**

5.4 Assumptions and Limitations

The water balance is based on the following assumptions:

- Calculations are based on the values, assumptions and data sources in Table 5-2;
- The working area i.e. the active area at the TSF where hydraulic reclamation is taking place, was estimated to be 5 % of TSF footprint area. It is assumed that runoff from the remaining area of the TSF will be contained and will not report to the pump station;
- Estimated runoff coefficients were fixed for all months of the year;
- The lined catchment paddock will be operated empty;

- It has been assumed that 80 % of the monthly water used for hydraulic reclamation would run off as slurry and that 20 % would be lost;
- It has been assumed that 50 % of the average monthly rainfall from the working area will run off to the slurry sump;
- The wet season scenario is the average volumes for the three wettest months (November, December and January), whilst the dry season scenario is the average volumes for the three driest months (June, July and August). The average yearly scenario are the average volumes over a 12 month period;
- The Kloof Shaft 10# will supply the bulk of the required water with remaining amount being supplied from the RTSF;
- 100 L of potable water per an onsite employee per day has been assumed;
- No water is needed for sanitation purposes as chemical toilets will be used; and
- Any dust suppression requirements were not included in the water balance calculations.

5.5 Input Parameters

The parameters and assumptions/sources used in the water balance calculations are provided in Table 5-2.

Table 5-2: Parameters and assumptions/sources used in the water balance calculations

Parameter	Value	Units	Assumption/Source
TSF area	1 348 000	m²	TSF footprint area
Reclamation working area	67 400	m²	Assumed to be 5 % of the TSF area
Slurry collection sump area	3 000	m²	Assumed
Working area rainfall-runoff coefficient	0.5	-	Assumed 50% of monthly rainfall runs off from the working area to the collection sump
Reclamation water runoff coefficient	0.8	-	Assumed 80% of water used for reclamation runs off as slurry. 20 % losses
Monthly water volume required for hydraulic reclamation	528 125	m³/month	Based on information provided by Kongiwe, 17 363 m³/day of water is required for hydraulic reclamation.
Operational phase	72	months	Project description
Number of employees	10	-	Obtained from Kongiwe

Potable water provision per employee	0.1	m^3/day	Assumed 100 litres per employee per day

5.6 Water Balance Results

The average yearly, average wet and average dry season scenario water balance for the Libanon TSF is indicated in Figure 5-1. The following provides a summary:

- The reclamation water requirement is 6 337 495 m^3/annum. This water will be sourced from the Kloof Shaft 10# (5 055 615 m^3/annum), whilst the RTSF can supply up to 25 386 115 m^3/annum;
- Runoff from reclamation activities reporting to the collection sump is expected to be in the order of 5 070 000 m^3/annum (422 500 m^3/month);
- On average, 5 089 296 m^3/annum (424 108 m^3/month) is estimated to report to the reclamation pump station, which will be pumped to the Driefontein No. 2 Plant; and
- The potable water requirement was calculated to be 372 m^3/annum (31 m^3/month).

5.7 Slurry Sump and Lined Catchment Paddock Sizing

The slurry sump has been sized to contain the 1:50 year runoff for the 24 hour storm event from the working area at the TSF, using the SCS method. This was calculated to be 1 370 m^3. The slurry sump should be operated to always have an additional 1 370 m^3 available on top of normal operational volumes in the sump, in order to cater for the 1:50 year runoff, and to comply with GN R704 regulations.

The lined catchment paddock should be sized to contain slurry within the process at the pump station, as well as within the penstock, should any emergency spills occur, or if these facilities need to be drained for maintenance purposes. The lined paddock should be operated empty to ensure sufficient capacity at all times.

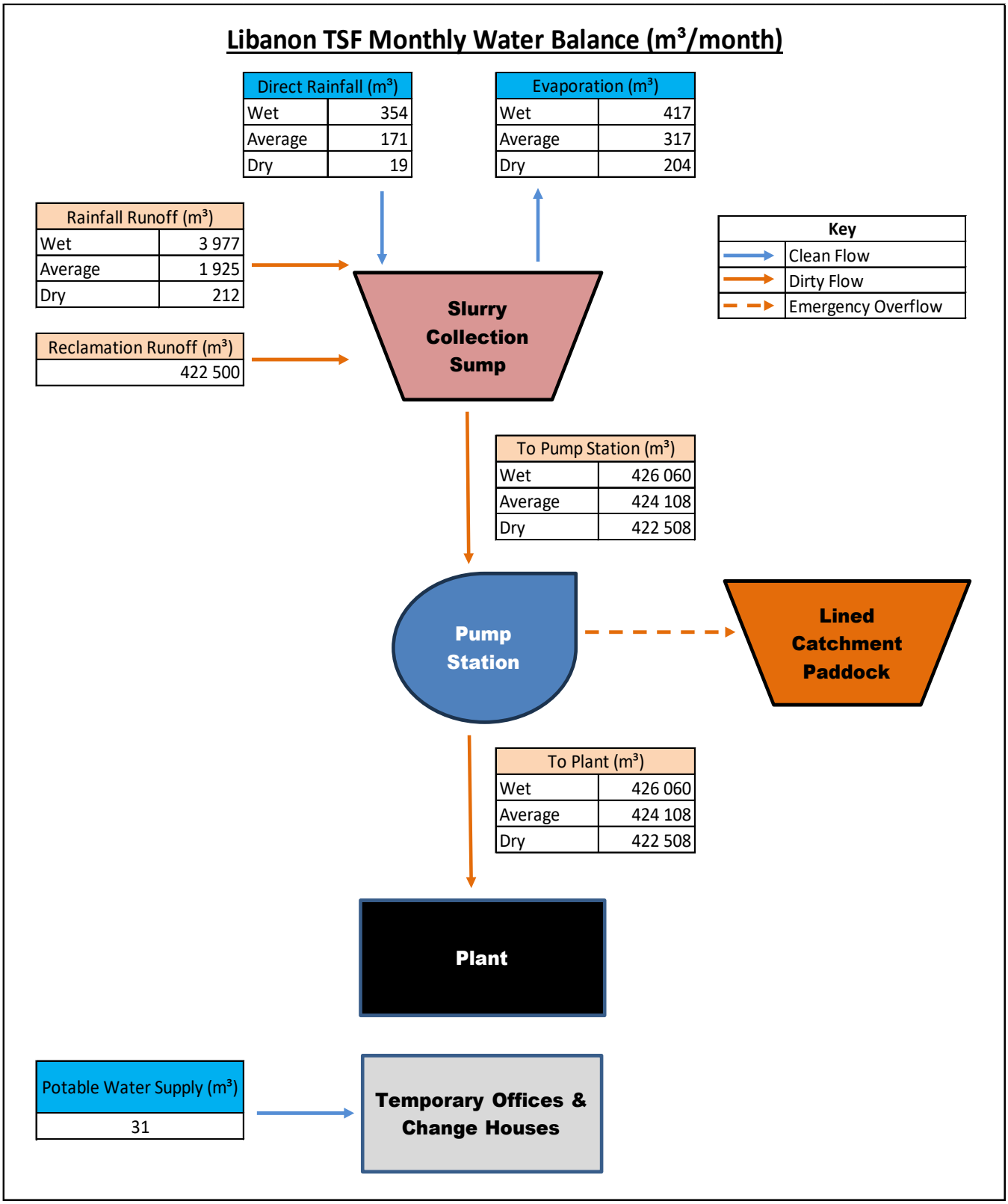


Figure 5-1: Average monthly water balance for the Libanon TSF

6 SURFACE WATER IMPACT ASSESSMENT

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:

6.1.1 Construction Phase

- Site clearance and the construction of minor infrastructure.

6.1.2 Operational Phase

- Hydraulic reclamation activities.

6.1.3 Closure and Rehabilitation Phase

- Rehabilitation activities.

6.2 Methodology

The impact significance rating process serves to highlight the critical impacts requiring consideration in the management and approval process. The impact significance rating system is presented in Table 6-1, Table 6-2 and Table 6-3, 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.

These are discussed in further detail below.

6.2.1 Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial Scale

Table 6-1 is used to determine the impact consequence characteristics for magnitude, spatial scale/population and duration.

Table 6-1: 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

IMPACT CHARACTERISTICS	DEFINITION	CRITERIA
	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

6.2.2 Part B: Determining the Consequence Rating

Once the impact consequence characteristics have been determined from Table 6-1, they are applied to Table 6-2 to obtain the consequence rating.

Table 6-2: Consequence rating

			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

			SPATIAL SCALE/ POPULATION		
			Site or Local	Regional	National/ international
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High

6.2.3 Part C: Determining Significance Rating

The probability of the impact occurring is assessed as either being definite, possible or unlikely, and is selected in Table 6-3. The consequence rating determined from Table 6-2, is then used to obtain the significance of the impact in Table 6-3.

Table 6-3: Significance rating

		CONSEQUENCE		
		Low	Medium	High
PROBABILITY (of exposure to impacts)	Definite	Medium	Medium	High
	Possible	Low	Medium	High
	Unlikely	Low	Low	Medium

The significance rating of the impact is determined prior to mitigation (without mitigation), as well as after mitigation measures have been implemented.

6.3 Impact Assessment and Mitigation

6.3.1 Construction Phase

During the construction phase, vegetation will be cleared and temporary infrastructure will be erected. The construction phase will be approximately 1 year. The activities and impacts that are likely to occur during the construction phase are summarised in Table 6-4.

Table 6-4: Summary of activities and impacts for the construction phase

Activity	Impact Description
Removal of vegetation and alteration to the topography.	Erosion and wash off of exposed soils leading to siltation in down gradient watercourses.

The ratings and proposed mitigation measures for the construction phase are provided in Table 6-5.

Table 6-5: Significance rating for the construction phase

NATURE OF IMPACT: The removal of vegetation will expose soils to water erosion that may lead to a deterioration in water quality		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
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	Possible
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Low**
Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None foreseen		
Mitigation measures • Clearance of vegetation must be limited as far as possible; • Temporary erosion measures such as sediment nets should be employed around exposed working areas; • The SWMP must be implemented as a first step during the construction phase; and • Water quality monitoring must be implemented upstream and downstream of construction sites.		

6.3.2 Operational Phase

During the operational phase, hydraulic reclamation will take place. The operational phase will be approximately 6 years.

The mixing of water with the tailings material during hydraulic mining, will add water and oxygen to the material, which could potentially result in acidic water, with leaching of metals and salts. It is therefore imperative that dirty water is kept within the TSF footprint through the implementation of a closed SWMP.

Poor maintenance of stormwater infrastructure such as the silting up of paddocks, as well as the erosion of berms, can result in spills from the operation. It is therefore important that stormwater infrastructure is regularly monitored and maintained as outlined in section 7.2.

The activities and impacts that could potentially occur during the operational phase are summarised in Table 6-6.

Table 6-6: Summary of activities and impacts for the operational phase

Activity	Impact Description
Uncontained runoff from the operational areas at the TSF.	**Impact 1:** Runoff into the downslope watercourses impacting on water quality.
Poor maintenance of stormwater infrastructure.	**Impact 2:** Silted paddocks and channels as well as eroded berms which lead to spills into the downslope watercourses impacting on water quality.

The ratings and proposed mitigation measures for the operational phase are indicated in Table 6-7 and Table 6-8.

Table 6-7: Significance rating of operational impact 1

NATURE OF IMPACT 1: Uncontained runoff from the operational area at the TSF running off into the downslope watercourses impacting on water quality		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Medium term	Medium term
Magnitude *(Major, Moderate, Minor)*	Major	Moderate
Probability *(Definite, Possible, Unlikely)*	Definite	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Medium**
Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None, as the impact will cease provided that rehabilitation is done appropriately.		

NATURE OF IMPACT 1: Uncontained runoff from the operational area at the TSF running off into the downslope watercourses impacting on water quality
Mitigation measures • Implementation of the proposed SWMP. It must be ensured that stormwater measures are designed, constructed and operated, to ensure that stormwater does not spill more than once in 50 years, in order to be compliant with GN R704 regulations; and • Water quality monitoring must be implemented upstream and downstream of the mining activities.

Table 6-8: Significance rating of operational impact 2

NATURE OF IMPACT 2: Poor maintenance of stormwater infrastructure resulting in silted channels, paddocks and eroded berms, leading to spills into the downslope watercourses impacting on water quality		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Long term	Medium term
Magnitude *(Major, Moderate, Minor)*	Major	Moderate
Probability *(Definite, Possible, Unlikely)*	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Medium**
Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None, as the impact will cease provided that rehabilitation is done appropriately.		
Mitigation measures • Implementation of the stormwater monitoring plan detailed in this report.		

6.3.3 Closure and Rehabilitation Phase

As reclamation progresses to ground level, the TSF footprint will continue to be sectioned off into paddocks. This will be a short-term measure to prevent contaminated runoff from flowing offsite. The area will be assessed for contamination (particularly in terms of radiation).

Contaminated soil will be removed and backfilled with uncontaminated soil. The land will be levelled to its original functioning topography and will be re-vegetated.

The activities and impacts that are likely to occur during the closure and rehabilitation phase are summarised in Table 6-9.

Table 6-9: Summary of activities and impacts for the closure and rehabilitation phase

Activity	Impact Description
Exposure of potential contaminated soils during the closure and rehabilitation phase once the TSF has been removed.	Erosion and wash off of contaminated soils resulting in water quality issues in the surrounding watercourses.

The ratings and proposed mitigation measures for the closure and rehabilitation phase are indicated in Table 6-10.

Table 6-10: Significance rating of closure impact 1

NATURE OF IMPACT: Erosion and wash off of potential exposed contaminated soils resulting in water quality issues in the surrounding watercourses		
	Impact Rating without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Long term	Medium term
Magnitude *(Major, Moderate, Minor)*	Major	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Low**
Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • Possible, unless potential spills are rehabilitated.		
Mitigation measures • Runoff must be contained onsite through the implementation of paddocks until any contaminated soils are removed;		

NATURE OF IMPACT: Erosion and wash off of potential exposed contaminated soils resulting in water quality issues in the surrounding watercourses
• Once contaminated soils are removed, the area must be backfilled with uncontaminated soils, and levelled to its original functioning topography and re-vegetated; and • Water quality monitoring must continue upstream and downstream until the site has been fully rehabilitated.

6.3.4 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 TSF will result in a long-term positive impact on the surrounding watercourses, provided that rehabilitation is successfully implemented.

6.4 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 of time and can include both direct and indirect impacts.

The project is located in a catchment that is highly impacted by mining and urban activities. The implementation of a sound SWMP is crucial to contain contaminated runoff from the operational area. The monitoring and maintenance of the implemented SWMP is of utmost importance, to ensure that dirty water is contained at the site. The removal of the TSF and the implementation of a rehabilitation plan that ensures that the site is returned to its original topography and re-vegetated, could enhance the catchment water quality. Should the above not be done, then in the long term, the proposed project has the potential to cumulatively add to the already deteriorated water quality of the Wonderfoneinspruit catchment.

The cumulative impact of the proposed project on the surface water quality of the catchment is rated in Table 6-11.

Table 6-11: Cumulative impact rating for surface water quality

NATURE OF IMPACT: Should dirty water runoff not be contained during the operational phase, and an appropriate rehabilitation plan not successfully implemented post-mine closure, 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**
Extent *(Local, Regional, International)*	Regional	Local
Duration *(Short term, Medium term, Long term)*	Long term	Medium term

NATURE OF IMPACT: Should dirty water runoff not be contained during the operational phase, and an appropriate rehabilitation plan not successfully implemented post-mine closure, then the proposed project has the potential to add cumulatively to the already deteriorated surface water quality of the catchment		
Magnitude *(Major, Moderate, Minor)*	Major	Minor
Probability *(Definite, Possible, Unlikely)*	Possible	Unlikely
Calculated Significance Rating (Low, Medium, High)	**High**	**Low**
Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	No	
Can impacts be enhanced: (Yes or No)	Yes	
Residual impacts • None, provided that the tailings material is removed, and appropriate rehabilitation is undertaken.		
Mitigation measures • Effective stormwater management that captures and contains all site runoff; • Removal of all tailing's material and successful rehabilitation of the area to a vegetated and free draining area; and • Water quality monitoring upstream and downstream of the proposed project until rehabilitation is successfully completed.		

6.5 Impact Summary Table

The impacts and mitigation measures are summarised in Table 6-12.

Table 6-12: 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 topography.	Erosion and wash off of exposed soils leading to siltation in down gradient watercourses.	*Moderate -*	*Short Term < 18 months*	*Regional*	*Possible*	Medium	• Clearance of vegetation must be limited as far as possible; •Temporary erosion measures such as sediment nets should be employed around exposed working areas; • The SWMP must be implemented as a first step during the construction phase; and • Water quality monitoring must be implemented upstream and downstream of construction sites.	*Minor -*	*Short Term < 18 months*	*Site or Local*	*Possible*	Low
Operational Phase													
1	Uncontained runoff from the operational area at the TSF.	Runoff into the downslope watercourses impacting on water quality.	*Major -*	*Long Term > 5 years*	*Regional*	*Possible*	High	• Implementation of a closed SWMP that captures and contains all dirty water runoff from the site. It must be ensured that stormwater measures are designed, constructed and operated, in order to ensure that stormwater does not spill more than once in 50 years, to be compliant with GN R704 regulations; and • Water quality monitoring must continue upstream and downstream of the proposed project.	*Moderate -*	*Long Term > 5 years*	*Site or Local*	*Possible*	Medium
2	Poor maintenance of stormwater infrastructure.	Silted paddocks and eroded berms can lead to spills in the downslope watercourses.	*Major -*	*Long Term > 5 years*	*Regional*	*Possible*	High	• Implementation of the stormwater monitoring plan detailed in this report.	*Moderate -*	*Long Term > 5 years*	*Site or 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
Closure & Rehabilitation Phase													
1	Exposure of potential contaminated soils during the closure and rehabilitation phase once the TSF has been removed.	Erosion and wash off of contaminated soils resulting in water quality issues in the surrounding watercourses.	*Major -*	*Long Term > 5 years*	*Regional*	*Possible*	High	• Runoff must be contained onsite through the implementation of paddocks until contaminated soils are removed; • Once contaminated soils are removed, the area must be backfilled with uncontaminated soils, and levelled to its original functioning topography and re-vegetated; and • Water quality monitoring must continue upstream and downstream until the site has been fully rehabilitated.	*Minor -*	*Medium Term > 18 months < 5 years*	*Site or Local*	*Possible*	Low
Cumulative Impacts													
1	Unsuccessful containment of dirty water runoff from the operation during the operational phase, as well as unsuccessful rehabilitation of the site post-mining.	The proposed project has the potential to cumulatively impact on the already deteriorated surface water quality of the catchment.	*Major -*	*Long Term > 5 years*	*Regional*	*Possible*	High	• Effective stormwater management that captures and contains all site runoff; • Removal of all tailings material and successful rehabilitation of the area to a free draining area that is vegetated; and • Water quality monitoring upstream and downstream of the proposed project until rehabilitation is successfully completed.	*Moderate -*	*Long Term > 5 years*	*Site or Local*	*Unlikely*	Low

7 MONITORING PLANS

7.1 Surface Water Quality

A surface water quality monitoring programme is essential as a management tool to detect negative water quality impacts as they arise and to ensure that the necessary mitigation measures are implemented. Should the project be approved, it is recommended that sampling points SW4 and SW5 in Table 3-3, form part of the water quality monitoring programme and that the parameters specified in Table 3-4 are monitored.

Water quality sampling should be done in accordance with the DWS Best Practice Guideline G3: Water Monitoring Systems. Samples must be kept cool (+-4°C), out of direct sunlight, and should be transported immediately to an accredited laboratory for water quality analysis within 24 hours of sampling. The impacts on water quality should be determined by comparing the monitoring results against the guideline limits provided in Table 3-4 (or as specified by the DWS), and importantly against previous results, to determine any deviations in trends over time. If the trend analysis indicates any deviations to the baseline monitoring, in terms of deteriorating water quality, then an immediate investigation must be undertaken to determine whether the operation may be responsible. If responsible, urgent action must be undertaken to implement mitigation measures to prevent further contamination.

Reporting should be done on a 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.

7.2 Stormwater Infrastructure

Water infrastructure (paddocks, channels, berms and slurry sumps) should be monitored on a monthly basis during the dry season, and on a weekly basis during the wet season. They should further be monitored immediately after any large storm events. Should blockages, silted up structures or breaches occur, immediate action should be undertaken to remove debris and repair breaches. monitoring should be undertaken by the onsite environmental control officer or maintenance manager. Inspections should be recorded and should include the following:

- Date of inspection;
- Rainfall amount received prior to inspection;
- Photographs of blockages, silted up structures or breaches witnessed;
- What action was undertaken to fix issues, and the amount of time taken to address them; and
- Photographs post action taken.

Inspection reports should be kept ready and supplied to the DWS when requested, or as part of the WUL conditions.

8 CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the most important aspect to prevent negative impacts from a surface water perspective, is to ensure that a sound SWMP is implemented prior to the commencement of reclamation activities, in accordance with the conditions stipulated in GN R704. Monitoring and maintenance of stormwater measures is of utmost importance and should be conducted as outlined in this report. The removal of the TSF is expected to have a positive long-term impact on the surrounding watercourses, provided that rehabilitation is successfully implemented.

Based on the findings of this report, the project can commence provided that the mitigation measures and monitoring plans are implemented.

9 REFERENCES

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APPENDIX A: WATER QUALITY LABORATORY CERTIFICATE

APPENDIX B: CURRICULUM VITAE

HYDROSPATIAL

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Curriculum Vitae – Andy Pirie – Hydrologist

Details

Name and Surname:	Andy Pirie
Occupation:	Senior Hydrologist
Company:	Hydrospatial (Pty) Ltd
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Andy Pirie is a senior hydrologist at Hydrospatial (Pty) Ltd. Andy graduated with a Master of Science (M.Sc.) in Water Resource Management (cum laude). He is registered as a Professional Natural Scientist (Pr.Sci.Nat.) in Water Resources Science with the South African Council for Natural Scientific Professions (SACNASP). He has worked on projects in South Africa, Cameroon, Senegal, Mali, Democratic Republic of the Congo (DRC), Botswana, Zambia and Namibia, for clients such as Assmang, Anglo American, Randgold Resources (now Barrick Gold), Sibanye-Stillwater, Birimian, Exxaro, Sasol, Eskom, Assore and SAFCOL. He has more than 9 years' experience in hydrological assessments and Geographical Information Systems (GIS). His expertise include the following:

- Floodline determinations;
- Mine water and salt balance modelling;
- Stormwater management plans;
- Surface water quality monitoring and assessment;
- Rainfall - runoff modelling;
- Catchment yield assessments;
- Sizing of dams and channels;
- Crop water requirement calculations;
- Environmental flow requirement calculations;
- Surface water impact assessments; and
- GN704 Regulation audits.

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Education

- 2013: M.Sc. Water Resource Management, cum laude (University of Pretoria).

Membership in Professional Associations

- Registered as a Professional Natural Scientist (Pr.Sci.Nat.) in Water Resources Science with the South African Council for Natural Scientific Professions (SACNASP). Registration number: 114988.

Employment

- March 2018 – Present: Senior Hydrologist at Hydrospatial (Pty) Ltd.
- June 2012 – February 2018: Hydrologist and GIS specialist at Digby Wells Environmental.

Selected Project Experience

Company	Position	Project Location	Client	Project	Responsibilities
Hydrospatial (Pty) Ltd	Senior Hydrologist	Gauteng	Sibanye Gold	Hydrological Study for the Sibanye Driefontein Operations EMP and WULA Update	• Baseline hydrological assessment. • Water quality assessment. • Stormwater management plan update. • Water and salt balance update. • GN704 and GN509 exemption assessment.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Mpumalanga South Africa	SAFCOL	Streamflow Reduction Modelling of the Genus Exchange Ratio of Eucalyptus for Pine at the SAFCOL Berlin Plantations	• Setup of the WRSM/Pitman model. • Calculation of the allowable genus exchange area using the Gush Tables. • Reporting. • Presentation of study and hand over of reports.

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Company	Position	Project Location	Client	Project	Responsibilities
Hydrospatial (Pty) Ltd	Senior Hydrologist	Mpumalanga South Africa	Transvaal Gold Mining Estates	Hydrological Study for the Proposed Theta Mine Project	• Calculation of the water use freed up through the proposed removal of pine, eucalyptus and wattle in the Blyde River catchment for an offset strategy for the mine. • Baseline hydrological study. • Surface water impact assessment. • Water quality sampling and analysis. • Setup of a water monitoring network and programme. • Stormwater structure placement and sizings of structures. • Development of a water balance model. • Terrain modelling and catchment delineation using ArcGIS software. • Land use and soil assessment. • Determination of Peak flows for the 1:50 and 1:100 year storm event. • Hydraulic modelling to determine the 1:50 and 1:100 year floodlines. • Reporting.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Limpopo, South Africa	Lunsklip Farming	Hydrological Study for the Lunsklip Irrigation Dam	• Catchment runoff modelling using the WRSM/Pitman model which included afforested areas. • Calculation of the farm irrigation requirements. • Quantification of the irrigation dam water balance.

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Company	Position	Project Location	Client	Project	Responsibilities
Hydrospatial (Pty) Ltd	Senior Hydrologist	Mpumalanga South Africa	Anglo American	Surface Water Assessment for the Proposed Leslie 1 Coal Mine	• Baseline hydrological study. • Surface water impact assessment. • Water quality sampling and analysis. • Setup of a water monitoring network and programme. • Stormwater structure placement and sizings of structures. • Development of a water balance model. • Terrain modelling and catchment delineation using ArcGIS software. • Land use and soil assessment. • Determination of Peak flows for the 1:50 and 1:100 year storm event. • Hydraulic modelling to determine the 1:50 and 1:100 year floodlines. • Reporting.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Limpopo South Africa	Assmang	GN704 Legal Compliance Audit of the Dwarsrivier Chrome Mine	• Site audit of the mine to GN704 regulations. • Reporting on findings and recommendations for improvement to comply with GN704 regulations.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Limpopo South Africa	Assmang	Floodline Determination for the Resource and Reserve Drilling Project at the Dwarsrivier Chrome Mine	• Catchment delineation. • Hydrological assessment to calculate the 1:50 and 1:100 year peak flows. • Hydraulic modelling of 18 river reaches to determine the 1:50 and 1:100 year flood water elevations.

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Company	Position	Project Location	Client	Project	Responsibilities
Hydrospatial (Pty) Ltd	Senior Hydrologist	Limpopo South Africa	Assore	GN704 Legal Compliance Audit of the Rustenburg Minerals Development Company Chrome Mine	• Site audit of the mine to GN704 regulations. • Reporting on findings and recommendations for improvement to comply with GN704 regulations.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Gauteng South Africa	Fry's Metals	Stormwater Management Plan for the Fry's Metal Factory	• Audit of site stormwater infrastructure. • Calculation of peak flows and stormwater volumes. • Calculation of stormwater channel capacities to assess whether capacities comply with regulatory requirements.
Hydrospatial (Pty) Ltd	Senior Hydrologist	North West South Africa	Assore	Hydrological Study for the Wonderstone Mine	• Baseline hydrological study. • Surface water impact assessment. • Water quality Assessment. • Development of a stormwater. management plan. • River diversion assessment.
Hydrospatial (Pty) Ltd	Senior Hydrologist	KwaZulu-Natal, South Africa	The Biodiversity Company	Water Quality Monitoring and Assessment for the Edendale Bulwer Housing Development	• Setup of a water monitoring network. • Surface water sampling. • Assessment of water quality results.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Gauteng South Africa	Eskom	Hydrological Assessment of a Tributary of the Braamfonteins pruit near Sandton, Johannesburg	• Site assessment. • Peak flow calculations. • Storm event assessment. • Hydraulic structure assessment. • Assessment of gabion retaining wall failure.

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Company	Position	Project Location	Client	Project	Responsibilities
					• Hydraulic modelling of watercourse.
Hydrospatial (Pty) Ltd	Senior Hydrologist	Limpopo South Africa	Assore	GN704 Legal Compliance Audit of the Zeerust Chrome Mine	• Site audit of the mine to GN704 regulations. • Reporting on findings and recommendations for improvement to comply with GN704 regulations.
Digby Wells Environmental	Hydrologist	Mali	Birimian	Hydrological Study for the Environmental and Social Impact Assessment for the Goulamina Lithium Project	• Baseline hydrological study. • Development of a water and salt balance. • Modelling of catchment flood hydrology. • Calculation of storm rainfall depths. • Stormwater management plan. • Surface water impact assessment.
Digby Wells Environmental	Hydrologist	Senegal	Randgold Resources	Hydrological Study for the Randgold Massawa Gold Project ESIA	• Baseline hydrological study. • Floodline determination. • Development of a water and salt balance. • Modelling of catchment hydrology. • Environmental flow requirement calculations. • Stormwater management plan. • Surface water impact assessment.
Digby Wells Environmental	Hydrologist	Cameroon	Caminex SA	Hydrological Study for the Environmental	• Baseline hydrological study. • Surface water impact

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Company	Position	Project Location	Client	Project	Responsibilities
				and Social Impact Assessment for the Ntem Iron Ore Project	assessment.
Digby Wells Environmental	Hydrologist	Gauteng South Africa	Sibanye-Stillwater	Sibanye Gold Millsite TSF Reclamation Project EIA	• Audit of existing stormwater management controls. • Development of a stormwater management plan to satisfy GN704 Regulation requirements. • Development of a stormwater control monitoring programme. • Water conservation and water demand management plan
Digby Wells Environmental	Hydrologist	Gauteng South Africa	Sibanye-Stillwater	Sibanye Gold Kloof Floodline Determination	• Site visit to assess channel and floodplains and to measure hydraulic structures. • DEM creation from lidar dataset. • Catchment delineation. • Catchment assessment of soils, vegetation, slope and land cover to obtain suitable runoff coefficients. • Calculation of peak flows using Rational and SDF methods. • Hydraulic modelling in HEC-RAS for approximately 25 river reaches to determine the 1:50 and 1:100 year surface water elevations.
Digby Wells Environmental	Hydrologist	Free State South Africa	Bothma and Son Transport	Stormwater management plan for the Bothma Sand	• Audit of existing stormwater management structures.

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Company	Position	Project Location	Client	Project	Responsibilities
				Mine	• Rainfall assessment. • Sizing of channels. • Development of a stormwater management plan to satisfy GN704 conditions. • Development of a stormwater structure monitoring programme. • Development of a PCD rehabilitation action plan. • Reporting.
Digby Wells Environmental	Hydrologist	Free State South Africa	Sasol Mining	Sasol Defunct Mines Surface Flow Analysis	• Project manager. • Creation of detailed DEMs from Lidar data for 4 of Sasol's defunct subsided collieries. • Modelling of surface water flow directions and accumulations to determine areas that are not free draining.
Digby Wells Environmental	Hydrologist	Gauteng South Africa	DRD Gold	DRD Gold Stormwater Management Plans for the Ergo Elsburg & Van Dyk Tailings Dams	• Project manager. • Site visit audit of stormwater management structures. • Flood peak calculations. • Stormwater structure sizing. • Management measures to ensure that stormwater structures are maintained. • Reporting.
Digby Wells Environmental	Hydrologist	Mpumalanga South Africa	Exxaro	Exxaro Surface Water Study for the Environmental Authorisation for the Proposed Schoonoord	• Baseline hydrological study. • Surface water impact assessment. • Water quality sampling and analysis of results.

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Company	Position	Project Location	Client	Project	Responsibilities
				Underground Mine, Arnot Coal, Mpumalanga	• Setup of a water monitoring network and programme. • Stormwater structure placement and sizings of structures. • Terrain modelling and catchment delineation using ArcGIS software. • Land use and soil assessment. • Determination of Peak flows for the 1:50 and 1:100 year storm event. • Hydraulic modelling using the HEC-RAS model to determine the 1:50 and 1:100 year floodlines. • Reporting.
Digby Wells Environmental	Hydrologist	Limpopo South Africa	Exxaro	Exxaro Floodline Determination for the Closure Environmental Management Plan for the Tshikondeni Coal Mine	• Catchment assessment of rainfall, topography, soils and land cover. • Determination of the 1:50 and 1:100 year peak flows. • Hydraulic modelling using HEC-RAS to determine the 1:50 and 1:100 year floodlines. • Reporting on catchment characteristics, methods and results obtained.
Digby Wells Environmental	Hydrologist	Botswana, Zambia and Namibia	Botswana Government	Kazungula Bridge Project Surface Water Quality Monitoring	• Setup of a water quality monitoring network and programme. • Monthly water sampling from the Zambezi and Chobe Rivers over a 6 year period to determine whether the construction and operation of

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Company	Position	Project Location	Client	Project	Responsibilities
					the Kazungula Bridge is impacting on the water quality. • Analysis of water quality results. • Monthly monitoring reports describing the water quality for the month and identifying possible sources of pollution as well as providing mitigation measures.
Digby Wells Environmental	Hydrologist	Free State South Africa	Sibanye-Stillwater	Sibanye Beatrix ESIA	• Baseline hydrological study. • Surface water impact assessment. • Water quality and trend analysis.
Digby Wells Environmental	Hydrologist	Mpumalanga South Africa	Anker Coal	Anker Coal Elandsfontein Colliery Stormwater Management Plan	• Site visit audit of stormwater structures. • Review of existing stormwater management plan. • Recommendations for the improvement of existing stormwater management plan
Digby Wells Environmental	Hydrologist & GN704 Auditor	Northern Cape, South Africa	Assmang	GN704 Legal Compliance Audit for the Khumani Iron Ore Mine	• Project manager. • Preparation of an audit checklist. • Audit of the mine to GN704 regulations. • Reporting on findings and recommendations for improvement to comply with GN704 regulations.
Digby Wells Environmental	Hydrologist	Okavango, Botswana	Botswana Government	Mohembo Bridge Surface Water Baseline and Monitoring Programme	• Setup of a surface water quality monitoring network and programme. • Surface water quality sampling and analysis of results. • Analysis of streamflows from the Mohembo

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Company	Position	Project Location	Client	Project	Responsibilities
					discharge gauging station. • Climate assessment.
Digby Wells Environmental	Hydrologist	Mpumalanga South Africa	Sasol Mining	Sasol Surface Water Study for the Environmental Authorisation for the Imvula Coal Mining Project	• Baseline hydrological study. • Surface water impact assessment. • Terrain modelling and catchment delineation using ArcGIS software. • Land cover and soil hydrological assessment. • Surface water report writing and compilation.
Digby Wells Environmental	Hydrologist	North-west South Africa	Sun International	Sun City Drinking Water Quality Analysis	• Sampling of drinking water at Sun City. • Interpretation of water quality results. • Reporting.
Digby Wells Environmental	Hydrologist	Limpopo South Africa	De Groote Boom Minerals	Surface Water Study for the Mining Permit Application for the De Groote Boom Project	• Baseline hydrological study. • Surface water impact assessment. • Water quality sampling and assessment of water quality results. • Setup of a water quality monitoring programme. • Reporting.
Digby Wells Environmental	Hydrologist	South Africa	Fountain Capital	Floodline Determination for Proposed Development of an Open Pit Coal Mine and Associated Infrastructure near Bronkhorstspruit, Gauteng	• Catchment assessment of rainfall, topography, soils and land cover. • Determination of the 1:50 and 1:100 year peak flows. • Hydraulic modelling using HEC-RAS to determine the 1:50 and 1:100 year floodlines. • Reporting on catchment

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Company	Position	Project Location	Client	Project	Responsibilities
					characteristics, methods and results obtained.
Digby Wells Environmental	Hydrologist	Limpopo South Africa	Pamish Investments No. 39	Floodline Determination for the Proposed Open Pit Magnetite Mine and Concentrator Plant, Mokopane, Limpopo Province	• Catchment assessment of rainfall, topography, soils and land cover. • Determination of the 1:50 and 1:100 year peak flows. • Hydraulic modelling using HEC-RAS to determine the 1:50 and 1:100 year floodlines. • Reporting on catchment characteristics, methods and results obtained.
Digby Wells Environmental	Hydrologist	Mpumalanga South Africa	Eskom	Eskom Surface Water Study for the Mashala Resourses 22kV Power Line	• Baseline hydrological study • Surface water impact assessment. • Hydraulic modelling using HEC-RAS to determine the 1:50 and 1:100 year floodlines. • Reporting.

Hydrospatial (Pty) Ltd (2018/059188/07)
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Company	Position	Project Location	Client	Project	Responsibilities
Digby Wells Environmental	Hydrologist	Mpumalanga South Africa	Msobo Coal	Msobo Coal Surface Water Study for the Sara Buffels A and B: IWULA and IWWMP for Opencast and Underground Mining Activities	• Surface water impact assessment. • Terrain modelling and catchment delineation using ArcGIS software. • Land use and soil assessment. • Determination of Peak flows for the 1:50 and 1:100 year storm event. • Hydraulic modelling using the HEC-RAS model to determine the 1:50 and 1:100 year floodlines. • Reporting.
Digby Wells Environmental	Hydrologist	Mali	Randgold Resources	Randgold Surface Water Study for the Morila Gold Mine Agri-Assessment Project	• Review of reports, mine layout plan and water quality data. • Classification of clean and dirty water areas based on the above. • Recommendations on water sources and areas for agri-business post mine closure.

APPENDIX C: STORMWATER MASTER PLAN

KONGIWE

Far West Gold Recoveries (Pty) Ltd

FWGR Phase 2 Expansion: Libanon

Stormwater Management Plan

December 2024

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Report Information

Project:	FWGR Phase 2 Expansion: Libanon
Report Title:	Stormwater Management Plan
Client:	Far West Gold Recoveries (Pty) Ltd
Project No:	DRDG#037

Project Approval

Name	Designation	Task	Signature	Date
Hilton Sparks	Professional Engineer	Report compiler		04 December 2024
Gerlinde Wilreker	Kongiwe: Technical Director	Report review		04 December 2024
Bradly Thornton	Kongiwe: CEO	Report approval		04 December 2024

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DECLARATION OF INDEPENDENCE

I, Hilton Sparks declare that:

a) I act as the independent specialist in this application;
b) 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;
c) I declare that there are no circumstances that may compromise my objectivity in performing such work;
d) I have the expertise in conducting the specialist study relevant to this application, including knowledge of the various Acts, regulations and any guidelines that have relevance to the proposed project;
e) I will comply with the Acts, regulations and all other applicable legislation;
f) I have not, and will not engage in, conflicting interests in the undertaking of the activity;
g) 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;
h) All the particulars furnished by me in this form are true and correct; and,
i) I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of Section 24F of the Act.



Hilton David Neville Sparks
Civil Engineer
Pr.Eng (Reg No. 740604)

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SPECIALIST REPORT GUIDELINE

A Specialist Report Checklist Table has been compiled in accordance with the guideline as set out in Appendix 6 of the EIA Regulations. Appendix 6 relays the specific information required as per the guideline is given in the second column of the Table.

Table 1-1 - Specialist Checklist

Specialist Report Guideline: Appendix 6 GNR 982 EIA Regulations 4 December 2014 as amended	
Details to be included in the Report	**Section in Report**
Details of	
Specialist who prepared the report	Section 1.3
Expertise of the specialist	Section 1.3
CV of the specialist	Annexure A
Declaration that the Specialist is Independent in a form as may be specified by the CA	Declaration of Independence
An indication of the Scope of and the Purpose for which the report was prepared	Section 2
An indication of the Quality and Age of base data used for the specialist report	Section 3.3
A Description of existing impacts on the site, cumulative impacts of the proposed development, and levels of acceptable change	Section 5.4
The Duration, Date, and Season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.1
A Description of the Methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
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	Sections 7
An identification of any areas to be avoided including buffers	Section 7
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 4.7
A Description of any Assumptions made and any Uncertainties or Gaps in Knowledge	Section 4
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 7
Any Mitigation Measures for inclusion in the EMPr	Section 5
Any Conditions for inclusion in the Environmental Authorisation	Section 7.7
Any Monitoring Requirements for inclusion in the EMPr or Environmental Authorisation	Section 7.7
As to whether the proposed activity/ activities or portions thereof should be authorised	Section 7
Regarding the acceptability of the proposed activity or activities	Section 7.7

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Specialist Report Guideline: Appendix 6 GNR 982 EIA Regulations 4 December 2014 as amended	
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 7.7
A Description of any Consultation Process that was undertaken during the course of preparing the specialist report	None required
A Summary and copies of any comments received during any consultation process and where applicable all responses thereto	None required
Any other information requested by the CA	None required

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EXECUTIVE SUMMARY

Introduction and Background

Far West Gold Recoveries (Pty) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSFs are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto Driefontein 4 TSF, until such stage as the Regional Tailings Storage Facility (RTSF) construction is completed and the TSF is commissioned.

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised .

The Libanon project will reclaim material at 600 000 tons per month . Required infrastructure will include:

- Pumpstation;
- Process water from Kloof Shaft 10#;
- Pollution paddock;
- Access road;
- Laydown area; and,
- Powerlines.

An Environmental Authorisation (EA) and a Water Use Licence (WUL) are therefore required for the Libanon project to proceed.

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 at the Libanon TSF;
- Delineate the clean and dirty water areas;
- Provide stormwater measures and recommendations for areas that require interventions; and
- Provide conceptual sizing's for the proposed stormwater measures in line with GN R704 regulations.

Baseline Hydrology

The area has a Mean Annual Precipitation (MAP) of 711 mm. Rainfall is highest over the months of October to March, and lowest over the months of April to September.

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The project area has a Storm Rainfall Depth of 126.3 mm for a 24 hour storm duration and a 1 in 50 year return period. The calculated 1 in 50 year peak flow is 3.333 m^3/s for the Libanon East catchment, 0.770 m^3/s for the Libanon West catchment and 1.073 m^3/s for the Libanon TSF catchment.

Conceptual Stormwater Management Plan

A conceptual Stormwater Management Plan (SWMP) was designed for the Libanon TSF area to ensure that clean and dirty water are adequately separated, in accordance with GN R704 regulations. The SWMP was designed to ensure that clean water is diverted away from dirty areas, and that dirty water runoff from the operation is captured, contained and managed.

Conclusions and Recommendations

In conclusion, the most important aspect to prevent negative impacts from a surface water perspective, is to ensure that a sound SWMP is implemented prior to the commencement of pumping activities, in accordance with the conditions stipulated in GN R704. Monitoring and maintenance of stormwater measures is of utmost importance and should be conducted as outlined in this report

The following is recommended:

- The existing berm/channel system around the TSF are reinstated where damaged, and maintained. This system acts as the barrier between the clean and dirty water;
- The “clean” runoff from the high lying areas above the Libanon TSF is deviated away from the Libanon TSF by an earth berm constructed immediately to the south of Bridges Avenue, up to the existing culvert under Bridges Avenue to the east of the Libanon TSF. The existing culvert is in a poor state of repair and will have to be reinstated; and,
- A dolomitic stability investigation be carried out around the Libanon TSF to confirm that the proposed reclamation method and stormwater containment on top of the TSF and in paddocks around the TSF is acceptable and in accordance with SANS 1936, and a dolomitic risk management plan be developed.

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Annexures

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Annexure B: Rational Method

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Abbreviations

CA	Competent Authority
CEO	Chief Executive Officer
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management
EMP	Environmental Management Plan
FWGR	Far West Gold Recoveries (Pty) Ltd
HSE	Health Safety and Environmental
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water Waste Management Plan
Kongiwe	Kongiwe Environmental (Pty) Ltd
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No 28 0f 2002)
Mt/a	Million tonnes per annum
NEM:WA	National Environmental Management : Waste Act, 2008 (Act No 59 of 2008)
NEMA	National Environmental Management Act, 1998 (Act No 107 of 1998)
NWA	National Water Act, 1998 (Act No 36 of 1998)
PEP	Project Execution Plan
PPE	Personal Protective Equipment
PPP	Public Participation Process
SoW	Scope of Works
TSF	Tailings Storage Facility
WUL	Water Use Licence
WULA	Water Use Licence Application

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1 INTRODUCTION AND BACKGROUND

Kongiwe Environmental (Pty) Ltd (Kongiwe) was appointed to prepare a stormwater masterplan for the Libanon and associated infrastructure (hereafter referred to as the project). This report provides the surface water study for the Environmental Impact Assessment (EIA) and Water Use Licence Application (WULA) processes.

1.1 Project Description

Far West Gold Recoveries (Pty) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSFs are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto the Regional Tailings Storage Facility (RTSF).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised).

The Libanon project will reclaim material at 600 000 tons per month . Required infrastructure will include:

- Pumpstation;
- Process water from Kloof Shaft 10#;
- Pollution paddock;
- Access road;
- Laydown area; and,
- Powerlines.

An Environmental Authorisation (EA) and a Water Use Licence (WUL) are therefore required for the Libanon project to proceed.

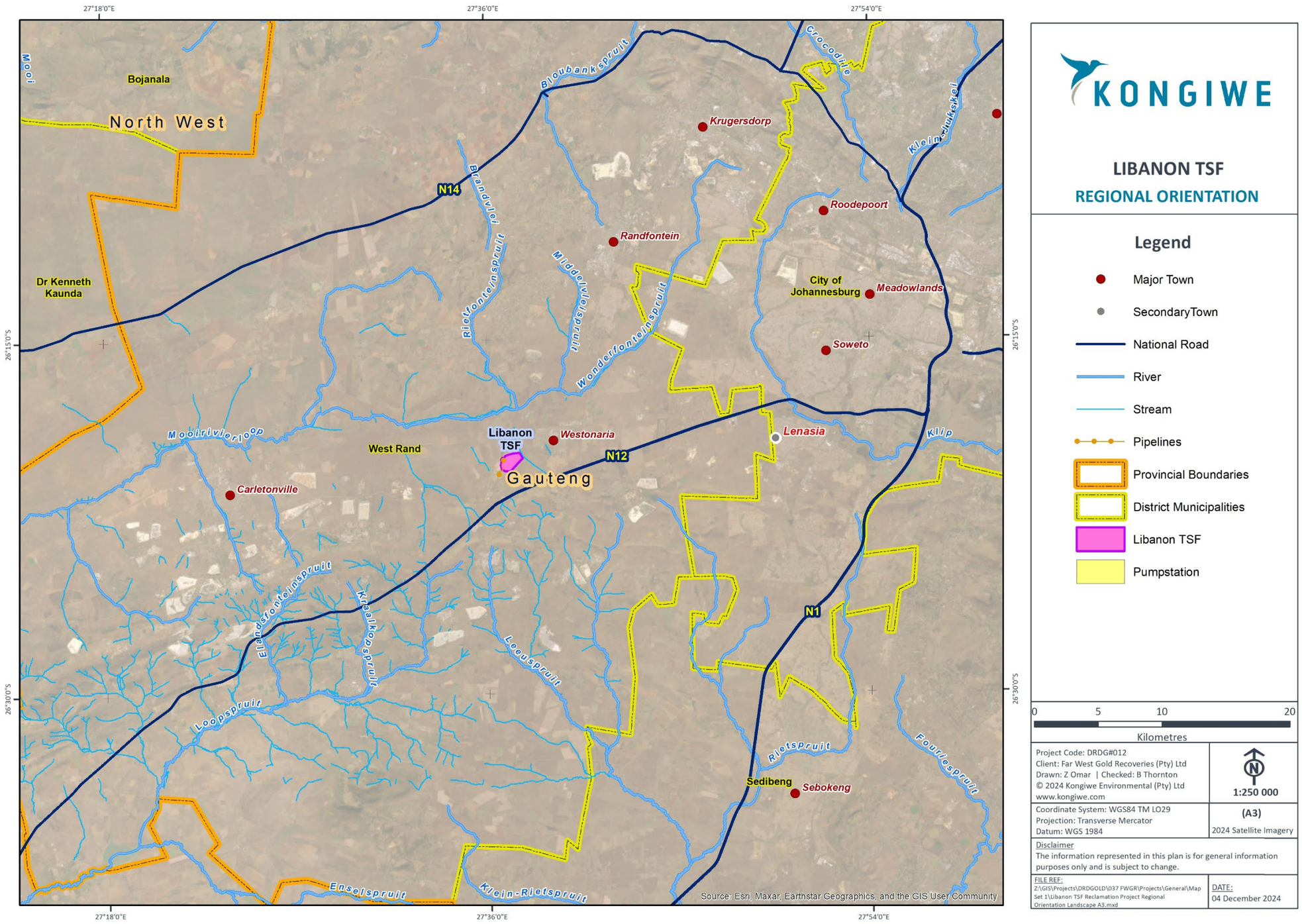
1.1.1 Locality

The Libanon TSF is located approximately 4 km west of Westonaria. Figure 1-1 shows that TSF is located on the Remaining Extent of Libanon or Witkleigat 283 IQ.

1.1.2 Access

Major routes around the mine dump are the N12 which runs 2km to the South of the TSF and Bridges Avenue which runs parallel to the southern edge of the TSF.

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KONGIWE

LIBANON TSF

REGIONAL ORIENTATION

Legend

- Major Town
- SecondaryTown
- National Road
- River
- Stream
- Pipelines
- Provincial Boundaries
- District Municipalities
- Libanon TSF
- Pumpstation

0 5 10 20

Kilometres

Project Code: DRDG#012 Client: Far West Gold Recoveries (Pty) Ltd Drawn: Z Omar | Checked: B Thornton © 2024 Kongiwe Environmental (Pty) Ltd www.kongiwe.com	1:250 000
Coordinate System: WGS84 TM LO29 Projection: Transverse Mercator Datum: WGS 1984	(A3) 2024 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\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Regional Orientation Landscape A3.mxd	DATE: 04 December 2024

Figure 1-1 - Location of the project

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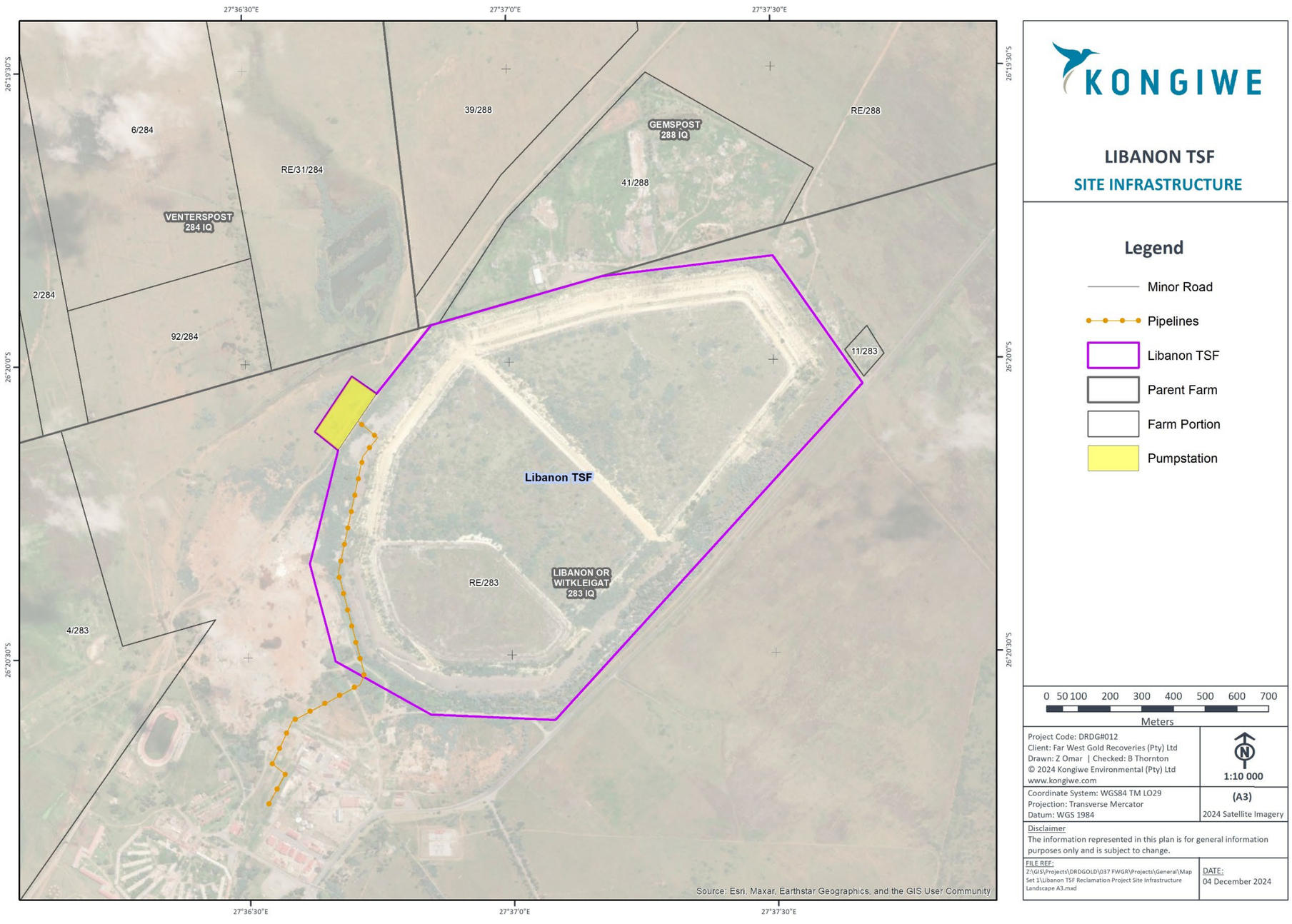


Figure 1-2 - Layout of 7L1 Pump Station

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1.2 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 recurrence 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; and,
  - 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.

1.3 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 (PrEng) (Registration Number 740604) with the Engineering Council of South Africa (ECSA) and as a Professional Construction Project Manager (PrCPM) (Registration Number D/202/2004) with the South African Council for the Project and Construction Management Professions (SACPCMP). 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.

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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 at the Libanon TSF site;
- Delineate the clean and dirty water areas;
- Provide stormwater measures and recommendations for areas that require interventions; and,
- Provide conceptual sizing's for the proposed stormwater measures in line with GN R704 regulations.

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3 METHODOLOGY AND DATA SOURCES

3.1 Site Investigations

A site investigation of the Libanon TSF site was undertaken on 8th May 2024, and a follow up on 9th December 2024.

The purpose of the site investigation was to locate and assess the current stormwater measures, as well as to assess areas where stormwater measures may be required.

This study was undertaken as a once-off study and relies on historical hydrological and climate data for the site; as well as recognized hydrological and water resource databases for South Africa. Data generated during the time of this study is not seasonally bound as average yearly data was applied where required and as scientifically acceptable.

3.2 Elevation Data

Elevation data was obtained from National Geospatial Information Website, the date of the data is 2016.

3.3 Climatic Data

Monthly rainfall between October 1941 – September 2008, was sourced from South African Weather Service (SAWS) station: Blyvooruitzicht (station number: 0474684 W) and was used to describe the seasonal rainfall at Libanon TSF. There are other weather stations located closer to the Libanon TSF, but the records are of short duration. Due to the flat topography of the region, the rainfall does not vary much, and therefore, the Blyvooruitzicht weather station was used to represent the rainfall at the Libanon TSF.

The storm rainfall depths, which are required to calculate the peak flows, were extracted using the Design Rainfall Estimation in South Africa software programme (Smithers and Schulze, 2002). The programme uses the six closest rainfall stations to a user specified coordinate, to calculate the storm rainfall depths for that site. Storm rainfall depths were extracted at Libanon TSF (26° 20’ S, 27° 37’ E).

According to the WR2012 study, Libanon TSF is located within evaporation zone 10A. Symon’s Pan (S-Pan) evaporation was obtained from the DWS Naauwpoort weather station (C2E009) at the Boskop Dam, which is also located within evaporation zone 10A. Monthly evaporation was available for the period of 1969 – 2019. S-Pan evaporation measurements tend to be higher than evaporation from natural open water bodies. To convert S-Pan measurements to open water evaporation, monthly conversion factors were used, which were obtained from the WR90 study.

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3.4 Terminology

The following definitions are relevant to the SWMP. These are provided here for clarity, as they are commonly referred to in this section of the report:

- **Clean area**: This refers to any area at or near a mine or activity, which is not impacted by mining activities, but has the potential to become contaminated if not managed appropriately;
- **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 (i.e. contain polluted water);
- **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. generate polluted water);
- **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; and,
- **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; 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.

3.5 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 storm event; and,
- Appropriate maintenance and management of stormwater related infrastructure should always be ensured.

The above design philosophy is applied as follows:

1. The catchment area upstream of the Libanon TSF extends up to the N12 Highway. The clean water from this catchment currently flows directly onto the TSF. There is a berm/channel system around the TSF (see Figure 3-1) which seperates the clean/dirty water, however the drainage ditch is siltedup and overgrown in places, and the berm breached in sone instances. These berms/channels

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must be reinstated and maintained to divert stormwater away from the Libanon TSF, however this concentrates the runoff at the south eastern and south western corners of the TSF.



Figure 3-1 – Berm/culvert around Libanon TSF

A new earth berm immediately to the south of Bridges Avenue extending over the full length of the Libanon TSF up to the existing culvert crossing Bridges Avenue to the east of the Libanon TSF, is proposed. This berm will deviate all stormwater runoff from the upstream areas to this culvert, which will have to be reinstated as it is in a poor state of repair;

2. Rainfall onto the top of the Libanon TSF will be retained on top of the TSF using earth berms, and the runoff will be allowed to infiltrate and evaporate. This is in line with FWGR's current strategy for the remining of existing TSFs, and has been used at other TSFs located in dolomitic areas;
3. Runoff from the side slopes of the Libanon TSF will be captured, contained and managed in paddocks immediately adjacent to the TSF (see Figure 3-2), and will be allowed to evaporate/infiltrate appropriately. The berm on the outside edge of the paddocks must be reinstated/maintained to ensure that dirty water is contained in the paddocks;



Figure 3-2 – Existing paddocks at toe of Libanon TSF

4. Dirty water will, as far as possible, be recycled and reused;

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5. Clean and dirty water systems must convey/contain runoff from the 50 year storm event, and should not lie within the 100 year floodline or within a horizontal distance of 100 m from any watercourse, whichever is the greater of the two; and
6. Appropriate maintenance and management of stormwater related infrastructure should be ensured at all times.

3.6 Sizing of Stormwater Measures

3.6.1 Peak Flows and Volumes

GN R704 regulations require that clean and dirty water systems are sized so that they do not spill more than once in 50 years.

3.6.1.1 Rational Method

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 flood (m^3/s);
C = Runoff coefficient (dimensionless);
I = Average rainfall intensity over the catchment (mm/hour);
A = Catchment area contributing to the peak flow (km^2); and,
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 Annexure B).

The Rational Method is based on the following assumptions:

- Rainfall has a uniform area distribution across the total contributing catchment;

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- 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; and
- The return period of the peak flow is the same as that of the rainfall intensity.

3.6.2 Channel Sizing's

The Manning's equation was used to calculate the channel sizes required to convey the 1:50 year peak flows. The Manning's equation is provided below:

$$Q = A\frac{1}{n}R^{2/3}S^{1/2}$$

Where:

Q = Peak flow (m^3/s)

A = Cross sectional area of the channel (m^2)

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 3-1.

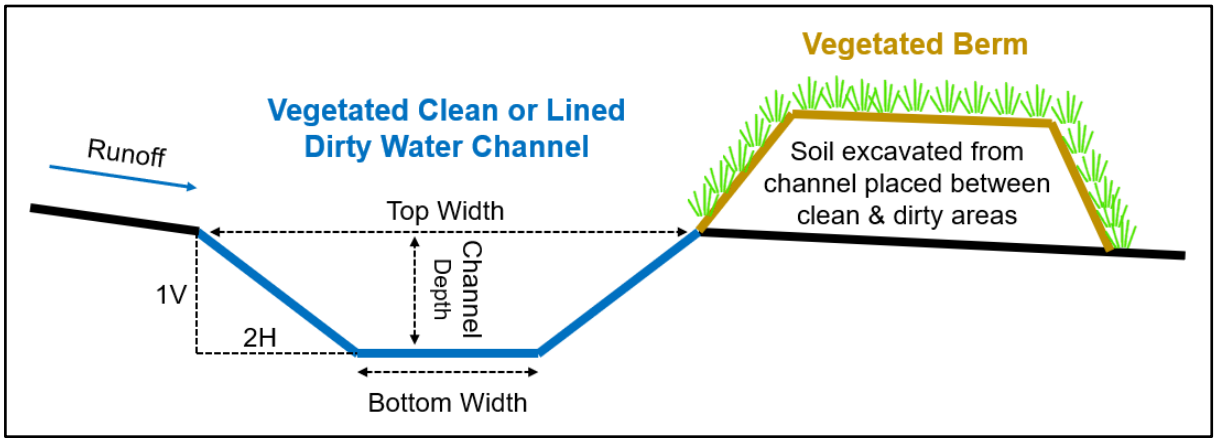


Figure 3-3: Typical proposed design for clean and dirty water channels

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3.7 Developments on Dolomitic Land

Sinkholes and subsidences are mostly caused by water ingress/seepage or a lowering of the ground water table.

Sinkholes are generated by a change in the moisture regime in the soils constituting the arch over the upward migrating void. This change in the state of the soil leads to the arch ravelling and the void moving upward towards ground surface. The void will eventually daylight and manifests as a sinkhole. Often paleo sinkholes are reactivated by groundwater level draw down. Paleo sinkholes are ancient features infilled over time by transported soil material, e.g. wind-blown, aeolian sands. These materials may extend below the original groundwater level. In such instances, lowering of the groundwater level leads to a change in the moisture regime of the soils that re-activates the sinkhole.

Seepage of water most commonly occurs from leaking water bearing services such as sewers, water pipes, stormwater systems etc. The leaking water erodes the soil covering the dolomite rock and carries the material down into the underlying cave systems resulting in the formation of a cavity below ground surface. A sinkhole results when this cavity daylights. Sinkholes and subsidences may occur soon after installation of services because of poor workmanship or use of inferior materials or after a period of time due to continual consolidation of poorly compacted materials. Obviously, as the condition of water bearing services deteriorate with time, the frequency of leaks increases and so does the likelihood of a sinkhole occurring.

The groundwater level drops when boreholes are used to pump water from underground aquifers. The groundwater level can also be lowered when mines pump water out of groundwater compartments to keep their underground workings dry. Groundwater level lowering leads to lowering of porewater pressure, which lowers, ground bearing capacity or draining of subsurface cavities, which may result in sinkhole or subsidence formation.

The dolomitic environment is often characterised by zones of deep weathering and preferential leaching. This process of preferential weathering is particularly well advanced within the shear zones of faults. Subsurface karst valleys up to 200 m in depth may develop in these shear zones.

Spectacular representations of these features are located on the **Far West Rand in the Gauteng Province**. In many of these areas, the groundwater level is located above the bedrock, in residual soils. These residual materials are essentially composed of wad and ferroan soil. The artificial lowering of the groundwater level may produce significant ground movement at the surface. This process manifests as a subsidence at ground surface.

Dolomite Stability Investigations (DSI) are conducted to determine the Inherent Hazard characterisation of dolomite land as well as the Dolomite Area Designations and shall be undertaken under the direction of one or more Competent Persons (geo-professionals). Geotechnical site investigations on dolomite land shall comprise investigations, as relevant, relating to:

a) the identification of hazards that impact upon the development of the land;
b) the determination of the Inherent Hazard; and,

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c) the stability of the dolomite land for various types of development, and the foundations for buildings and structures.

In their report "Technical Report on Moisture Levels of the Kloof 1, Libanon and Venterspost North Tailings Storage Facilities", The RVN Group found the base of the Libanon TSF (from 42 to 54 m below the top surface) to be wet under the present conditions (ie a "dormant" state) (See Figure 3-4). They recommend:

- The authors recommend drilling be completed on all TSFs, obtaining up-to-date data, and commissioning a hydrogeological study;
- Furthermore, the authors recommend that the RC drilling technique is utilized so that wet or watery samples can be recovered and the TSF bases can be intersected and defined;
- The authors recommend that larger TSFs like Libanon and Venterspost North should undergo an initial geotechnical assessment. This assessment can involve a visit to the site by professionals and a desktop study utilizing satellite data.
- The authors recommend that FWGR consider incorporating the latest monitoring technologies for TSFs as a sustainable long-term measure. The authors suggest exploring the technology currently being developed and tested at numerous operational and decommissioned TSFs worldwide.

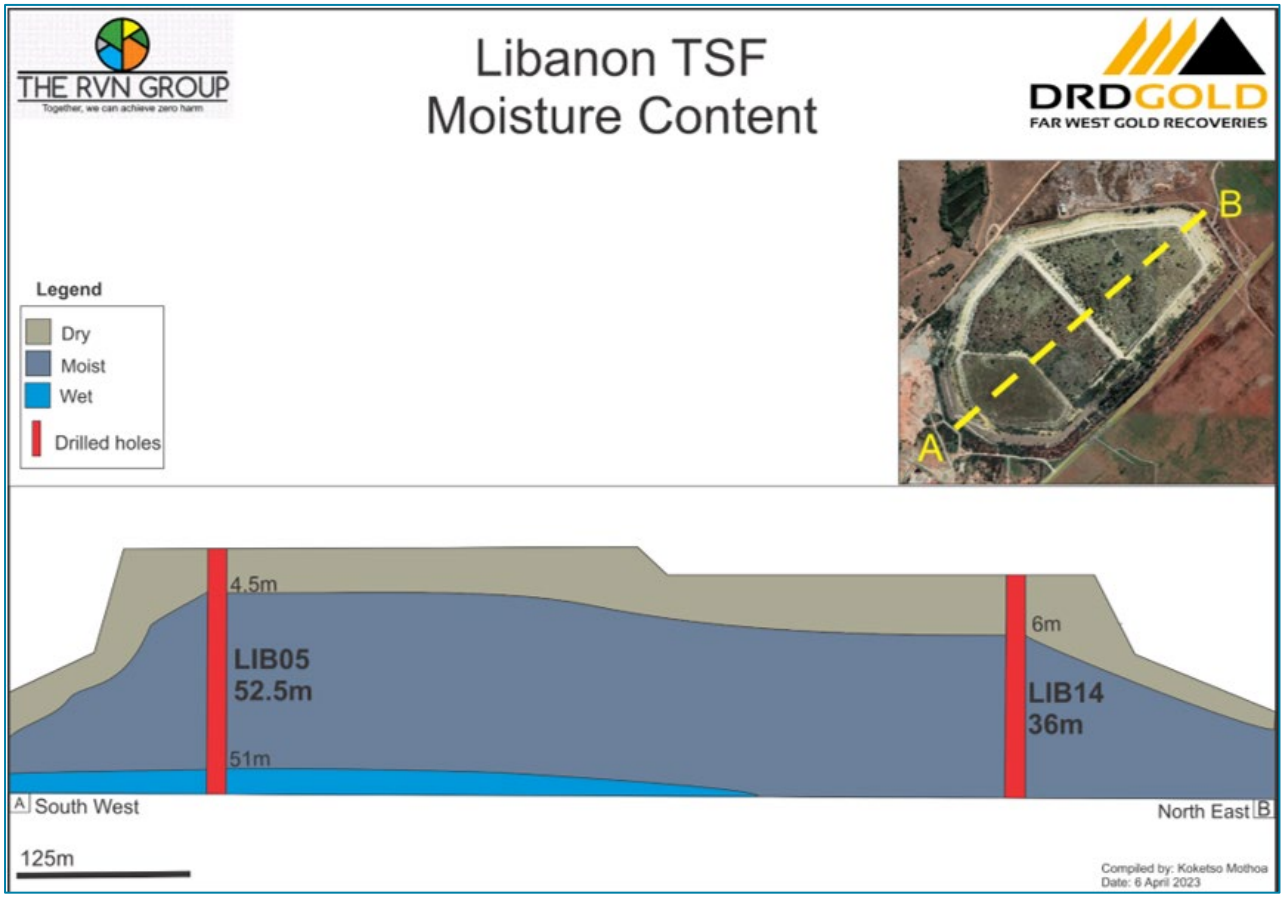


Figure 3-4 – Schematic cross-section through the Libanon TSF

The general requirements for such investigations are described in SANS 1936-2 and comprise the following:

a) Feasibility-level Dolomite Stability Investigation

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   a. The first phase of investigation requires fieldwork to enable the land to be characterized in terms of its stability. This phase of investigation forms the basis of development planning.

b) Design-level Dolomite Stability Investigation
   a. Such investigation, including footprint investigation, where necessary, entails further investigations to provide specific information for design purpose of structures, facilities, infrastructure or bulk services.

c) Investigations during Installation of Services
   a. This investigation is undertaken during the installation of services and entails observations and further investigations as are necessary to confirm the Inherent Hazard characterization of dolomite land or Dolomite Area Designations (or both) determined during the feasibility-level investigation.

The safe development of a site located on dolomite involves:

a) careful geotechnical assessment of the delineated area;
b) appropriate planning and appropriate design of structures and services; as well as,
c) the perpetual management thereof.

In addition, a dolomitic risk management plan must be developed.

3.8 Stormwater Drainage on Dolomitic Land

3.8.1 Concentrated Stormwater

Concentrated stormwater shall not be disposed of other than in natural water courses unless the land upon which it is discharged is:

- not dolomite land; or
- dolomite land categorised as having a Dolomitic Area Designation D1 (refer to SANS 1936-1).

3.8.2 Surface Ponds

Stormwater drainage shall be such that no surface water ponds other than in natural watercourses save for that associated with the attenuation of stormwater for a period not exceeding **6 hours**;

3.8.3 Stormwater retention and attenuation structures

Stormwater retention and attenuation structures should preferably not be constructed on land of Dolomite Area Designation D4 in accordance with SANS 1936. Dolomite Area Designation D4 (Inherent Hazard Classes 5, 6, 7 and 8) may only be considered provided the conditions as prescribed in SANS 1936 are met; and,

3.8.4 Precautionary Measures

Appropriate precautionary measures should be specified for Dolomite Area Designation D3 (Inherent Hazard Classes 1, 2, 3 and 4).

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4 Assumptions and Limitations

The following are assumptions and limitations for the conceptual SWMP:

- The SWMP is based on the project description and infrastructure layout. Should the project description or infrastructure layout change, then the SWMP will need to be revised;
- The capacities calculated for proposed containment facilities, do not include any additional volumes other than the 1:50 year runoff.

5 Hydrological Setting

5.1 Climate

5.1.1 Rainfall

Rainfall data for the area was obtained from the Blyvooruitzicht rainfall station (Station No. 0474684 W). The station is located 4 km south of Carletonville and 14 km west of the Libanon TSF. The mean monthly rainfall is indicated in Figure 3-2. The area has a Mean Annual Precipitation (MAP) of 711 mm. Rainfall is highest over the months of October to March, and lowest over the months of April to September.

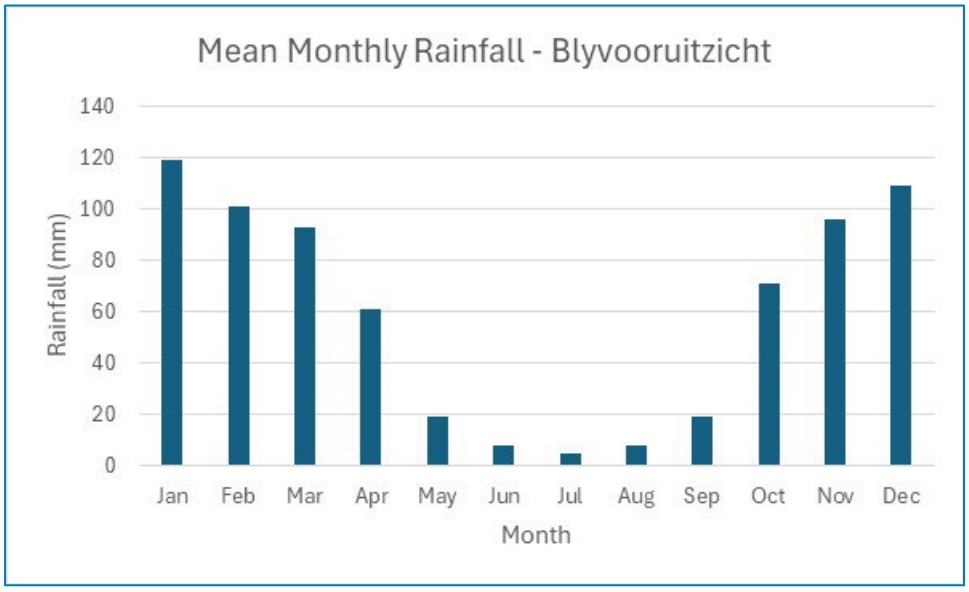


Figure 5-1 - Mean monthly rainfall for the area

5.1.2 Evaporation

According to the WR2012 study, the Libanon area is mostly located within evaporation zone 10A. Symon's Pan (S-Pan) evaporation was obtained from the DWS Naauwpoort weather station (C2E009) at the Boskop Dam, which is also located within evaporation zone 10A. Monthly evaporation was available for the period of 1969 – 2019. S-Pan evaporation measurements tend to be higher than evaporation from natural open water bodies. To convert S-Pan measurements to open water evaporation, monthly conversion factors were used, which were obtained from the WR90 study. The monthly evaporation for the project is indicated in Table 5-1. The open water Mean Annual Evaporation (MAE) is 1 454 mm, which is double the MAP of the

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area. Evaporation is highest over the warmer months of September to March, and lowest over the cooler months of April to August.

Table 5-1 - Evaporation for the area

Month	S-Pan Evaporation	Open Water Evaporation Factor	Open Water Evaporation (mm)
January	190	0.84	159
February	161	0.88	142
March	149	0.88	131
April	116	0.88	102
May	96	0.87	83
June	77	0.85	65
July	86	0.83	71
August	120	0.81	97
September	160	0.81	130
October	187	0.81	152
November	191	0.82	156
December	201	0.83	166
Total	1732		1454

5.1.3 Storm Rainfall Depths

The storm rainfall depths for the centre point of the Libanon TSF were extracted for the catchments from the Design Rainfall Estimation in South Africa software programme (Smithers and Schulze, 2002). The programme uses the six closest rainfall stations to a user specified position to calculate the storm rainfall depths. The storm rainfall depths were extracted at 26° 20’ S and 27° 37’ E. The six closest rainfall stations are indicated in Table 5-2

Table 5-2 – Six closest rainfall stations to the Project

Station Name	Station No.	Distance from Site (km)	Record (Years)	Latitude	Longitude	MAP (mm)	Altitude (mamsl)
Venterspos (Old Homestead)	0475227_W	5.7	43	26°17S	27°38E	655	1 555
Kloof (GM)	0475174_W	8.0	33	26°24S	27°35E	695	1 723
Bank (SAR)	0475019_W	13.1	57	26°18S	27°30E	603	1 530
Leeuwpoort	0475056_W	14.1	64	26°26S	27°32E	644	1 580
Luipaardsvlei	0475404_W	16.6	50	26°14S	27°44E	651	1 603
Eldorado	0475477_W	19.1	47	26°27S	27°45E	590	1 557

The extracted storm rainfall depths for the project are indicated in Table 5-3.

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Table 5-3 - Storm rainfall depths for the area

Storm Duration	Return Period / Storm Rainfall Depth (mm)						
mm/hr/day	1:2 yr	1:5 yr	1:10yr	1:20yr	1:50 yr	1:100 yr	1:200 yr
5 min	8.9	11.8	13.8	15.7	18.2	20.1	22.0
10 min	12.8	17.1	20.0	22.7	26.4	29.1	31.9
15 min	15.9	21.2	24.8	28.2	32.8	36.2	39.6
30 min	20.3	27.1	31.6	36.1	41.8	46.2	50.6
45 min	23.4	31.3	36.5	41.6	48.3	53.3	58.4
1 hr	25.9	34.6	40.4	46.0	53.4	59.0	64.6
1.5 hr	29.9	39.9	46.6	53.1	61.6	68.1	74.5
2 hr	33.1	44.2	51.6	58.8	68.2	75.3	82.5
4 hr	39.4	52.5	61.3	69.8	81.0	89.5	98.0
6 hr	43.5	58.0	67.8	77.2	89.6	98.9	108.3
8 hr	46.7	62.3	72.8	82.9	96.2	106.3	116.4
10 hr	49.4	65.9	76.9	87.6	101.7	112.3	123.0
12 hr	51.7	68.9	80.5	91.7	106.4	117.5	128.7
16 hr	55.5	74.0	86.4	98.5	114.3	126.2	138.2
20 hr	58.7	78.2	91.3	104.1	120.8	133.4	146.1
24 hr	61.4	81.8	95.6	108.9	126.3	139.5	152.8
1 day	53.2	70.9	82.8	94.3	109.5	120.9	132.4
2 day	65.4	87.2	101.9	116.1	134.7	148.8	162.9
3 day	73.9	98.5	115.0	131.0	152.0	167.9	183.9
4 day	80.2	106.9	124.9	142.3	165.1	182.3	199.7
5 day	85.5	114.0	133.1	151.7	176.0	194.4	212.8
6 day	90.1	120.1	140.2	159.8	185.4	204.8	224.2
7 day	94.1	125.5	146.6	167.0	193.8	214.0	234.4

5.2 Topography and Drainage

The elevation of the Libanon area varies from a high of 1 765 metres above mean sea level (mamsl) at the ridge located to the south to a low of 1546 at the Wonderfonteinspruit in the north. The topography of the area is flat, with an average slope of 1.5 %. The only areas where steep slopes occur, are along the sides of the TSFs and in the high lying ridge along the south edge of the area.

The Wonderfonteinspruit and its tributaries are the primary surface water system near the project site, forming part of a broader watershed that ultimately flows into larger water bodies downstream. During peak rainfall events, these watercourses can experience significant flow increases, carrying stormwater runoff from both natural and anthropogenic sources. The proximity of the Libanon TSF to these watercourses necessitates stringent controls to prevent contaminated stormwater from reaching the Wonderfonteinspruit, where it could impact downstream water quality, ecosystems, and local communities. (See Figure 5-4).

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There is a tarred road (Bridges Avenue) located on the southern side of the TSF. This road has no formal stormwater drainage system (see Figure 5-2, although there is an unformed channel draining to a culvert immediately to the east of the TSF, however the inlet to the culvert is completely blocked (see Figure 5-3).



Figure 5-2 – Drainage system on Bridges Avenue



Figure 5-3 – Blocked culvert under Bridges Avenue

5.3 Soils Characteristics and Drainage

Soils in the vicinity of the Libanon TSF are generally composed of a thin layer of sandy or silty material overlying dolomitic bedrock, with low to moderate permeability. This composition poses dual challenges: the soils have limited capacity to absorb large volumes of water during intense storms, contributing to increased runoff, while the dolomitic bedrock below is vulnerable to infiltration if water accumulates or ponds. To prevent destabilization of the ground, it is essential to design drainage systems that route stormwater away from critical areas and toward safe discharge points. (See Figure 5-4).

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Information available indicates that a dolomitic stability investigation has NOT been conducted in the area of the Libanon TSF.

It must also be recorded that in the process of carrying out the groundwater study for this project, one of the boreholes drilled in close proximity to the Libanon TSF encountered a cavity.

5.4 Environmental Sensitivities and Implications for Stormwater Management

Given the site's dolomitic conditions, hydrological characteristics, and proximity to watercourses, the stormwater management strategy must be designed to:

- Limit infiltration to avoid ground subsidence and sinkhole formation;
- Ensure contaminated runoff from the TSF does not reach local watercourses or groundwater systems; and,
- Control erosion and sediment transport to protect the stability of the TSF and the quality of nearby aquatic habitats.

Overall, the presence of dolomite adds a critical layer of complexity to stormwater management for this project, requiring specialized infrastructure and best practices to protect both environmental and structural integrity.

SANS 1936 states the following:

The requirements for **dams**, reservoirs and public swimming pools (including **attenuation dams**) shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:

- a gravity survey over the site at 30 m grid spacing with a minimum of three lines;
- additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
- inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
- investigation of potential paleosinkhole structures wherever they are exposed; and,
- where justified, supplementary geotechnical site investigation.

A proposed site for dams and reservoirs (attenuation dam) should be at least 100 m from the nearest housing or commercial development.

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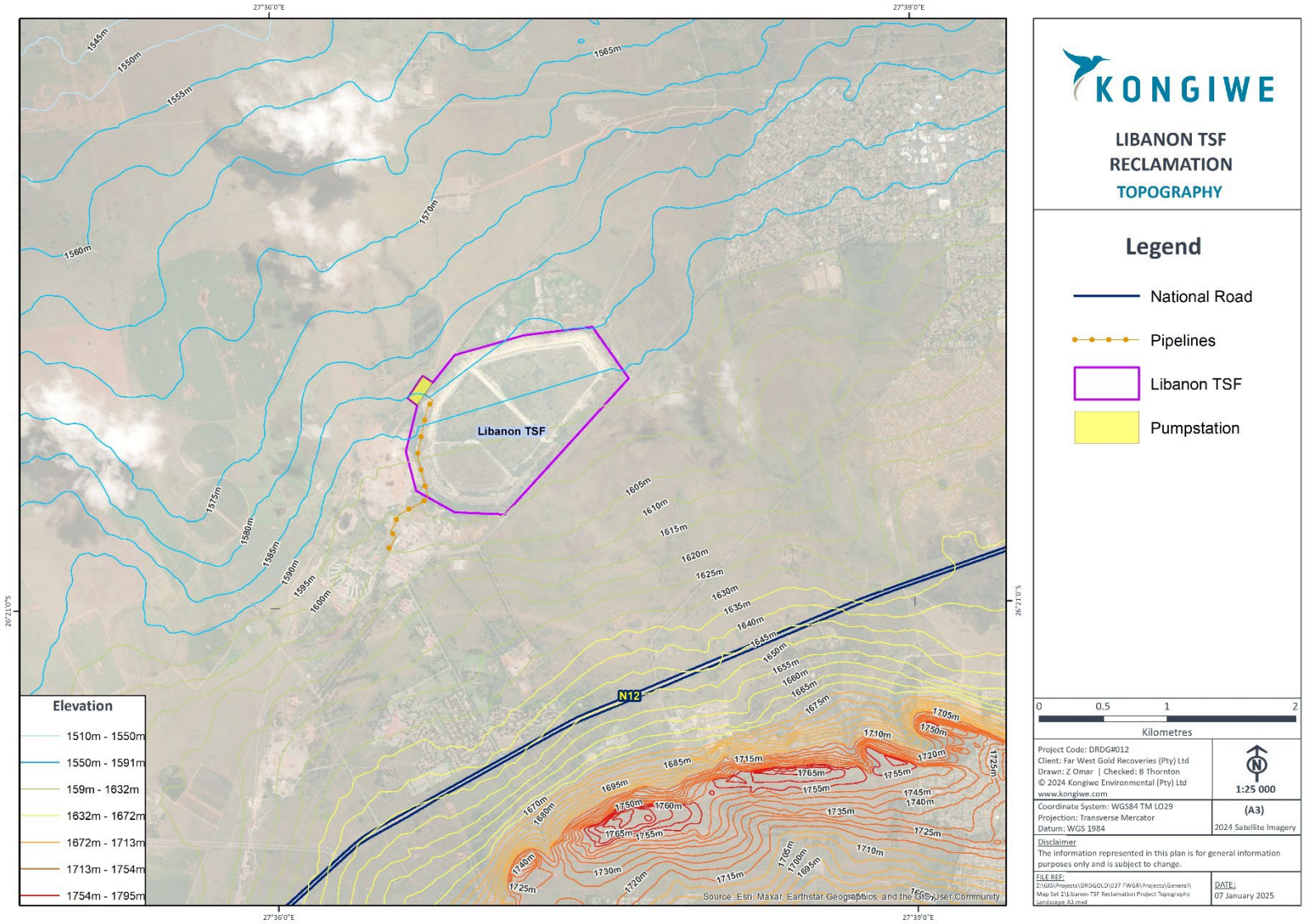


Figure 5-4 - Topography

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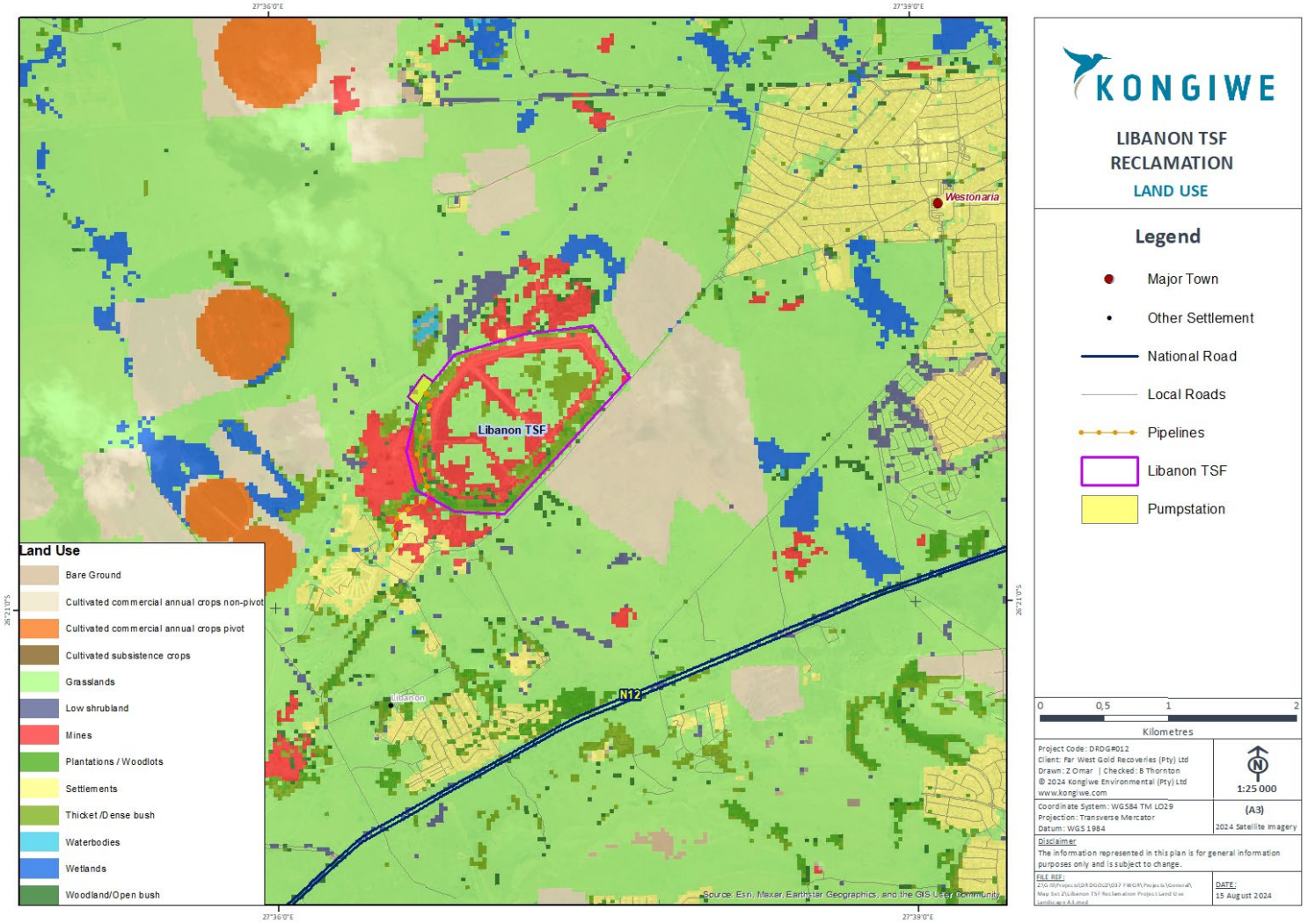


Figure 5-5 – Land Use

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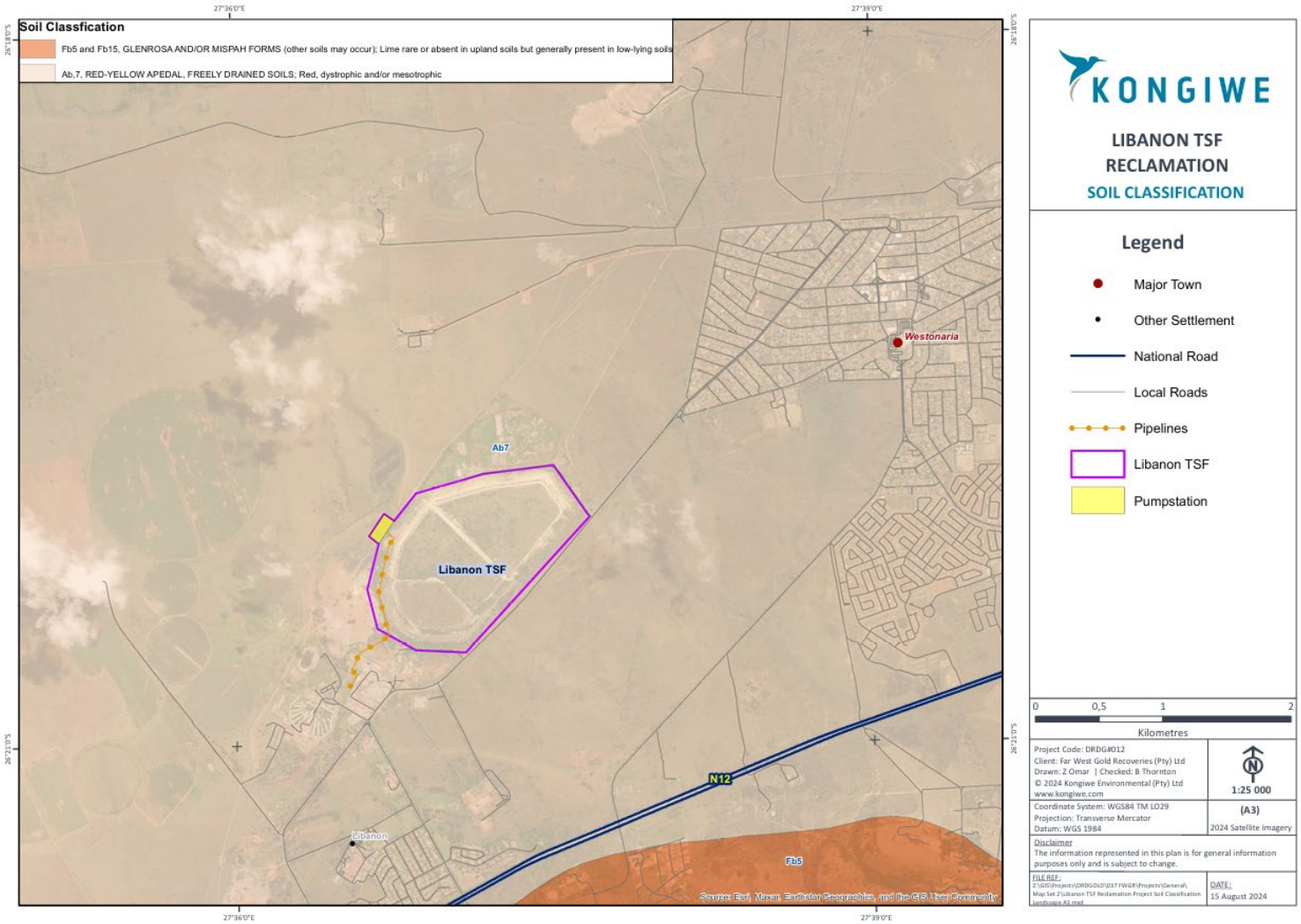


Figure 5-6 - Soils Classification

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6 PROPOSED RECLAMATION METHOD

The proposed method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being reclaimed. At the sump, finger screens remove any debris that may impact pumping operations, and a penstock will control water flow into the sump. The position of the collection sump will change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation station. To control the volume of water reporting to the reclamation station, flapper valves are used to hold, and release slurry contained in the collection sump. This slurry is then pumped via pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation.



Figure 6-1 Mobile tracked hydraulic monitor on a tailings facility in South Africa

Reclamation will take place in predetermined benches (or ‘cuts’) and will move unidirectionally until the entire TSF has been reclaimed. Generally, 30 m cuts are made for reclamation as per Figure 2-4 below.

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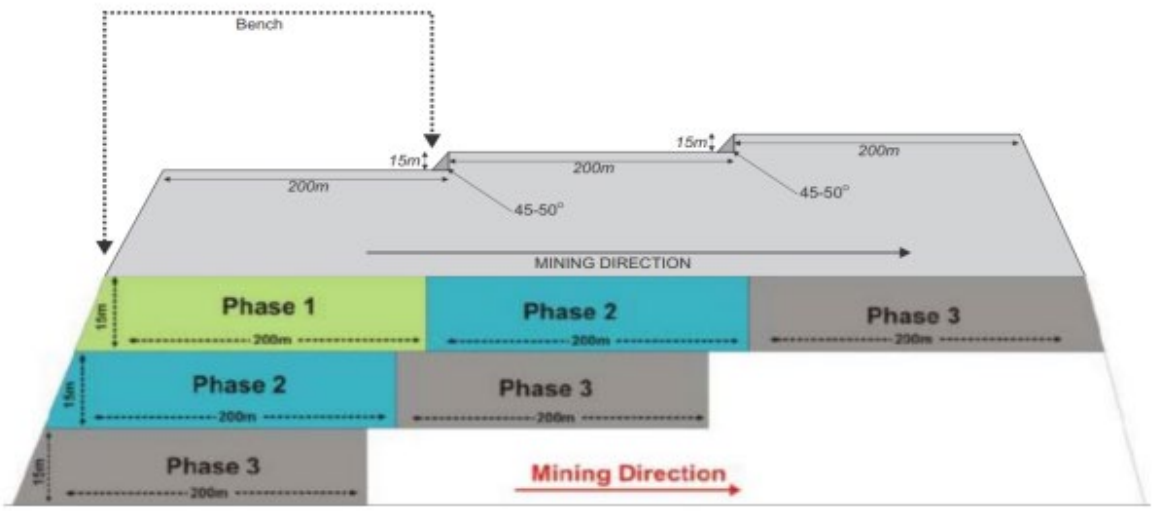


Figure 6-2 Typical bench widths proposed for a gold reclamation project (Source: www.drdgold.com/investors-and-media/circulars/cpr-samrec-wrtrp-26022018.pdf).

An earth berm is constructed on the outer edge of the benches to prevent stormwater and dirty water from contaminating the areas adjacent to the TSF.

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7 CONCEPTUAL STORMWATER MANAGEMENT PLAN

The purpose of the conceptual SWMP is to ensure that clean and dirty water are adequately separated, by diverting clean water away from dirty areas, and ensuring that dirty water from the operation is captured, contained and managed appropriately in accordance with GN R704 regulations and DWS best practice guidelines.

7.1 Stormwater Catchment Areas

The Libanon TSF has 3 catchment areas contributing stormwater runoff to it (see Figure 7-1):

- Clean water areas:
  - Libanon East – the biggest area commencing on the high lying ridge to the south, flowing northwards and concentrating at the eastern corner of the Libanon TSF; and,
  - Libanon West – commencing at the N12 to the south, flowing northwards and concentrating at the western corner of the Libanon TSF;
- Dirty water areas:
  - Libanon TSF – the TSF footprint where stormwater will be contained on the TSF by earth berms constructed as part of the reclamation process; and,
  - Paddocks constructed at the toe of the TSF, to contain stormwater runoff from the side slopes of the TSF and allowing the ponded “dirty” water to either evaporate or infiltrate.

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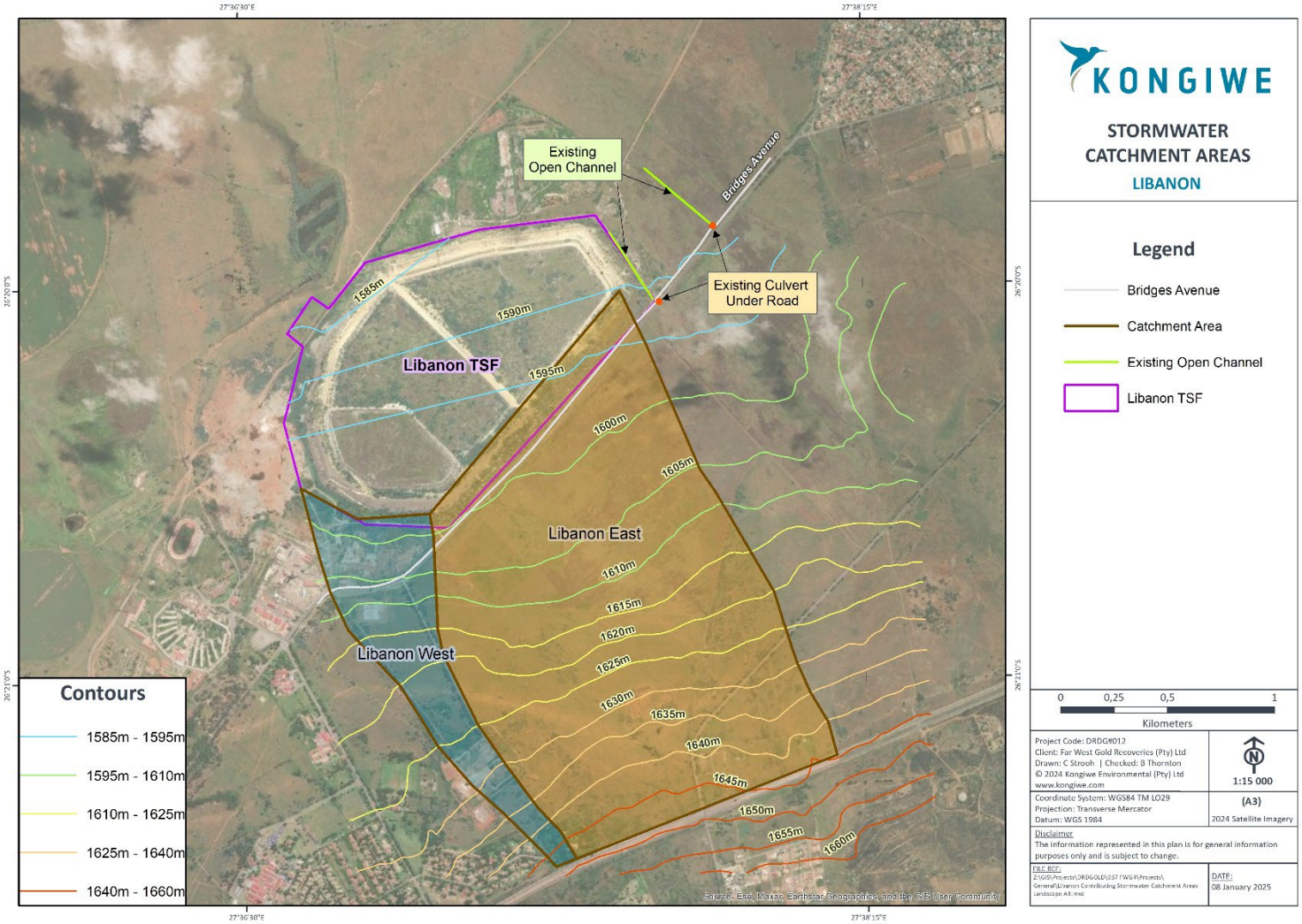


Figure 7-1 - Contributing Stormwater Catchment Areas

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7.2 Characteristics of contributing areas

7.2.1 Libanon East

- Catchment Area: 2.79 km2
- Longest watercourse: 2.597 km
- Average slope: 2.926%
- Dolomitic area: 100%

7.2.2 Libanon West

- Catchment Area: 0.54 km2
- Longest watercourse: 2.08 km
- Average slope: 2.69%
- Dolomitic area: 100%

7.2.3 Libanon TSF

- Catchment Area: 0.97 km2
- Longest watercourse: 1.21 km
- Average slope: 0.88%
- Dolomitic area: 100%

7.2.4 Libanon TSF Paddocks

- Catchment Area: 0.37 km2
- Longest watercourse: 0.07 km
- Average slope: 24.3%
- Dolomitic area: 100%

7.3 Factors used in Rational Formula Calculations

Table 7-1 – Factors used in Rational Formula Calculations

Area	Factor	Value	Comment
Libanon East	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface slope	Flat (1% - 10%)	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	Grassland	See land use
	Roughness coefficient	0.3	Sparse grass over fairly rough surface

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Area	Factor	Value	Comment
	Initial saturation	Adjustment factor for flat and permeable catchments	
Libanon West	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface slope	Flat (1% - 10%)	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	Grassland	See land use
	Roughness coefficient	0.3	Sparse grass over fairly rough surface
	Initial saturation	Adjustment factor for flat and permeable catchments	
Libanon TSF	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface slope	Vlei and pans (<3%) – 90%, Steep slopes (>30%) - 10%.	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	Grassland	See land use
	Roughness coefficient	0.3	Sparse grass over fairly rough surface
	Initial saturation	Adjustment factor for flat and permeable catchments	
Libanon Paddocks	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface Slope	Steep >30%	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	No vegetation	
	Roughness Coefficient	0.26	
	Initial saturation	Adjustment factor for steep and impermeable catchments	

7.4 Calculated storm peak flows

7.4.1 Rational Formula

Table 7-2 – Calculated storm peak flows in m^3/s (Rational Formula) – Clean water areas

Return Period	Libanon East	Libanon West
2 year	1.009	0.172
5 year	1.480	0.256
10 year	1.903	0.324
20 year	2.415	0.411

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Return Period	Libanon East	Libanon West
50 year	3.470	0.594
100 year	4.613	0.791
200 year	5.045	0.865

7.5 Dirty Water Runoff under 1:50 Condition

7.5.1 Libanon TSF

The volume of dirty water contained within the berm at the top of the Libanon TSF is calculated as follows:

- 1:50 year 24 hr Storm rainfall depth 126.3 mm
- Area of Libanon TSF (top area excluding the side slopes) 96.9 ha
- Rational C factor 0.281
- Runoff volume contained on Libanon TSF 34 390 m^3

7.5.2 Libanon Paddocks

The volume of dirty water from the slopes of Libanon TSF and the paddock area is calculated as follows:

- 1:50 year 24 hr Storm rainfall depth 126.3 mm
- Area of Libanon Paddocks 37.3 ha
- Rational C Factor 0.497
- Runoff volume contained on Libanon TSF 23 414 m^3

7.6 Identified Stormwater Issues

7.6.1 Libanon East

The runoff concentrates at the north eastern corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 2% (Google Earth), the flow width will be 3.926 m and the velocity of flow is 13 m/s. This far exceeds the acceptable maximum velocity for earth of 1.2 m/s, so excessive erosion will occur. The high flow velocity will also be harmful to life.

7.6.2 Libanon West

The runoff concentrates at the north western corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 1% (Google Earth), the flow width will be 2.742 m and the velocity of flow is 7.3 m/s. However, inspections on site indicate that the land is degraded after previous developments in the area, and the flow will scatter across the area, thus reducing the velocity.

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7.6.3 Libanon TSF

With the proposed reclamation method, the stormwater runoff is being collected within the berm on top of the Libanon TSF and allowed to infiltrate or evaporate. In effect this is a dam on top of the Libanon TSF on top of underlying dolomites, so SANS 1936 must be complied with.

7.6.4 Libanon Paddocks

The stormwater runoff from the TSF side slopes and the paddocks is collected in the paddocks and allowed to infiltrate or evaporate. In effect this is a dam on top of the underlying dolomites, so SANS 1936 must be complied with.

7.7 Proposed Stormwater Measures

7.7.1 Libanon East and West

7.7.1.1 Earth Berm along Southern side of Bridges Avenue

The proposed stormwater attenuation measure for the Libanon East and West catchments are shown in Figure 7-3.

It is proposed to construct an earth berm immediately to the south of Bridges Avenue adjacent to the Libanon TSF to the existing culvert under Bridges Avenue, described as follows:

a. An earth berm top width 1 m, side slopes 1 vertical to 2 horizontal, 1 m high from point A to point B, a length of 1 845 m;

The berm detail is shown in Figure 7-2 below:

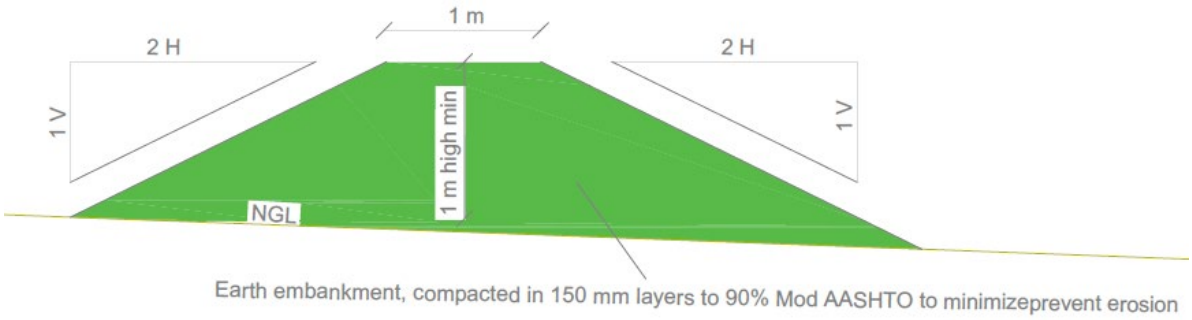


Figure 7-2 - Earth Berm Detail

The above structure will collect all the runoff from the Libanon East catchment, and 60% of the runoff from the Libanon West catchment.

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The existing culvert under Bridges Avenue must be cleaned out and reinstated to its original design state. The size of the culvert could not be ascertained, but normally these structures are designed to handle the 1 in 5 year incident. In the event of the 1 in 50 year storm, the balance of the water not going through the culvert will flow across the road surface.

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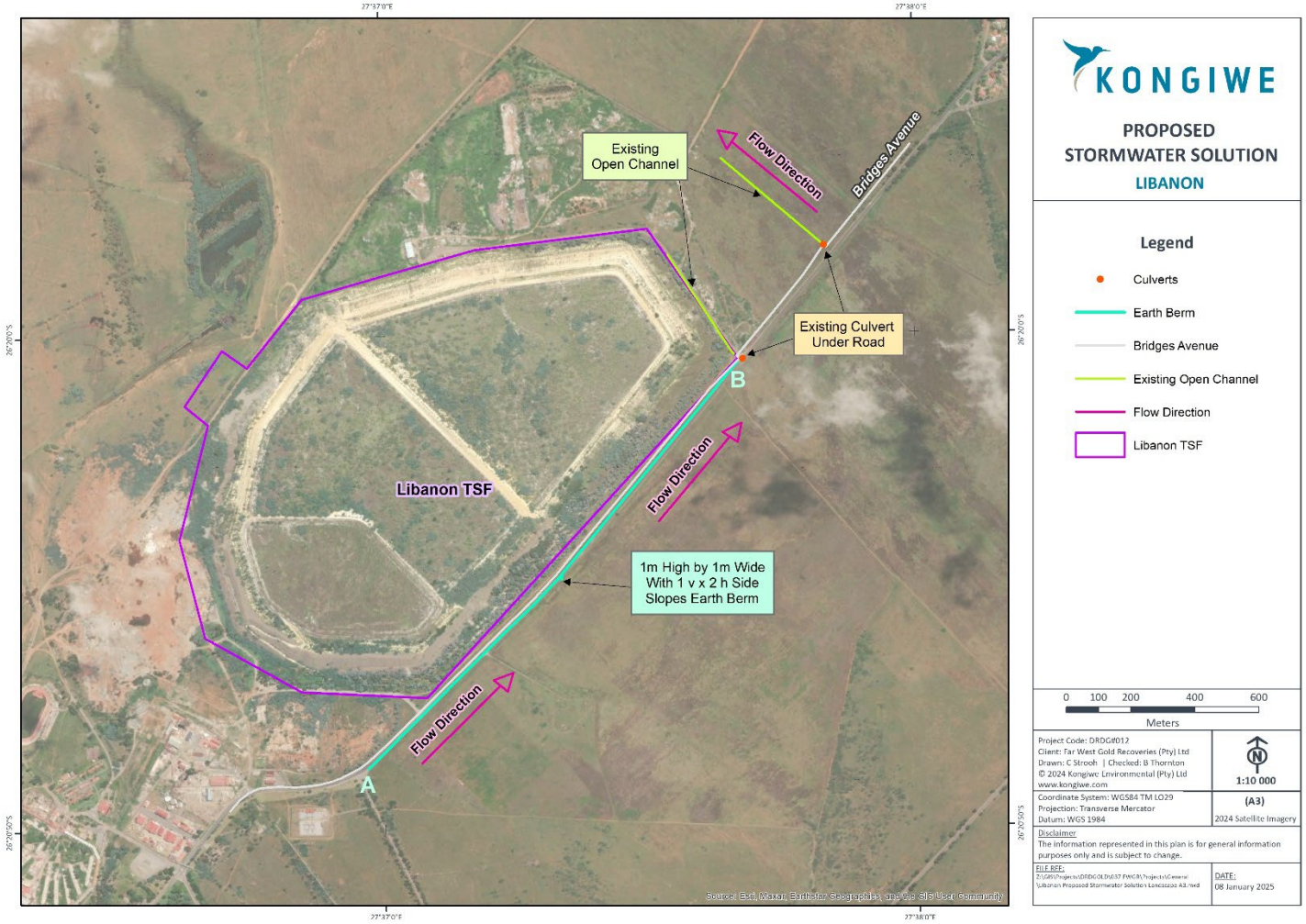


Figure 7-3 – Proposed stormwater solution

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7.7.2 Libanon TSF

It is proposed to contain all stormwater falling on the top surface of the TSF within a berm located on the outside edge of the TSF top surface.

Due to the underlying dolomitic condition, the requirements of SANS 1936 must be adhered to. This will require the following to be carried out:

1. Dolomitic stability investigation
    - General
        - Investigations shall conform to the requirements of SANS 1936-2 (4.3.2 and 4.3.3). The investigator/Competent Person (geo-professional) shall, during the investigation, confirm and refine the Inherent Hazard Zone and the associated Dolomite Area Designations and confirm that the mandatory precautions associated with a designation have been observed;
        - The investigator/Competent Person (geo-professional) shall, as a minimum to comply with the above requirements, interact with suitably qualified professionals and the person responsible for the development of the parcel of land or the relevant portions thereof concerning appropriate planning, design of infrastructure, buildings, and structures; and,
        - The investigator/Competent Person (geo-professional) shall develop a risk management plan strategy specific to the development in accordance with the requirements of SANS 1936;
    - Report
        - The investigator/Competent Person (geo-professional) shall prepare a report including the following:
            - a method description of the work undertaken;
            - a drawing indicating the location of the points profiled in the service trenches;
            - records of all profiles, boreholes and tests;
            - records of any geotechnically problematic conditions intercepted, such as paleokarts structures, sinkholes etc.;
            - a description of any additional geotechnical investigations undertaken;
            - a description of any precautionary or remedial measures applied to problematic conditions identified during the design-level inspections;
            - a site/development layout drawing which confirms the Inherent Hazard Classes and Dolomite Area Designations, in accordance with the requirements of SANS 1936;
            - an indication where the dolomite designations have been changed and provide a motivation for such changes;
            - a comprehensive list and description of any ongoing monitoring required;

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- an identification of monitoring area designations where a risk management plan has been developed; and,
- an indication that amended water precautionary measures shall apply;

- Additional Requirements for **Attenuation Dams, Retention Dams, Reservoirs** and Public Swimming Pools:
  - The requirements for dams, reservoirs and public swimming pools shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:
    - a gravity survey over the site at 30 m grid spacing with a minimum of three lines;
    - additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
    - inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
    - investigation of potential paleosinkhole structures wherever they are exposed; and,
    - where justified, supplementary geotechnical site investigations.

Note 1: The proposed site for dams and reservoirs should be at least 100 m from the nearest housing or commercial development.

2. Compilation of a Dolomite Risk Management Plan

An appropriate Dolomite Risk Management Plan is to be compiled in accordance with SANS 1936. The Dolomite Risk Management Plan is to be site specific and based on all data gathered until that time, taking cognisance of final precautionary measures, site layout and shall also contain the final Monitoring Designations. The Dolomite Risk Management Plan shall outline the responsibilities and actions of the relevant Authority and the Client Department. It is a compulsory requirement for the appointed professional service provider to prepare a site specific Dolomite Risk Management Plan (DRMP) for the development in accordance with the requirements of SANS 1936-4.

7.7.3 Libanon Paddocks

It is proposed to contain all stormwater falling on the slopes of the TSF and in the paddocks at the toe of the side slopes of the TSF within these paddocks.

Due to the underlying dolomitic condition, the requirements of SANS 1936 must be adhered to. This will require the following to be carried out:

1. Dolomitic stability investigation:
   - General

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- Investigations shall conform to the requirements of SANS 1936-2 (4.3.2 and 4.3.3). The investigator/Competent Person (geo-professional) shall, during the investigation, confirm and refine the Inherent Hazard Zone and the associated Dolomite Area Designations and confirm that the mandatory precautions associated with a designation have been observed;
- The investigator/Competent Person (geo-professional) shall, as a minimum to comply with the above requirements, interact with suitably qualified professionals and the person responsible for the development of the parcel of land or the relevant portions thereof concerning appropriate planning, design of infrastructure, buildings, and structures; and,
- The investigator/Competent Person (geo-professional) shall develop a risk management plan strategy specific to the development in accordance with the requirements of SANS 1936;

o Report
- The investigator/Competent Person (geo-professional) shall prepare a report including the following:
  - a method description of the work undertaken;
  - a drawing indicating the location of the points profiled in the service trenches;
  - records of all profiles, boreholes and tests;
  - records of any geotechnically problematic conditions intercepted, such as paleokarts structures, sinkholes etc.;
  - a description of any additional geotechnical investigations undertaken;
  - a description of any precautionary or remedial measures applied to problematic conditions identified during the design-level inspections;
  - a site/development layout drawing which confirms the Inherent Hazard Classes and Dolomite Area Designations, in accordance with the requirements of SANS 1936;
  - an indication where the dolomite designations have been changed and provide a motivation for such changes;
  - a comprehensive list and description of any ongoing monitoring required;
  - an identification of monitoring area designations where a risk management plan has been developed; and,
  - an indication that amended water precautionary measures shall apply.

o Additional Requirements for **Attenuation Dams, Retention Dams, Reservoirs** and Public Swimming Pools
- The requirements for dams, reservoirs and public swimming pools shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:
  - a gravity survey over the site at 30 m grid spacing with a minimum of three lines;

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- additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
- inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
- investigation of potential paleosinkhole structures wherever they are exposed; and,
- where justified, supplementary geotechnical site investigations.

Note 1: The proposed site for dams and reservoirs should be at least 100 m from the nearest housing or commercial development.

2. Compilation of a Dolomite Risk Management Plan

   An appropriate Dolomite Risk Management Plan is to be compiled in accordance with SANS 1936. The Dolomite Risk Management Plan is to be site specific and based on all data gathered until that time, taking cognisance of final precautionary measures, site layout and shall also contain the final Monitoring Designations. The Dolomite Risk Management Plan shall outline the responsibilities and actions of the relevant Authority and the Client Department. It is a compulsory requirement for the appointed professional service provider to prepare a site specific Dolomite Risk Management Plan (DRMP) for the development in accordance with the requirements of SANS 1936-4.

8 RECOMMENDATIONS

The following is recommended:

- The existing berm/channel system around the TSF are reinstated where damaged, and maintained. This system acts as the containment of the dirty water from the Libanon TSF side slopes;
- The “clean” runoff from the high lying areas above the Libanon TSF is deviated away from the Libanon TSF by an earth berm constructed immediately to the south of Bridges Avenue, up to the existing culvert under Bridges Avenue to the east of the Libanon TSF. The existing culvert is in a poor state of repair and will have to be reinstated; and,
- A dolomitic stability investigation be carried out around the Libanon TSF to confirm that the proposed reclamation method and stormwater containment on top of the TSF and in paddocks around the TSF is acceptable and in accordance with SANS 1936, and a dolomitic risk management plan be developed.

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Smithers J.C. and Schulze R.E. 2002. Design Rainfall and Flood Estimation in South Africa. WRC Project No. K5/1060.

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APPENDIX A:
Curriculum Vitae : H D N Sparks

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Name	**Sparks Hilton D N**
Profession:	Civil Engineer
Date of Birth:	1 August 1947
Nationality:	South African
ID number:	4708015052081

Membership in Professional Societies:

- Professional Engineer Pr Eng 740604;
- Professional Construction Project Manager D/202/2004;
- Member of the South African Institute of Civil Engineers; and,
- Member of South African Institute of Municipal Engineers.

KEY QUALIFICATIONS

Has vast experience in many of the disciplines related to the provision, design, operation and maintenance of civil engineering municipal infrastructure, bulk water supply system design and assessment, risk assessment related to bulk water distribution, project management of large infrastructure projects, management, construction management, formulating and implementing strategies, research and development, bulk sanitation services and knowledge of OHS and environmental matters.

EDUCATION:

- B Sc (Eng), University of Natal – 1969;
- Diploma in Business Management, Damelin – 1977; and,
- NQF 7 Labour Intensive Construction.

PUBLICATIONS:

- "The IDT Capital Subsidy Scheme in the Transvaal - 30 months later" - Housing in Southern Africa, May 1994;
- Layout Planning and Stormwater Management, Afritech Conference, SA Development Bank, June 1992;
- Managing the Environmental Impact of Current and Future Development, Low-Cost Housing and Urbanization Conference, September 1994;
- Katorus: Repairs to Houses Damaged in Unrest, Housing for Africa International Conference, August 1997;
- Katorus wins Impumelelo Award, Housing in Southern Africa, December 2000; and,
- A housing project brings some peace to Katorus and is rewarded with an Impumelelo Award, IMIESA Journal, February 2001.

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AWARDS

- Masimanyane Award for innovation and excellence in engineering – Repairs to Damaged Houses Project, Katorus – 1997; and,
- Impumelelo Award for innovative dedicated work in the field of poverty reduction and community development – Repairs to Damaged Houses Project, Katorus – 2000.

ADDITONAL COURSES

Has attended many courses over the period, most relevant are:

1. Project Management Professional, SAACE course, Johannesburg;
2. Epanet Course, University of Johannesburg; and,
3. NQF 7 Labour Intensive Construction, Johannesburg.

EXPERIENCE RECORD:

January 2024 to date - Kongiwe Environmental (Pty) Ltd

Responsible for the investigation, design (civil works) and the overall project management of environmental projects:

- Surface Water Studies – 7L1 Pump Station, Libanon TSF and Kloof Venterspost TSF;
- Project Management systems for all active Environmental projects; and,
- As-Built drawings – Harmony Gold Mining Free State Operations.

September 2020 to December 2023 - Consultant to Impofu Engineering

Responsible for the investigation, design (civil works) and the overall project management during the design phase in respect of a range of multi-disciplinary engineering projects:

- Project Management of Proposed Gauteng Disaster Management Centre, R2 billion, on hold pending acquisition of land, Gauteng Department of Infrastructure Development;
- Project Manager and Water Engineer for Restoration of Water to Amajuba District Council, KZN Department of Corporate Governance and Traditional Affairs;
- Technical Manager for Construction of Lehae Clinic, Cultura School and Father Smangaliso School, Gauteng Department of Infrastructure Development; and,
- Project Manager for Construction of Marapong Housing Development, Limpopo Department of Corporate Governance and Traditional Affairs.

December 2010 to January 2020 - Scriptio (Pty) Ltd

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- Programme management of Orange Farm projects for City of Johannesburg Project Management Unit; and,
- Stormwater management and irrigation usage computerised model at Golf Course for Johannesburg Country Club;
- Surface Water Resource Study for Johannesburg Country Club.

January 1994 to December 2010 - Phumaf Consulting Engineers

January 1985 to January 1994 - Brain Leech Associates

January 1980 to January 1985 - Hill Kaplan Scott

Responsible for the investigation, design (civil works) and the overall project management during the design phase in respect of a range of multi-disciplinary engineering projects:

- Township Infrastructure in many high-income residential townships:
  - Randparkrif Ext 25 - 700 erven; Hurlingham Ext 5 - 600 erven; Benmore Gardens Ext 3 - 250 erven; The Orchards Ext 13 - 350 erven; The Orchards Ext 16 - 240 erven; Sunward Park Ext's 3, 4 and 5 - 1 000 erven; Wilgeheuwel Ext 3 - 250 erven; Jukskeipark Ext 5 - 250 erven; Bloubosrand Ext 2 - 250 erven;
- Stormwater drainage layouts at planning and detail design stages for numerous townships;
- Hydraulic design for numerous pipe networks for township water supplies;
- Floodlines for numerous streams;
- Analysis of Randburg Northern Areas Water Master Plan, and design of 350/400/450/600 mm Kya Sand Bulk Water Main for Randburg Town Council;
- Sewerage Master Plan for Randburg Northern Areas for Randburg Town Council;
- Engineering services for Moffat View Ext 4 for City of Johannesburg;
- Engineering services for Atteridgeville Ext 19 and Capital Park for City of Tshwane;
- Engineering services for City Deep Extensions 26 and 28 for JOSHCO;
- Township infrastructure in industrial and commercial townships:
  - Rustivia Ext 3, Germiston; Strydom Park Ext 21, Randburg; Alrode Ext 19, Alberton; Sandown Ext 52, Sandton;
- Container Depot at Nelspruit;
- Engineering design and contract documentation for numerous golf courses and golf course estates for Gary Player Group;
- Design of 1 200 mm diameter deviation of Johannesburg Cydna Outfall Sewer through Falcon Crest property;
- Township infrastructure in low-income residential townships for Gauteng Department of Housing, including:
  - Phola Extension, Ogies - 1 340 erven; Vosloorus Ext 25 - 1 800 erven; Vosloorus Ext 9 - 1 436 erven; Vosloorus Ext 26 - 350 erven; Moleleki Ext's 1 & 2 - 1 346 erven; Dobsonville Gardens - 1 000 erven; Mabopane Unit M - 1 500 erven; Tembisa Ext 12 –480 erven; Phuthaditjhaba Unit

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L - 350 erven; Magagula Heights –800 erven; Soshanguve South Ext's 11, 12 and 13 – 5 000 erven;

- Township infrastructure in low income residential townships for Qwaqwa Department of Housing, in Phuthaditjhaba Unit L - 350 erven;
- Report on water supply to Ogies Area, including assessment of existing purification works for Gauteng Department of Housing;
- Assessment of existing sewer network at Steve Bikoville for Gauteng Department of Housing;
- Bulk services to Phola Extension township including potable water ground reservoir and rising main, elevated water tower and sewage Pump Station for Gauteng Department of Housing;
- Project management of SAFA House construction for South African Football Association;
- Project Management of Soccer City Stadium for 2010 World Cup;
- Project management of staff village for Nissan employees - 300 houses;
- Project management of construction of Buhlebemfundo Secondary School in Tsakane using emerging contractors for Gauteng Department of Education;
- Project management of engineering component of Alexandra Renewal Project for Gauteng Department of Housing;
- Project management of repairs to violence damaged houses in Katorus - 2 400 houses for Gauteng Department of Housing;
- Project management of repairs to violence damaged houses in the balance of Gauteng - 400 houses for Gauteng Department of Housing;
- Housing functional coordinator for Katorus Special Presidential Project for Gauteng Department of Housing;
- Project management of Regional Professional Team for Gauteng Department of Housing for implementation of housing backlog in the Tshwane and Metsweding areas;
- Project management of Professional Resource Team for Gauteng Department of Housing for implementation of housing backlog in the Tshwane and Metsweding areas; and,
- Co-ordinating Technical Consultant for Transvaal IDT capital subsidy scheme.

January 1970 to December 1979 - Rand Water Board

Responsible for the investigation, design (civil works) and the overall project management during the design phase in respect of a range of multi-disciplinary engineering projects:

- Engineer in charge of Rand Water Board construction team, involved in many types of work from weirs on rivers to Pump Stations to pipelines;
- Project Manager for 800 Ml/d capacity water purification works at Zuikerbosch Pump Station for Rand Water Board;
- Project coordination and critical path planning of 600 Ml/d capacity water purification works at Zuikerbosch Pump Station for Rand Water Board;
- Design of measuring weirs on numerous rivers flowing into the Vaal River Barrage Catchment for Rand Water Board;
- Model filter tests to ascertain the effectiveness of dual media (anthracite/sand) filter beds as opposed

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to normal single media (sand) filter beds for Rand Water Board;

- Design of "Crump" weir between abutments of railway bridge on Klip River for Rand Water Board;
- Hydraulic and structural design of 2 100 mm diameter steel pipeline, 80 km long for Rand Water Board;
- Hydraulic and structural design of 3 500 mm diameter steel pipeline to carry raw water from Vaal Dam to purification works for Rand Water Board;
- Hydraulic and structural design of 800 mm/ 900 mm/ 1 200 mm diameter steel pipeline for Rand Water Board;
- Tests on strength of in-situ cement mortar lining to steel pipelines, especially when subjected to water hammer surges for Rand Water Board;
- Structural design of wall section for Sasolburg Reservoir for Rand Water Board;
- Structural design of underground coal bunker, Vereeniging Pump Station for Rand Water Board;
- Structural design, 60 No hopper bottomed sedimentation tanks, Zuikerbosch Pump Station for Rand Water Board;
- Structural design, 3 500 mm diameter steel pipeline including tests to confirm design for Rand Water Board.

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APPENDIX B:
Rational Method Stormwater Peak Flow Calculations

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Rational Method

Description of catchment :	Libanon East	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	2.7900	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	2.597	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1649	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1592	MSL	Weather Service station	Springs	
Average slope (S_{av})	0.02926	m/m	Weather Service number	476736	
Over landflow length	3	km	Area distribution factors		
$H_{100\%}$	1649	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1592	MSL	100%	0%	0%
Average slope (S_{av})	0.01900	m/m	Notes:	Libanon East Catchment Area	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	100	%			

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%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.310**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	0%	0.950	0.000
Maximum Flood	0%	1.000	0.000
	0%		
Total (C_2)			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.451 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.539 Hours

Notes: Working area assumed to be paved

$T_{C\text{ - TOTAL}}$	**1.45**	Hours	V=	**0.50**	m/s

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Description of catchment :	Libanon East		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.062	0.062	0.062	0.062	0.062	0.062	0.062
Adjusted factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.031	0.034	0.037	0.042	0.051	0.062	0.062
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.031*	*0.034*	*0.037*	*0.042*	*0.051*	*0.062*	*0.062*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	42.324	56.386	65.899	75.067	87.061	96.160	105.328
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*42.000*	*56.000*	*66.000*	*75.000*	*87.000*	*96.000*	*105.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***1.009***	***1.480***	***1.903***	***2.415***	***3.470***	***4.613***	***5.045***

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Rational Method

Description of catchment :	Libanon West	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	0.5400	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	2.08	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1657	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1615	MSL	Weather Service station	Blyvooruitzicht	
Average slope (S_{av})	0.02692	m/m	Weather Service number	474684	
Over landflow length	2	km	Area distribution factors		
$H_{100\%}$	1657	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1615	MSL	100%	0%	0%
Average slope (S_{av})	0.02100	m/m	Notes:	Libanon West Catchment Area	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	100	%			

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%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.310**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	0%	0.950	0.000
Maximum Flood	0%	1.000	0.000
	0%		
Total (C_2)			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.173 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.469 Hours

Notes:

$T_{C\text{ - TOTAL}}$	**1.64**	Hours	V=	**0.35**	m/s

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Description of catchment :	Libanon West		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.062	0.062	0.062	0.062	0.062	0.062	0.062
Adjusted factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.031	0.034	0.037	0.042	0.051	0.062	0.062
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.031*	*0.034*	*0.037*	*0.042*	*0.051*	*0.062*	*0.062*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	37.403	49.831	58.237	66.339	76.939	84.980	93.082
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*37.000*	*50.000*	*58.000*	*66.000*	*77.000*	*85.000*	*93.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***0.172***	***0.256***	***0.324***	***0.411***	***0.594***	***0.791***	***0.865***

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Rational Method

Description of catchment :	Libanon TSF	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	1.3400	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	1.21	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1630	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1622	MSL	Weather Service station	Blyvooruitzicht	
Average slope (S_{av})	0.00882	m/m	Weather Service number	474684	
Over landflow length	0.8	km	Area distribution factors		
$H_{100\%}$	1627	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1622	MSL	100%	0%	0%
Average slope (S_{av})	0.00625	m/m	Notes:	Libanon TSF Catchment Area	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	100	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	90%	0.01	0.009
Flat areas (3% - 10%)	0%	0.06	0
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	10%	0.22	0.022
Total	**100%**		**0.031**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.281**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	100%	0.950	0.950
Maximum Flood	0%	1.000	0.000
	100%		
Total (C_2)			**0.950**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.015 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.475 Hours

Notes:

$T_{C\text{ - TOTAL}}$	**1.49**	Hours	V=	**0.23**	m/s

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Description of catchment :	Libanon TSF		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.281	0.281	0.281	0.281	0.281	0.281	0.281
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(\text{sum}(D_{factor} \times C_{S\%}))$	0.039	0.039	0.039	0.039	0.039	0.039	0.039
Adjusted factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.020	0.022	0.024	0.026	0.033	0.039	0.039
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.020*	*0.022*	*0.024*	*0.026*	*0.033*	*0.039*	*0.039*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	41.226	54.923	64.189	73.119	84.802	93.665	102.595
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*41.000*	*55.000*	*64.000*	*73.000*	*85.000*	*94.000*	*103.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***0.300***	***0.443***	***0.562***	***0.716***	***1.033***	***1.376***	***1.508***

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Rational Method

Description of catchment :	Libanon TSF	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	0.3700	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	0.07	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1630	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1613	MSL	Weather Service station	Blyvooruitzicht	
Average slope (S_{av})	0.24286	m/m	Weather Service number	474684	
Over landflow length	0.07	km	Area distribution factors		
$H_{100\%}$	1630	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1613	MSL	100%	0%	0%
Average slope (S_{av})	0.24286	m/m	Notes:	Libanon TSF Catchment Area	
Roughness coefficient (r)	0.26				
Dolomite area ($D_{\%}$)	100	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	30%	0.01	0.003
Flat areas (3% - 10%)	0%	0.06	0
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	70%	0.22	0.154
Total	**100%**		**0.157**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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	0%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	100%	0.26	0.26
Total	**100%**		**0.26**
Total (C_1)			**0.497**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	100%	0.950	0.950
Maximum Flood	0%	1.000	0.000
	100%		
Total (C_2)			**0.950**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

0.129 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.015 Hours

Notes:

$T_{C\text{ - TOTAL}}$	**0.25**	Hours	V=	**0.08**	m/s

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Description of catchment :	Libanon TSF		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.497	0.497	0.497	0.497	0.497	0.497	0.497
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.189	0.189	0.189	0.189	0.189	0.189	0.189
Adjusted factor for initial saturation, F_t	0.750	0.800	0.850	0.900	0.950	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.142	0.151	0.161	0.170	0.179	0.189	0.189
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.142*	*0.151*	*0.161*	*0.170*	*0.179*	*0.189*	*0.189*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	245.600	327.200	382.400	435.600	505.200	558.000	611.200
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*246.000*	*327.000*	*382.000*	*436.000*	*505.000*	*558.000*	*611.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***3.581***	***5.078***	***6.303***	***7.617***	***9.312***	***10.831***	***11.860***

Appendix B:
Groundwater Impact Assessment Report

2024

Libanon TSF Reclamation Project. Groundwater Report



12 December 2024

Groundwater Abstract (Pty) Ltd
Enterprise Number: 2017/489367/07
Rietfontein
Pretoria, 0084
www.wells.*africa*



LIBANON TSF RECLAMATION PROJECT. GROUNDWATER REPORT

Ergo Mining (Pty) Ltd

Report compiled by:

Groundwater Abstract Pty Ltd

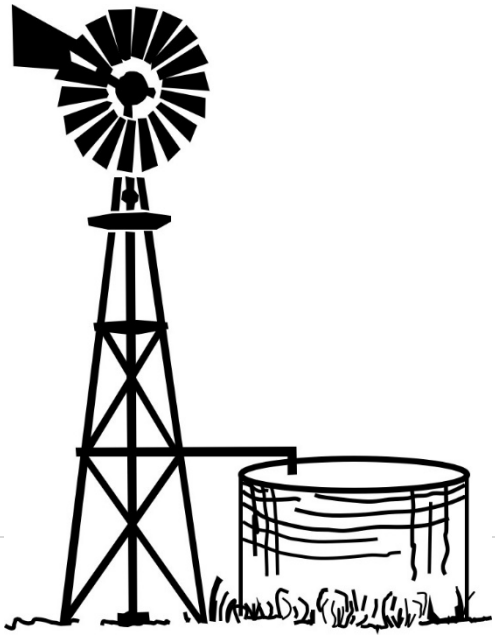
Lucas Smith and Irene Lea

Principal Hydrogeologists –

M.Sc. and Pr. Sci. Nat.

On behalf of:

Kongiwe Environmental (Pty) Ltd



Declaration of Independence

We, Lucas Smith and Irene Lea, declare that –

General declaration:

- *I act as the independent Hydrogeology practitioner 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 hydrogeological impact assessments, 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;*
- *I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;*
- *I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;*
- *All the particulars furnished by me in this form are true and correct;*
- *I will perform all other obligations as expected from a hydrogeological practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and*
- *I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.*

Disclosure of Vested Interest

- *I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.*

CONTACT PERSON: Lucas Smith

Tel: +27 82 577 8439

Email: lucas@wellsafrica.com

SIGNATURES:

_____ _____

LA Smith I Lea

03 December 2024

INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the authors' best scientific and professional knowledge as well as available information. The report is based on assessment techniques, which are limited by information available, time and budgetary constraints relevant to the type and level of investigation undertaken, and Groundwater Abstract (Pty) Ltd, supported by Irene Lea Environmental and Hydrogeology cc (ILEH) reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research, monitoring and further work in this field pertaining to the investigation.

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Executive Summary

Far West Gold Recoveries (Proprietary) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSF are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto the Regional Tailings Storage Facility (RTSF).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant, or any other future plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. An estimated amount of 600 000 tons/month of slurry is expected to be pumped from the TSF via existing pipelines to the Driefontein 2 Plant for beneficiation.

Libanon TSF is situated approximately 2 km west of Westonaria, in the Rand West City Local Municipality. Libanon TSF is approximately 170 hectares in extent and located on the farm Witkleigat 283 IQ 87IR. The project is in a regional gold mining area within the Kloof Mineral Rights Area.

The anticipated life span of the project is approximately 12 years. It is expected that there would be a 1-year construction and ramp-up period which would include the placement of infrastructure and site preparation, a 6-year Life of Operation, a 2-year ramp-down period and 3 years to rehabilitate the reclaimed site. Upon completion of reclamation, the footprint area will be assessed for contamination, particular in terms of radiation. Contaminated soils will be removed, and the land will be levelled to its original topography.

The proposed reclamation method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors / cannons to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being mined.

Kongiwe Environmental (Pty) Ltd (Kongiwe) has been appointed by Far West Gold Recoveries (Pty) Ltd, 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 reclamation of the Libanon TSF.

Environmental Setting:

The project is situated on a relatively flat plain that dips in a northerly direction towards the Wonderfonteinspruit. The flat plain is associated with dolomitic and Karoo Sequence outcrops. The undulating and hilly ground south of the TSF is formed by outcrops of the Timeball Hill and Rooihoogte Formations (Pretoria Group).

The Venterspost Eye is located approximately 3.6 km north of Libanon TSF, close to the Wonderfonteinspruit. This eye is dry at present because the dolomitic compartment in which it is situated has been dewatered by gold mines.

Libanon TSF falls in the Wonderfonteinspruit catchment, in the C23D quaternary catchment, forming part of the Vaal Water Management Area.

The Mean Annual Precipitation for the Blyvooruitsig weather station is 711 mm. The open water Mean Annual Evaporation is 1 454 mm, which is double the MAP of the area.

Regionally the geology consists of formations of the Karoo, Transvaal, Ventersdorp and Witwatersrand Supergroups. The Black Reef quartzite, which is present at the base of the Transvaal Supergroup, outcrops north of the project area. Of the Transvaal Supergroup Formations, the Chuniespoort Group are of most significance, as the Libanon TSF is located on outcropping Malmani dolomite. The dolomite varies in thickness regionally from around 200 to 1500 m. Underneath the Libanon TSF, the base of the dolomite is at an elevation of 1000 to 800 mamsl and dips in a southerly direction (Jones and Wagener, 2013).

South of Libanon TSF, formations of the Pretoria Group outcrop, including ferruginous shale and quartzite of the Timeball Hill Formation, Hekpoort lavas, as well as shale outcrops of the Strubenkop and Silverton Formations.

Some Karoo sediments have remained as inliers above the dolomite, delineated as the Vryheid Formation.

In addition to the regional post-Transvaal faults, regional diabase (dolerite) dykes have intruded into some of the north-easterly striking faults. Many of these faults penetrated the full Transvaal sequence as well as the underlying Ventersdorp and Witwatersrand Supergroups. These dykes have subdivided the dolomites in watertight compartments. The Libanon TSF is located on the western edge of the Venterspost Compartment and possibly to some extent on the Bank Compartment. The eastern boundary of the Venterspost Compartment is formed by the Gemsbokfontein No 2 Dyke and the western boundary by the Venterspost Dyke, which transects the western boundary of the Libanon TSF. The northern boundary of the dolomitic compartments is formed by the outcrop of the dolomite against the Black Reef Quartzite. The southern boundary is formed by the overlying Transvaal sediments.

Site Investigations:

Three sets of shallow and deep monitoring boreholes were drilled and tested as part of this project. The results of the drilling program indicate the presence of thick residual dolomite, referred to as wad underneath the Libanon TSF footprint. This material has very low permeabilities and act largely as an aquitard. One of the deeper boreholes intersected a cavity in the dolomitic formation, which complicated the drilling process.

Hydrocensus:

A hydrocensus was conducted across the study area during August 2024. The survey included the Libanon TSF property, plus accessible properties within a 4.5 km radius, and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use. Only one borehole was identified on one of the properties on the ridge to the south, but a groundwater level could not be measured due to security measures installed.

Locally surface drainage and possibly groundwater flow will be towards the Wonderfonteinspruit.

Information presented in Jones & Wagener (2013) indicates that there is a 77% correlation between groundwater level and topographical elevations in the weathered dolomitic aquifer. The 77% correlation suggests that there is some relationship between groundwater elevation and topography in the weathered dolomitic aquifer, but that dewatering has lowered groundwater levels significantly in places, thus skewing this correlation.

Borehole Drilling:

Based on a geophysical survey, three drilling positions were identified around the footprint area of Libanon TSF. The percussion drilling program was carried out during October 2024, by Redirile Drilling.

Two groundwater characterisation and monitoring boreholes were drilled at each of the 3 target areas. The one borehole was drilled to a depth of 80 m below surface, with the aim of characterising and monitoring the deeper fractured aquifer. The second borehole was drilled 30 m deep, with the aim of monitoring potential groundwater flow, quality and possible connection between the deeper fractured aquifer and the shallow weathered aquifer in the area.

Two of the 6 new percussion boreholes produced a measurable groundwater level, post drilling (boreholes Lib BH3s and Lib BH3d). The other four boreholes produced no water and remained dry post closure. There were no measurable blow yields with only seepage water observed for boreholes Lib BH3s and Lib BH3d.

The set of shallow and deep boreholes that contained some groundwater are located on a comparatively fresh dolomitic pinnacle, based on the gravity survey, which is probably associated with the position of the Venterspost Dyke. In the deep borehole, the groundwater level is deeper than 70m below surface, reflecting the regional impact of the dewatered compartment. The fact that a groundwater level could be measured in this position probably attributed to the percolation of rainwater into the dolomitic pinnacle and the presence of increased porosity to facilitate storage of this groundwater.

In the shallow borehole, the depth to groundwater is around 20 m, which also suggests percolation of rainwater from surface as well as infiltration from the Libanon TSF that is retarded in the vertical flow direction by the presence of the thick wad. This groundwater probably sits on a pocket of low permeability wad as a perched aquifer near surface.

Aquifer Testing:

Following completion of the drilling programme, an aquifer test programme was initiated to determine the hydrogeological characteristics of the local aquifers, where possible. VSA Leboa Consulting was appointed by Water Hunters to conduct yield testing of the newly drilled boreholes. Only 5 of the 6 boreholes were available for yield testing. Borehole Lib BH1d (deep borehole) intercepted a cavity at depth and was not tested.

For this project maximum drawdown pump tests were conducted on the two water yielding boreholes (boreholes Lib BH3s and Lib BH3d), followed by a recovery test after each test. Slug tests were conducted on three of the dry boreholes (slug in / infiltration tests) (Lib BH1s, Lib BH2s and Lib BH2d). VSA Leboa Consulting concluded that the slug test analysis shows some heterogeneity in the aquifer

system, with hydraulic conductivity (k-value) values ranging from 0.000003 m/d to 0.0035 m/d. The average k-value is 0.001 m/d, based on the model fits, was determined from the slug test. Large variations in the k-values were observed, mostly due to the analytical solutions fitting the data and heterogeneity in die geology formations.

It is shown that the permeabilities of the residual dolomite are very low, on average 9.93E-4 m/d and varying between 1.4E-4 and 2.5E-3 m/d. All three boreholes on which tests could be completed were dry with residual dolomite extending at least to an average depth of 26 m.

During the Aquifer tests on boreholes Lib-BH3s and Lib-BH3d, the shallow borehole was pumped dry within 16 minutes at a rate of 0.18 L/s (648 L/hr) but recovered by 81% in 20 hours. The deep borehole was pumped dry in 40 minutes at a rate of 0.03 L/s (108 L/hr) and only recovered by 6% in 3 hours. This suggests that the residual dolomite underneath the Libanon TSF has a very low yield, but that some groundwater seeps into the comparatively fresh dolomite pinnacle in this position over time, thus recharging the aquifer. This groundwater probably originates from within the lateral extent of the dolomite pinnacle and is stored in what is perceived to be significant storage capacity contained in secondary porosity as a result of karstification of the weathered dolomite.

On a local scale perched aquifer conditions are expected in the residual dolomite, as rainwater percolates into the karstified aquifer.

The pumping test data is used during the calibration of the groundwater numerical model.

Groundwater Qualities:

During the August 2024 hydrocensus only one borehole was identified, and a groundwater sample was collected (borehole Lib 1). Another two groundwater samples were collected during the aquifer test program. The water samples were submitted to Aquatico Laboratories for analysis. Aquatico is a SANAS accredited laboratory.

Based on the water quality results the following conclusions were drawn (SANS 241:2015 comparison):

- Chronic Health effects:
    - Total Iron – An elevated iron concentration (exceeding the chronic health limits) was recorded for borehole Lib-BH3s (7.62 mg/L), with the SANS limit set at 2 mg/L. The concentration of dissolved iron in water is also dependent on the occurrence of other heavy metals or could be related to the local Karoo and dolomite geology or leaching from the TSF.

      Borehole Lib-BH3s is on the downstream side (west) from Libanon TSF. The total iron concentrations were below the detection limit for the other two sampled sites.

    - Manganese – Borehole Lib-BH3s measured a manganese concentration that could result in chronic health effects (22.2 mg/L). The health impact limit is set at 0.4 mg/L.

      The manganese concentration could be related to the local Karoo and dolomite geology or leaching from the TSF. The manganese concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.

    - Sulphate – Borehole Lib-BH3s exceeds the health guideline limits for sulphate with a measured concentration of 1623 mg/L. The health limit set at 500 mg/L).

The sulphate concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.

- Nickel – An elevated nickel concentration was recorded for Lib-BH3s (0.136 mg/L). The maximum SANS guideline health limit is 0.07 mg/L. The nickel concentrations were below the detection limit for the other two sampled sites.

- Aesthetic / Operational effects:
  - Ammonium – The ammonium concentration for borehole Lib-BH3s exceeds the aesthetic limits for drinking water (13.0 mg/L) with the aesthetic limit set at 1.5 mg/L.
  - Total hardness – Very hard total hardness values were measured at the two downstream boreholes at Libanon TSF – Lib-BH3s and Lib-BH3d.

In terms of major cations and anions, sulphate is by far the most significant element of concern, with a concentration of above 1500 mg/l for Lib-BH3s. Elevated sulphate concentrations are typical of the impact of gold tailings on groundwater quality, as it is a product of sulphide oxidation.

In terms of metals, manganese and iron concentrations are significantly elevated. Manganese concentrations exceeding 20 mg/L are probably more reflective of the geochemical character of the residual dolomite (wad) than the impact of the Libanon TSF on groundwater quality. Manganese is one of the byproducts of dolomite dissolution, as discussed earlier. Iron is also to some extent a byproduct of dolomite dissolution, but it is also a characteristic element of the oxidation of sulphide minerals. For this reason, sulphate and iron will be used as the two indicator elements for this impact assessment.

The hydrocensus was completed during August 2024 during the dry, winter season in Gauteng. The 2024 fieldwork programme was completed between October and November 2024, which represents the end of the dry season conditions.

Groundwater Numerical Model:

The objectives of the numerical modelling are based on the requirements of the EIA process and the water use licence application requirements. The following objectives are reported:

- Estimate the impact of the proposed Libanon TSF Reclamation Project at the end of the construction and operational phases of the project on groundwater quality. No significant impacts on groundwater levels are expected.
- Predict the long-term impact of the project on groundwater quality post closure and rehabilitation.
- Evaluate the effect that tailings removal and footprint rehabilitation would have on groundwater quality.
- Develop a groundwater monitoring program based on the outcome of the impact prediction study.
- Develop a groundwater management program geared at reducing the impacts on groundwater quality identified.

The outcome of the simulations is presented as sulphate and iron concentration contour maps that delineate the anticipated plumes for the three scenarios tested. These are based on the source term discussed earlier. The three operational scenarios tested are:

- **Best case scenario**: comparatively good quality seepage during reclamation and low seepage infiltration, equivalent to dry conditions, to the underlying aquifers.
- **Likely scenario**: measured quality seepage during reclamation and moderate seepage infiltration rates, equivalent to average conditions, to the underlying aquifers.
- **Worst case scenario**: comparatively poor quality leachate during reclamation with higher seepage infiltration, equivalent to wet conditions, to the underlying aquifers. This scenario is also presented as an indication of long-term impacts if the Libanon TSF is not removed, i.e. the No Project option.

The impact assessment was completed for the residual and weathered dolomitic aquifers. Since vertical flow will be prominent underneath the TSF and in the absence of attenuation in the unsaturated zone, potential contamination from surface is likely to affect both aquifers over time.

Simulated zones of impact on groundwater quality are presented for operational as well as for the anticipated post-closure long-term conditions below. Operational impacts for the three scenarios tested are similar due to the comparatively short period during which tailings will be reclaimed, the low aquifer permeabilities and the perceived latent impacts of historical tailings deposition. For this reason, impacts associated with the likely operational conditions are presented.

To facilitate comparison between long-term impacts, the simulated sulphate and iron plumes that delineate the zones of significant impact on groundwater quality are overlain on a single map for sulphate and iron. To incorporate the level of uncertainty with regards to groundwater flow conditions in the residual and weathered dolomitic aquifers, the estimated zone impact in terms of drinking water standards is presented for the potential worst case only.

The estimated zone of impact in terms of drinking water standards therefore presents the maximum zone of impact post closure, following the precautionary principle. Groundwater within this zone is likely to exceed drinking water standards for sulphate and iron, making the groundwater potentially unfit for use. For sulphate, this zone is delineated by the 250 mg/L concentration contour and the 0.3mg/L concentration contour for iron. These are indicated in a dashed line with yellow fill.

The zones of significant impact delineate areas where the concentrations of sulphate and iron, and by implication other salts and metals, are likely to exceed concentrations that could pose a health risk if ingested. Groundwater in these zones will therefore not be fit for use. For sulphate, this zone is delineated by the 1000 mg/L concentration contour and for iron the 1 mg/L concentration contour. These are indicated in a red line with red fill.

The extent of the contours is based on domestic use guidelines after DWAF (1996). This approach is taken to enable delineation zones of significant risk to health associated with the project.

General Outcome for all Scenarios:

The overall outcome of the simulations is summarised as follows:

- Simulations suggest that the private borehole south of the Libanon TSF fall outside the anticipated groundwater impact zones delineated for the project. This borehole will therefore not be affected by the tailings reclamation project.
- The plumes are expected to migrate regionally in a north-westerly direction towards the Wonderfonteinspruit in the residual and weathered dolomitic aquifers. It is highly unlikely that plumes associated with the Libanon TSF could reach this stream, even in the long-term. This is because aquifer permeabilities are low and the plumes are anticipated to move less than 50 m per year. In addition, vertical groundwater flow to the level of dewatering in the compartment will prevail until underground dewatering ceases and groundwater levels have regionally rebounded. Previous studies completed on the Kloof underground workings estimate that groundwater levels could recover within 20 years after pumping ceases to an elevation of 1560 mamsl. This is the elevation of the Venterspost Eye from which the compartment is expected to decant into the Wonderfonteinspruit once groundwater levels reach this elevation. Under these conditions the residual dolomitic aquifer underneath the Libanon TSF is expected to remain dewatered, as the current groundwater level in Lib-BH3s is at 1581 mamsl. The deeper weathered aquifer may however recover to 1560 mamsl, thus rewatering Lib-BH3d by approximately 40 m.
- On a local scale, groundwater flow will be towards the two non-perennial streams northeast and southwest of the Libanon TSF. It is likely that groundwater impacted by the TSF has already reached the stream 200 m northeast of the TSF.
- Flow in the residual and weathered dolomitic aquifers will be controlled by the presence and extent of dolomitic grykes and pinnacles, which was delineated based on a gravity survey completed for the aquifer. Preferential flow is expected in the dolomitic pinnacles. The grykes are expected to be significantly more clay-rich and therefore have lower permeabilities and groundwater flow conditions.
- A small northwestern portion of the Libanon TSF is located within the adjacent Bank Dolomitic Compartment. The boundary between the Venterspost and Bank Compartments is formed by the Venterspost Dyke that transects the northwestern edge of the Libanon TSF. Groundwater levels on the eastern edge of this compartment are not lowered significantly, based on the available dataset (Figure 8). Preferential flow is therefore likely to take place in this area, as the dolomitic aquifer is not as significantly dewatered compared to the Venterspost Compartment.
- The shape of the plumes is affected by the aquifer parameters as well as the calculated dispersion in the formations. Of most significance is the presence and extent of dolomitic grykes as well as regional post-Transvaal age dykes and faults. Dispersion especially plays a role in the extent to which lower concentrations of sulphate and iron would spread from the TSF. Dispersion can account for the spread of contamination that is not necessarily driven by groundwater flow.
- The zones of significant risk to groundwater quality delineated by the 1000 mg/L sulphate and the 1 mg/L iron concentration contours are expected to be restricted mainly to the footprint of the Libanon TSF. The extent of the zones of significant risk to groundwater reduces for Scenarios 2 and 3. This highlights the importance of implementing a sound water balance during operations and controlling the quality of leachate associated with the TSF. It is noted that FWGR has already committed to measures to control the factors and for this reason, long-term impacts are expected to approximate the likely scenario.
- The historical impact of tailings deposition is expected to continue to affect groundwater quality associated with the project areas in the long-term, even if FWGR removes the tailings as part of the proposed project. This is because the contamination already present in the

aquifers will continue to move slowly down gradient, away from the TSF along groundwater flow patterns. For this reason, the shape of the plumes remains similar for the three scenarios tested. The difference is the concentration of contaminants within the plumes and a reduction in the extent of the zone of unacceptable impact after tailings reclamation, as mentioned.

- The extent of the iron plume is larger compared to that of sulphate. This is because lower water quality objectives are imposed on manganese compared to sulphate.

Impact at the end of the Operational Phase:

The impact of tailings reclamation at the end of the operational phase is presented for iron and sulphate in the residual and weathered dolomitic aquifers in Figure 16. The simulations indicate the following:

- The zone of impact in terms of drinking water standards is not expected to extend more than 200 m from the TSF for sulphate and not more than 500 m for iron concentrations. No private borehole is present in this zone of impact. It is likely that the plume has reached the non-perennial stream northwest of the TSF. Groundwater near to or entering the stream as baseflow is not expected to exceed concentrations that would signify significant impacts.
- The zone of significant impact on groundwater quality is expected to be restricted mainly to the footprint of the TSF. It is acknowledged that portions of the residual and weathered aquifer within the TSF footprint is likely to be dewatered. From an impact assessment perspective, it was assumed that groundwater is likely to be affected over the entire footprint area.

Based on the impact assessment discussed above, the consequence rating for the operational phase, within the context of historical pre-existing impacts, is presented as follows:

- Magnitude: Moderate –
- Spatial scale: Site or local
- Duration: Medium term
- Probability: Possible

Long-Term Scenarios:

As discussed earlier, the long-term impact of three operational scenarios were tested as part of impact predictions completed. The outcome of these is presented in Figure 17 for sulphate and iron for a period 100 years after rehabilitation of the TSF footprint. The following is concluded from the information presented:

- The zone of impact delineated in terms of drinking water standards is expected to expand in the long-term and migrate towards the two non-perennial streams on either side of the TSF. Groundwater flow and the extent of the zones of impact on groundwater quality will be controlled by the location of the Venterspost dyke as well as the dolomitic grykes. Preferential

flow is anticipated in comparatively fresh dolomitic pinnacles compared to the grykes. The dyke will form a boundary to groundwater flow in the dolomitic aquifer.

- The sulphate plume is not expected to migrate more than 500 m from the TSF. The iron plume may extend further from the TSF mainly because it is delineated by much lower concentrations compared to sulphate. It is possible that the iron plume may migrate a further 500 m from the estimated operational plume in the long-term.
- The zone of significant impact on groundwater quality are compared for the three scenarios in the figure. As discussed earlier, the worst-case scenario can also be used to approximate the "Do Nothing" option. Under the conditions of aquifer conceptualisation, it is likely that the plume delineated by the 1000 mg/L sulphate concentrations contour could extend more than 200 m from the TSF footprint for this case. The worst-case scenario iron plume is also expected to extend approximately 350 m beyond the TSF footprint. No private boreholes are located within the zone of significant risk to groundwater quality. It is also unlikely that these zones would reach the non-perennial stream northwest of the TSF. There is a small risk that the zone of significant impact may however reach the northeastern stream.
- The most significant outcome of the likely and best-case scenarios is a reduction in the zone of significant impact on groundwater quality. Simulations suggest that both the sulphate and iron plumes could be reduced to within the TSF footprint area in the long-term. As discussed earlier, FWGR has developed stormwater management measures to at least achieve the conditions of the likely scenario. For this reason, long-term impacts on groundwater quality are anticipated to be restricted to the TSF footprint area and therefore not significantly impact on water resources.

Based on the impact assessment discussed above, the consequence rating for the worst-case scenario is presented as follows:

- Magnitude: Major –
- Spatial scale: Site or local
- Duration: Long-term
- Probability: Possible

A preliminary groundwater monitoring network is presented in Table 30. If additional private boreholes are identified within a 1 km radius, they must be included in the monitoring programme.

Soil and groundwater assessments of the TSF footprint area are recommended after removal of the tailings material to define the status of these environments and determine mitigation, management and monitoring requirements, post-removal.

DRDGOLD must ensure that an effective surface water collection and retention system is in place to ensure that all flow and collected water is directed towards the paddocks and not allowed to drain freely away from the TSF areas. Pooling of water must not be allowed on open surfaces, except if lined.

The reclaimed slurry and any water must be removed from the exposed surfaces (immediately) to avoid seepage of contaminated water into the shallow weathered and deeper fractured and karst aquifers.

Ensure that paddocks are designed to contain all dirty water generated during the reclamation process to prevent overflows and spillages.

Recommendations listed in Table 29 and Table 31, plus Section 15 to Section 17 need to be followed.

Reasoned Opinion:

It is the opinion of the project hydrogeologists that the reclamation of the Libanon TSF can proceed, provided that good surface water / storm water management measures are put in place and maintained throughout the life of the project. No ponding over exposed areas must be allowed. The project must further commit to complete tailings removal and not undertake selective tailings reclamation. Overall, the project will deliver a long-term positive impact on groundwater quality if the TSF is removed, and footprint areas are rehabilitated.

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Abbreviations

Abbreviation	Description
AMD	Acid Mine Drainage
Bh	Borehole
BPG	Best Practice Guideline
CV	Curriculum Vitae
DTM	Digital Terrain Model
DWAF	Department of Water Affairs and Forestry (now DWS)
DWS	Department of Water and Sanitation
EA	Environmental Authorisations
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FDEM	Frequency Domain Electro-magnetic
FWGR	Far West Gold Recoveries (Pty) Ltd
GPS	Global Positioning System
ha	Hectares
iLEH	Irene Lea Environmental and Hydrogeology
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
K	Hydraulic conductivity (unit: m/d)
km	kilometre
LOO	Life of Operations \
L/hr	Litres per hour
L/s	Litre per second
m	metre
m/day	metre per day
m^2/day	Metre square per day
MAE	Mean Annual Evaporation
mamsl	metres above mean sea level
MAP	Mean Annual Precipitation

m bgl	metres below ground level
mg/L	milligrams per litre
ml	millilitre
mm	millimetre
mm/a	millimetre per annum
mS/m	milliSiemens per meter
NEMA	National Environmental Management: Waste Act, 2008 (Act No 59 of 2008)
NWA	National Water Act, 1998
RTSF	Regional Tailings Storage Facility
S	Specific storage
S&EIA	Scoping and Environmental Impact Assessment
SANAS	South African National Accreditation System
SANS	South African National Standards
T	Transmissivity
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility
WMA	Water Management Area
WRC	Water Research Commission
WRTRP	West Rand Tailings Retreatment Project

1 INTRODUCTION

Far West Gold Recoveries (Proprietary) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSF are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto the Regional Tailings Storage Facility (RTSF).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant, or any other future plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. Reprocessed tailings will be deposited on the RTSF. Required infrastructure will include:

- Pumpstation;
- Connecting pipelines for process water from Kloof Shaft 10#;
- Connecting slurry pipelines to existing pipelines;
- Pollution control paddock;
- Access roads;
- Laydown area; and
- Powerlines.

The proposed reclamation activity will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses, the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008), Category B Activities. 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).

Kongiwe Environmental (Pty) Ltd (Kongiwe) has been appointed by Far West Gold Recoveries (Pty) Ltd, 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 reclamation of the Libanon TSF.

In terms of regional setting, Libanon TSF is situated approximately 2 kilometres (km) west of Westonaria, in the Rand West City Local Municipality (Figure 1). Libanon TSF is approximately 170 hectares (ha) in extent and located on the farm Witkleigat 283 IQ 87IR (Figure 2). The project is in a regional gold mining area within the Kloof Mineral Rights Area and in the vicinity of South Deep, Cooke and Driefontein Gold Mines.

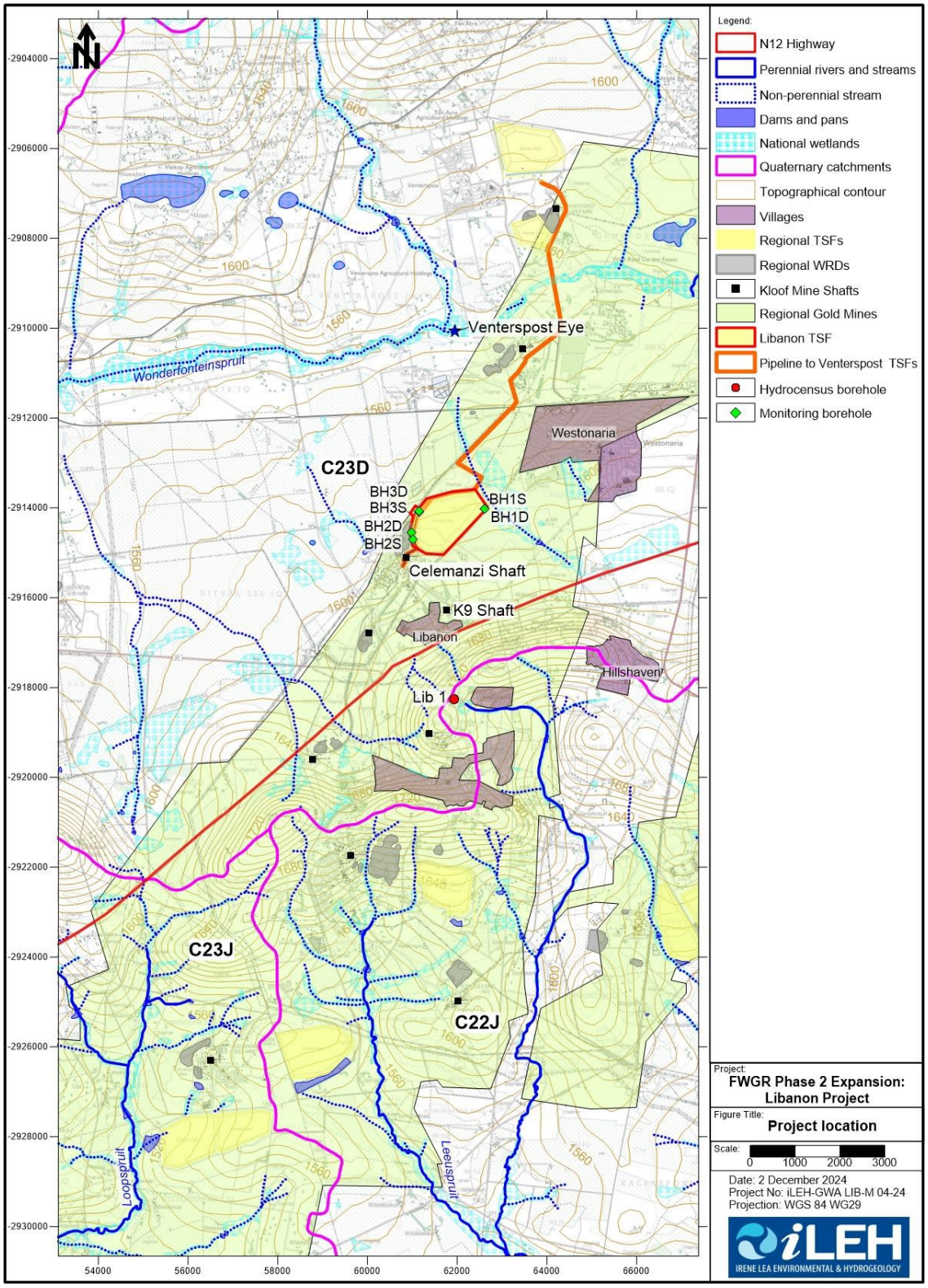


Figure 1. Libanon project locality map

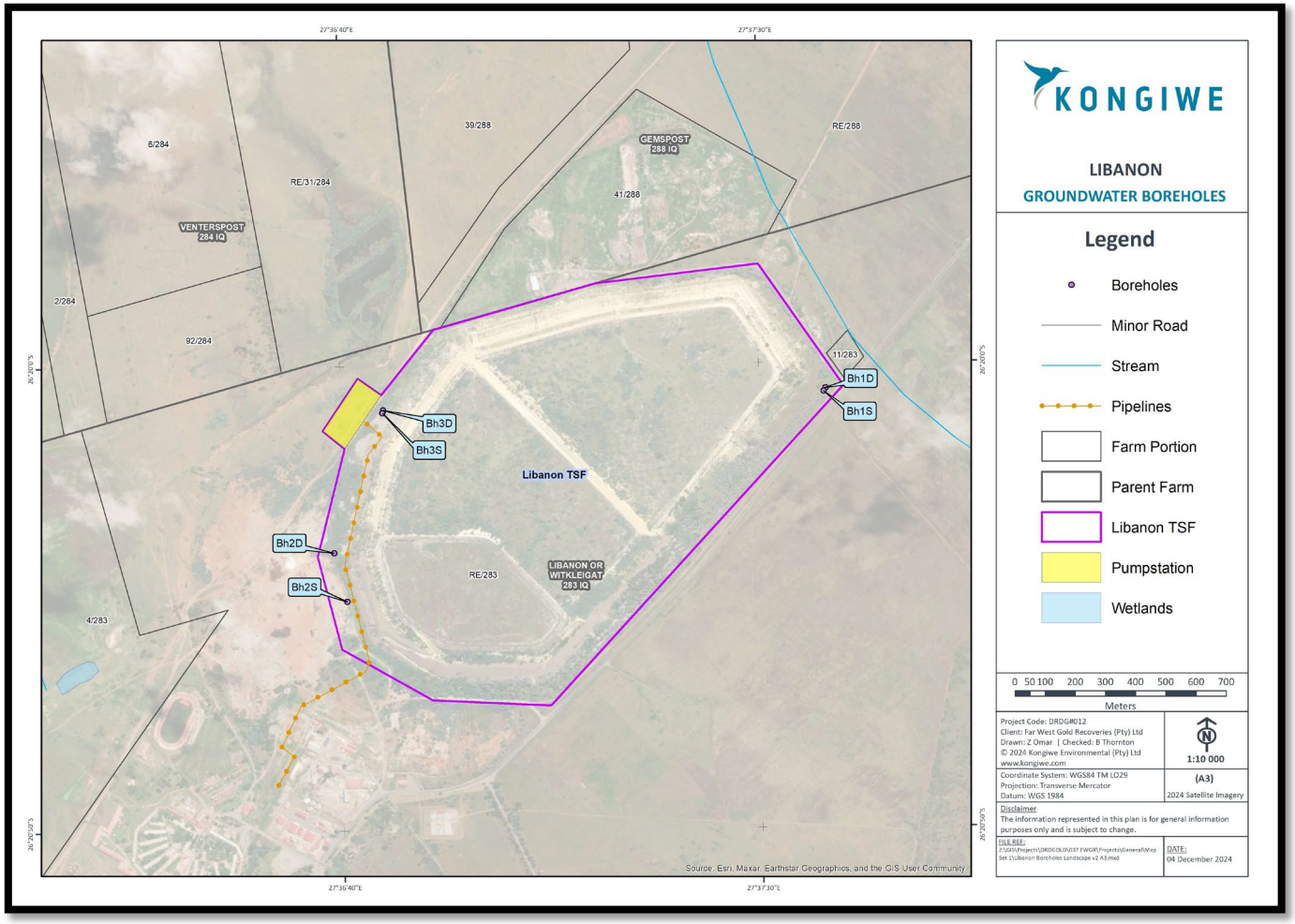


Figure 2. Libanon TSF master layout

1.1 Project Description

Libanon TSF is surrounded by open areas, areas cleared of mining infrastructure and the closed Libanon Gold Mine. The N12 runs 2 km to the south of Libanon TSF.

1.1.1 Access

The main access route is off Bridges Avenue which runs parallel to the south of the TSF (Figure 2). As far as possible, existing access roads will be utilised, and where this is not possible, these will be constructed. Where access roads are to be constructed, these will be 4 meters (m) wide gravel roads with mitre drains to protect the road structure from flood damage. Intersections will be properly designed to provide safe entry and exit in and out of the reclamation area. Approvals from the Provincial Roads authorities will be obtained where necessary.

1.1.2 Power and Water

The proposed reclamation activity will require 3 kVA of electricity.

Power will be supplied by Eskom and potable water will be purchased from Rand Water Board or the Municipality, with a contingency for portable JoJo tanks or connection to existing water pipeline infrastructure.

In terms of process water, the water cycle operates as a closed circuit, meaning that limited make-up water will be required for the reclamation of the TSF. Water required for the reclamation activity will be sourced from the Kloof Shaft 10# and conveyed through existing process water pipeline to the project site for reuse in a closed-circuit system.

Stormwater management will consider water infrastructure and stormwater systems, the existing catchment paddock on the TSF footprint and a pollution control paddock.

1.1.3 Life of Operation

An estimated amount of 600 000 tons/month of slurry is expected to be pumped from the TSF via existing pipelines to the Driefontein 2 Plant for beneficiation.

The anticipated life span of the project is approximately 12 years. It is expected that there would be a 1-year construction and ramp-up period which would include the placement of infrastructure and site preparation, a 6-year Life of Operation (LOO) where active hydraulic reclamation and mechanical removal would take place, a 2-year ramp-down period and 3 years to rehabilitate the reclaimed site.

Upon completion of reclamation, the footprint area will be assessed for contamination, particular in terms of radiation. Contaminated soils will be removed, and the land will be levelled to its original topography. Following rehabilitation, it is anticipated that the land will be returned to the landowner to use at their discretion.

1.1.4 Infrastructure Proposed for the Project

The following infrastructure will be utilised on site:

- Reclamation infrastructure consisting of a pump station which include:
  - Slurry sump;
  - Penstock;

  - Vibrating Screen;
  - Water tank;
  - Motor control centre;
  - Pump;
- A short connecting 600-millimetre (mm) pipeline for process water from Kloof Shaft 10#;
- A short connecting 550 mm pipeline to the slurry pipeline to Driefontein 2 Plant;
- Stormwater management infrastructure including:
  - Water infrastructure and stormwater systems;
  - Existing catchment paddocks on the TSF footprint; and
  - Pollution control paddock;
- An 11 kV overhead powerline capable of transmitting 3 kVA of electricity and electricity reticulation;
- Administration buildings, including change houses and ablution facilities;
- Access roads, routed from existing entry points; and
- Construction contractors' yards (temporary facilities).

1.1.5 Reclamation Method

The proposed reclamation method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors / cannons to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being mined.

At the sump, finger screens remove any debris that may impact pumping operations, and a penstock will control water flow into the sump. The position of the collection sump will change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation station. To control the volume of water reporting to the reclamation station, flapper valves are used to hold, and release slurry contained in the collection sump. This slurry is then pumped via existing pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation.

Reclamation will take place in predetermined benches (or cuts) and will move unidirectionally until the entire TSF has been reclaimed. Generally, 30 m cuts are made for reclamation.

The reclaimed slurry will be deposited in the approved pipelines to the Regional TSF.

1.1.6 Rehabilitation

The property on which Libanon TSF is situated currently belongs to Sibanye. As such, the rehabilitation will need to be in line with Sibanye's closure plans. At present Sibanye's closure plan indicates that the area must be rehabilitated to wilderness.

Once the TSF has been reclaimed, rehabilitated, and cleared of radiation, the land will be shaped and revegetated to match the surrounding environment. The land will then be made available to Sibanye to use at their discretion.

This report represents the geohydrological specialist study completed for the Environmental Impact Assessment (EIA) phase of the application, for environmental authorization to reclaim the Libanon TSF. The information presented in the report will also be used in support of an Integrated Water Use Licence Application (IWULA).

2 GROUNDWATER ASSESSMENT FRAMEWORK

A thorough understanding of the hydrogeological environment is essential to understand the impact of the operations on the receiving environment and to help design a groundwater management plan that reduces or removes the risk of groundwater quality and quantity impacts.

2.1 GROUNDWATER STUDY OBJECTIVES

The groundwater impact assessment focussed on the following objectives:

- Define the current groundwater use in the Libanon TSF study area;
- Define the aquifers underlying the Libanon TSF, as well as current groundwater table depth, groundwater quality, and flow characteristics;
- Define what impact the reclamation activities might have on the groundwater environment; and
- Recommend an initial groundwater monitoring network that will effectively monitor the groundwater quality and level changes during the reclamation activities.

2.2 COMPLIANCE FRAMEWORK

This report is compiled based on the requirements of GNR 267 of the National Water Act (1998) (NWA). The report format is also based on the requirements of the Department of Water and Sanitation (DWS) Best Practice Guideline (BPG) G4 (2008).

The water quality assessment will be based on South African National Standard (SANS) 241-1:2015, Drinking Water.

2.3 ALTERNATIVES CONSIDERED

Kongiwe (2024a) have investigated project alternatives related to the property on which the project is located, the type, design and layout of the activity and the technology used. The operational aspects of the activity, and the "No-Go" alternative were considered in the Scoping Report.

The proposed project will investigate one pipeline route to link into existing authorised slurry pipelines to convey slurry from the TSF to the Driefontein No. 2 Plant for reprocessing; and return process water to the project site for reclamation. The pipeline configuration will consist of one 550 mm diameter slurry pipeline and, one 600 mm diameter process water pipeline.

Details regarding each alternative considered are provided in the Scoping Report (Kongiwe, 2024a). The outcome indicates that there is no project alternative; that TSF reclamation methodology discussed above is the preferred option in terms of the type of activity; the design and layout of the project id dictated by the existing location of the TSF and its associated infrastructure; that the

technology discussed above is the most efficient in terms of water use and water-related impacts; and that existing infrastructure will be used during the operation of the project. For this assessment, two scenarios will therefore be considered:

- Scenario 1: Tailings reclamation according to the project description above
- Scenario 2: The "No Project" option, which will entail leaving the TSF in situ. The tailings material is considered a source of groundwater and surface water pollution.

The proposed reclamation activity will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses, the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008), Category B Activities. 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).

2.4 Groundwater Assessment Team

The following hydrogeologists are involved in the Libanon TSF groundwater assessment:

- Lucas Smith (MSc Geohydrology) Pr.Sci.Nat:
  - Field work, data analysis, interpretations, and reporting.
- Irene Lea (MSc Geohydrology) Pr.Sci.Nat:
  - Data analysis, interpretations, numerical model and impact assessment.

Curricula Vitae (CVs) are appended to Appendix A.

2.5 Report Structure

The remainder of the report is structured as follow:

- Section 4 – Environmental Setting.
- Section 5 – Site Investigations.
- Section 6 – Hydrogeology.
- Section 7 – Conceptual Hydrogeological Model.
- Section 8 – Source Term.
- Section 9 – Potential Pathways and Receptors.
- Section 10 – Key Assumptions and Literature Based Inputs.
- Section 11 – Groundwater Modelling.
- Section 12 – Hydrogeological Impacts.
- Section 13 – Groundwater Impact Assessment.
- Section 14 – Cumulative Impacts.
- Section 15 – Groundwater Management Measures.
- Section 16 – Post Closure Management.
- Section 17 – Groundwater Monitoring.
- Section 18 – Reasoned Opinion.
- Sections 19 and 20 – Conclusions and Recommendations.

Appendices:

- Appendix A: Curricula Vitae.
- Appendix B: Geophysical Survey Data.
- Appendix C: Percussion Drill Logs.
- Appendix D: Aquifer Test Data.
- Appendix E: Water Laboratory Certificates.

3 KEY FINDINGS FROM THE SCOPING REPORT

Kongiwe (2024a) reports the following potential impacts on groundwater, associated with the project:

- The potential for further acid mine drainage (AMD) with increased heavy metal and sulphate concentrations in local surface water and groundwater if runoff from the operations is not adequately managed through efficient stormwater management structures.
- Water and groundwater contamination due to pipeline leaks/spillages if inadequate preventative measures are not implemented.
- Improved surface water and groundwater quality around the project area due to the removal of Libanon TSF.

The scoping report further concludes that the project and its associated infrastructure would pose minimal and short-term negative environmental impacts if adequate and appropriate mitigation measures are implemented. Positive long-term environmental impacts are expected once the project has been completed. It is reported that the removal of Libanon TSF would assist with the alleviation of a major pollution source.

4 ENVIRONMENTAL SETTING

The project is situated on a relatively flat plain that dips in a northerly direction towards the Wonderfonteinspruit (Figure 1). The flat plain is associated with dolomitic and Karoo Sequence outcrops. The undulating and hilly ground south and north of the TSF is formed by outcrops of the Black Reef quartzite and other West Rand formations (Witwatersrand Supergroup) in the far north, and Timeball Hill and Rooihoogte Formations (Pretoria Group) to the south.

A section of the Wonderfonteinspruit is diverted to prevent the stream from flowing into dewatered dolomitic compartments. Several springs, including the Venterspost Eye and the Wonderfontein Eye are located along the flow of the stream. The Venterspost Eye is located approximately 3.6 km north of Libanon TSF. This eye is dry at present because the dolomitic compartment in which it is situated has been dewatered by gold mines.

Over the footprint area, the topography dips north at elevations of between 1600 and 1580 meters above mean sea level (mamsl).

4.1 CATCHMENT

Libanon TSF falls in the Wonderfonteinspruit catchment, in the C23D quaternary catchment, forming part of the Vaal Water Management Area (WMA:5). The main drainage for the greater area is the Wonderfonteinspruit. Regionally, the Wonderfonteinspruit drains in a westerly direction into the Mooi River.

4.2 CLIMATE AND RAINFALL

The project area falls within a Highveld climatic zone. Rainfall occurs as thunderstorms during the summer months with a dry winter period.

Kongiwe (2024a) reports that the mean annual precipitation (MAP) for the Kloof weather station is 920 mm/a, based on data for the period December 2013 to February 2020 (Table 1). Older data over a longer period for this weather station reports a MAP of 697 mm/a between 1966 and 2012. This rainfall data will be used to complete the impact assessment.

Rainfall data from the Kloof and the Blyvooruitsig weather stations was not available for the period of 2008 to 2013. The driest year on record was 1945, where 415 mm was received. The two wettest years occurred recently, with the first being in 2014, where 1 145 mm was received, whilst the wettest year on record is 2016, where 1 534 mm was received. Rainfall is highest over the summer months of October to April, and lowest over the months of May to September. Due to the short record, as well as 2014 and 2016 being extremely wet years, the MAP for the Kloof weather station is skewed, and therefore, the Blyvooruitsig MAP of 711 mm was adopted, as it is more representative of the long-term annual rainfall of the area.

Table 1. Summary of the details of the rainfall stations

Station name	Station number	Station location	Rainfall record	MAP (mm)
Blyvooruitsig	0474684 W	4 km south of Carletonville	Oct 1941 – Sep 2008	711
Kloof	--	Located at the Kloof Operation	Dec 2013 – Feb 2020	920

According to the WR2012 study, Kloof is mostly located within evaporation zone 10A. Symon's Pan (S-Pan) evaporation was obtained from the DWS Naauwpoort weather station (C2E009) at the Boskop Dam, which is also located within evaporation zone 10A. Monthly evaporation was available for the period of 1969 to 2019. S-Pan evaporation measurements tend to be higher than evaporation from natural open water bodies. To convert S-Pan measurements to open water evaporation, monthly conversion factors were used, which were obtained from the WR90 study. The open water Mean Annual Evaporation (MAE) is 1 454 mm, which is double the MAP of the area. Evaporation is highest over the warmer months of September to March, and lowest over the cooler months of April to August.

4.3 GEOLOGY

The regional surface geology for the project area is presented in Figure 3. Regionally the geology consists of formations of the Karoo, Transvaal, Ventersdorp and Witwatersrand Supergroups. Gold mineralisation is present in conglomerates of the Witwatersrand Supergroup. The Ventersdorp Contact Reef, Kloof Reef and the Middelvlei Reef were extensively mined in the Kloof underground

workings. The Kloof Celemanzi (Kloof 10 Shaft) is located immediately southwest of the Libanon TSF, as indicated on Figure 3. The northern section of Kloof Mine was previously known as Venterspost and Libanon Mines. These northern sections have been mined out, but some of the Kloof Shafts remain open to dewater the old underground workings to preserve regional gold mining activities. The depth of the Ventersdorp Contact Reef in the underground workings is at least 800 to 1000 m below surface, with deeper mining associated with reefs lower in the geological succession. The lower units of the Witwatersrand Supergroup include the West Rand Group and the upper unit the Central Rand Group. The West Rand Group is divided into three subgroups including the Hospital Hill, Government Reef and Jeppestown Formations. These comprise mainly shale, quartzite, banded ironstone, tillite and intercalated lava flows. North of Libanon TSF, the Government Formation outcrops. The Ventersdorp Supergroup overlies the Wits formations and comprises mainly andesitic lavas and related volcanic pyroclastics.

The overlying Transvaal Supergroup formations are of specific interest to this study. The Black Reef quartzite, which is present at the base of the Transvaal Supergroup, outcrops north of the project area. Of the Transvaal Supergroup Formations, the Chuniespoort Group are of most significance, as the Libanon TSF is located on outcropping Malmani dolomite. The dolomite varies in thickness regionally from around 200 to 1500 m. Underneath the Libanon TSF, the base of the dolomite is at an elevation of 1000 to 800 mamsl and dips in a southerly direction (Jones and Wagener, 2013).

According to Parsons (1991), the two lower formations of the Malmani Subgroup is present in this area, namely the Oaktree and Monte Christo Formations. The Oaktree Formation consists of chert-poor homogenous dark-grey dolomite with interbeds of shale and numerous columnar stromatolites. The Oaktree Formation is conformably overlain on the Black Reef Formation with a transitional zone of carbonaceous, calcareous, argillaceous and arenaceous sediments. The Monte Christo Formation lies conformably on the Oaktree Formation and consists of alternating chert-rich and chert-poor dolomite. This formation consists of interlayered crystalline coarse-grained dolomite, calcareous shale and fine-grained white dolomite.

The dolomite forms a significant aquifer regionally. Dissolution of the dolomite encourages deep zones of weathering. The residues of the weathering are present as brown clays and wad, chert rubble and boulders. The depth of weathering can vary significantly with pinnacles of fresh dolomite often adjacent to deeply weathered zones. The depth of weathering is controlled by the presence of fractures and fissures in the dolomite along which water can infiltrate. In addition, cavities often form in fresh unweathered dolomite where dissolution has taken place along faults and fractures to depth. These cavities can be filled with water, which provides hydrostatic pressure and keeps the cavities stable. If the cavities are dewatered, the stability is removed and the probability of sinkhole development increases.

The geomorphology of the weathered dolomitic aquifer, which has relevance to the geohydrology of the Libanon TSF, is presented in Figure 4 (Jones and Wagener, 2013). This aquifer has specific significance to the project, as the TSF is located on outcropping dolomite. The base of this aquifer was identified by means of a gravity geophysical survey completed by the Council for Geoscience, as presented in Figure 4. The information indicates that the base of the weathered dolomites is highly irregular, with an average depth of 200 m.

South of Libanon TSF, formations of the Pretoria Group outcrop, including ferruginous shale and quartzite of the Timeball Hill Formation, Hekpoort lavas, as well as shale outcrops of the Strubenkop and Silverton Formations.

Some Karoo sediments have remained as inliers above the dolomite, delineated as the Vryheid Formation in Figure 3.

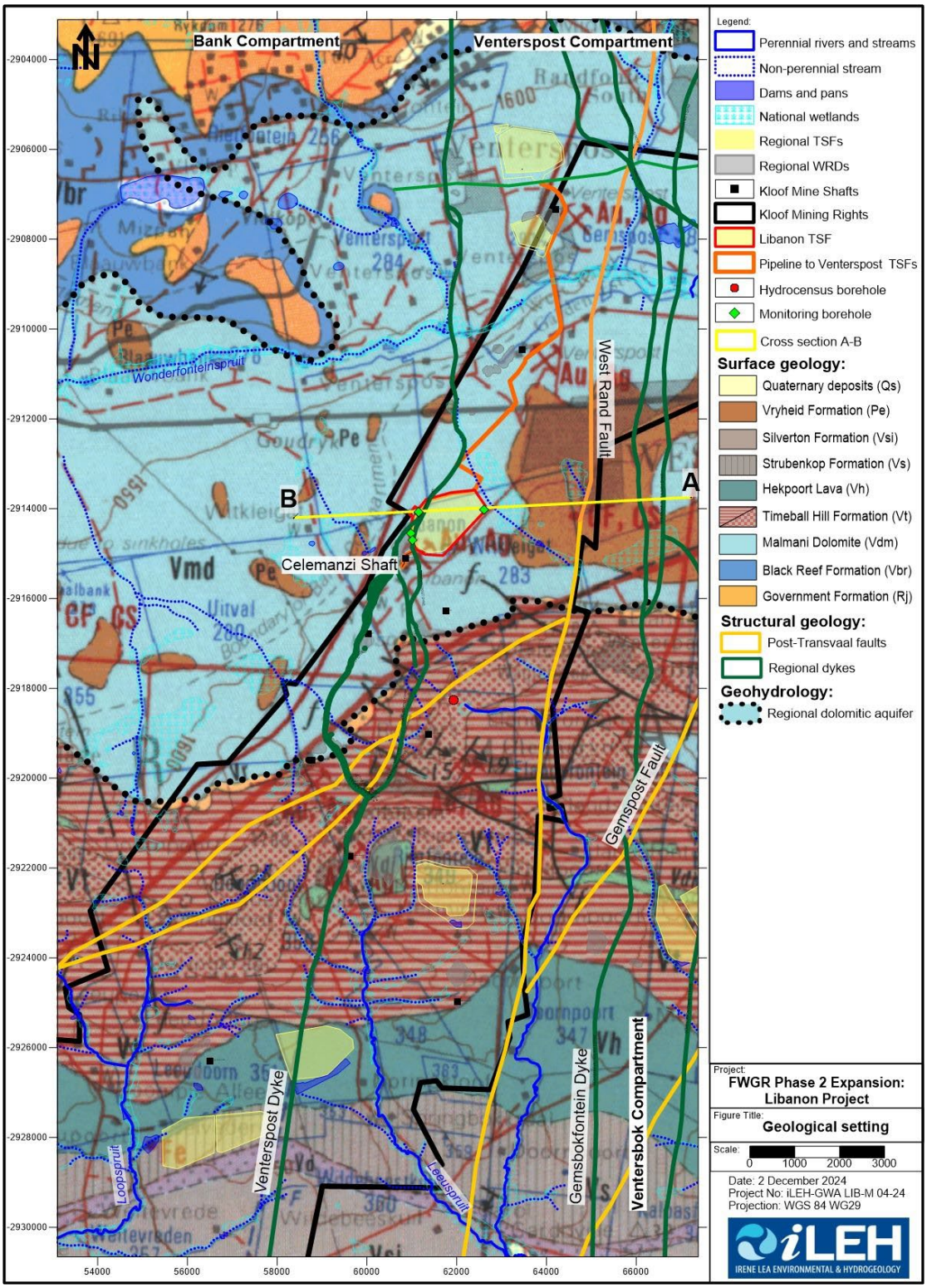


Figure 3. Project area geology

4.3.1 STRUCTURAL GEOLOGY

The structural geology forms an important component of the hydrogeological setting of the project and is complex in this region. The information presented here is based on work completed by Dr Marius van Biljon (Jones & Wagnener, 2013).

The structural geology governs aquifer development and regional groundwater flow patterns. The region is characterised by several folds, of which the southern limb of the east-west striking Rand Anticline transects Kloof Mine. This structure affects the deeper geological setting and the underground mining areas and is distorted by several north-south trending folds. The result is a regional geological structure interpreted as domes and cusps (basins). Within the dome structures, prominently deeply weathered grykes form from the dolomite surface. A gryke is a deep narrow slot filled with dolomite wad. Dolomitic aquifers are also typically formed within the dome structures. The cusp structures for the most efficient groundwater conduits at the intersections of the synclinal fold axes. Some of the cusp structures resulted in post-Transvaal age faults, which are younger in geological age than he dolomites. These faults link the underground mine workings with the weathered dolomite aquifer that can yield significant volumes of groundwater and increased seepage to the mining areas. The positions of the post-Transvaal faults in the project area are indicated on Figure 3. It is shown that none of these faults transect the Libanon TSF footprint.

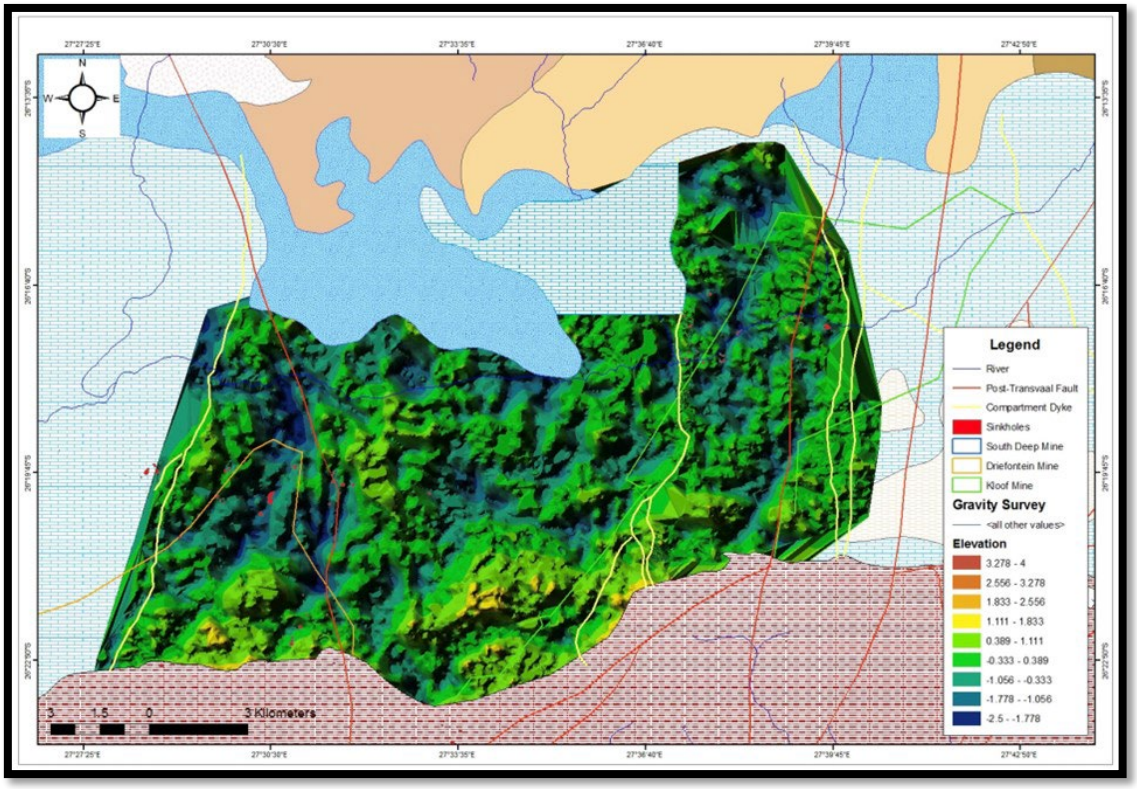


Figure 4. Geomorphology of the weathered dolomite aquifer (Jones & Wagener, 2013)

In addition to the regional post-Transvaal faults, regional diabase (dolerite) dykes have intruded into some of the north-easterly striking faults. Many of these faults penetrated the full Transvaal sequence as well as the underlying Ventersdorp and Witwatersrand Supergroups. These dykes have subdivided

the dolomites in watertight compartments. A number of these dolomitic compartments are present in the region, including the Gemsbokfontein, Venterspost and Bank compartments, as indicated on Figure 3.

The Libanon TSF is located on the western edge of the Venterspost Compartment and possibly to some extent on the Bank Compartment, as shown in Figure 3. The eastern boundary of the Venterspost Compartment is formed by the Gemsbokfontein No 2 Dyke and the western boundary by the Venterspost Dyke, which transects the western boundary of the Libanon TSF. The northern boundary of the dolomitic compartments is formed by the outcrop of the dolomite against the Black Reef Quartzite. The southern boundary is formed by the overlying Transvaal sediments.

Prior to mining, groundwater levels in the dolomitic compartments varied due to the impermeable nature of the compartment forming dykes. Mining activities have however punctured these dykes in places. The Venterspost Compartment is largely dewatered. The water level in the compartment is estimated to be around 1400 mamsl, which is more than 150 m below surface underneath the Libanon TSF. The dewatering rate is reported as 40.4 ML/d from the Celemanzi (Kloof No 10) Shaft (Kongiwe, email dated 6 November 2024).

5 Site Investigations

Three sets of shallow and deep monitoring boreholes were drilled and tested as part of this project. The locations of the boreholes are indicated on Figure 1 and Figure 2. The results of the drilling programme indicate the presence of thick residual dolomite, referred to as wad underneath the Libanon TSF footprint. This material has very low permeabilities and act largely as an aquitard. One of the deeper boreholes intersected a cavity in the dolomitic formation, which complicated the drilling process. This is discussed in more detail below.

Due to the presence of the residual dolomite and dewatered environment, aquifer tests could only be completed on two of the boreholes drilled. Slug tests were completed on three of the remaining boreholes. Groundwater samples were collected from two of the boreholes that contained groundwater at the end of the drilling and testing programs.

5.1 Desktop Study

A desktop study was completed with information made available for the project, including results from a hydrocensus conducted as part of this study. The list of documents assessed is presented in the references at the end of this report. All information that was used during the assessment is summarised in the report.

5.2 Hydrocensus

A hydrocensus was conducted across the study area during August 2024. The survey included the Libanon TSF property, plus accessible properties within a 4.5 km radius, and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use. Only one borehole was identified on one of the properties on the ridge to the south (Table 2).

During the hydrocensus the following information was collected for each site:

- Borehole position (X, Y, Z-coordinates).
- Information relating to equipment installed.
- Borehole construction details.
- Borehole yield – if known by the landowner.
- Groundwater level, if possible.
- Current use.

Fourteen properties that were visited had no boreholes. These include:

- Libanon TSF property.
- Landfill site north of Libanon TSF.
- Westonaria Cemetery.
- Hendrik Van Niekerk Waste Water Treatment Works.
- WESTCOL Westonaria - School.
- Westonaria High School.
- Westonaria Primary School.
- Gerrit Maritz Primary school.
- Rand Water Depot Westonaria.
- Klipfontein Guest House, Wagterskop.
- Libanon Mine Town.
- Eskom Distribution Libanon.
- Kos-Mos – Restaurant.
- Mr Oberholzer's farm west of Libanon Town.

A summary of the hydrocensus information is available in Table 2. All coordinates were taken with a hand-held Garmin GPS (Global Positioning System) (WGS84).

The extent of the study area, budget and time constraints, and land access limited the hydrocensus in terms of surveying every property in the area. The study aimed to cover the whole area to ensure a data set representative of the study area.

Only one borehole was identified during the hydrocensus, and a groundwater level could not be measured due to security measures installed to safeguard the borehole pump (Table 2). Detailed information in terms of borehole construction and yield, plus water strike depths are not known for the identified hydrocensus site. Time series groundwater level or quality data are also not available for the private borehole to determine seasonal groundwater changes for the area. A groundwater sample was collected from the one borehole (see Section 5.7).

Locally surface drainage and possibly groundwater flow will be towards the Wonderfonteinspruit. The groundwater table governs water flow and in similar geological terrains a relationship exists between the groundwater table and the topography. This correlation is known as the Bayesian relationship. The borehole collar elevation is plotted against the measured groundwater elevation to test if this relationship is applicable. This was not possible for the Libanon TSF area due to the lack of rest level data.

Generally, a groundwater mound occurs beneath a TSF because of seepage from the TSF, that recharges the underlying aquifer. This results in radial flow from the TSF footprint but assumes regional flow direction again as the distance increases from the TSF.

Table 2. 2024 Hydrocensus data

Site ID	Lib 1
Lat (WGS84)	26°22'21.26"S
Long	27°37'14.26"E
Elev (mamsl)	1732
Locality	Kobus Oberholzer farm
Water depth (mbgl)	sealed
Collar height (m)	0,15
Water elevation (mamsl)	--
BH depth (m)	100
Yield (L/hr)	good
Casing diameter (mm)	165
Sampled	yes
Pump type	submersible
Use	domestic, gardens
Notes	Only source of water

5.3 Geophysical Survey

A ground geophysical investigation was conducted to identify linear geological structures in the area which could act as preferential groundwater flow paths. The geophysical survey has been used in conjunction with the available remote sensing images and geological maps.

The geophysical survey was conducted on 14 and 15 October 2024 and included Magnetics and Electromagnetic (EM34-3) surveying only. The survey included 3 survey lines, and the line and station coordinates were marked in the field using a handheld Garmin GPS (Figure 5).

The interpretation of the data was done with care as the response of the instruments can be influenced by shallow weathered zones (e.g., clay) and cultural effects such as fences and buried objects.

5.3.1 Magnetometer Survey

Many geological formations by virtue of their content of magnetic minerals will behave like buried magnets and have associated with them a magnetic field. This local magnetic field will be superimposed on the normal magnetic field of the earth. Measurements of the magnetic field taken in the locality of such geological formations will show departures from the undisturbed earth's magnetic field in the vicinity of these formations. These changes, or anomalies as they are called, could be larger or smaller and could be either an increase or a decrease of the earth's field and will

depend on the depth of burial, degree and direction of magnetisation, and the attitude of formation in relation to the direction of the earth's field at that locality.

Many rocks and minerals are weakly magnetic or are magnetized by induction in the Earth's field and cause spatial anomalies in the Earth's main field.

The magnetometer survey reflects the physical process by which the magnetic field is measured. Proton procession instruments have a sensor filled with a hydrogen rich fluid (like kerosene). An inductor (geological unit such as a dyke) creates a strong magnetic field in the fluid resulting in the alignment of protons. When the inducted current is suspended, the relaxation rate, as the protons return to ambient magnetic conditions is recorded. This rate is directly proportional to the magnetic field.

The Magnetic survey was run in support of the EM survey and was run on the same survey lines as the EM survey, at 5 m reading intervals.

5.3.2 The Electromagnetic Method

Frequency Domain Electromagnetics (FDEM) techniques use a primary time-varying magnetic field produced in a transmitter coil to induce the flow of electrical current in subsurface conductors via electromagnetic induction. By measuring the secondary magnetic fields or response of these currents, electrical and magnetic properties of the subsurface or causative body can be deduced.

FDEM is effective at mapping major lateral changes in shallow subsurface electrical conductivity due to variations in water conductivity (salinity), water saturation, porosity, presence of clays, conductive minerals (graphite and massive sulphides) and man-made metallic objects. FDEM relies on a contrast in physical properties of materials.

The EM34 data was recorded every 10 meters, with coil separations of 20 m and 40 m used on each survey line.

The geophysical data is presented in Appendix B. The geophysical survey was successful in identifying three drilling targets (Table 3 and Figure 5).

Table 3. Proposed drill targets

Site number	Latitude (WGS84)	Longitude	Notes
Line 1, station 480	26°20'02.06"S	27°37'37.98"E	Upstream monitoring
Line 2, station 250	26°20'25.35"S	27°36'40.44"E	Downstream monitoring
Line 3, station 240	26°20'04.70"S	27°36'45.09"E	Downstream monitoring

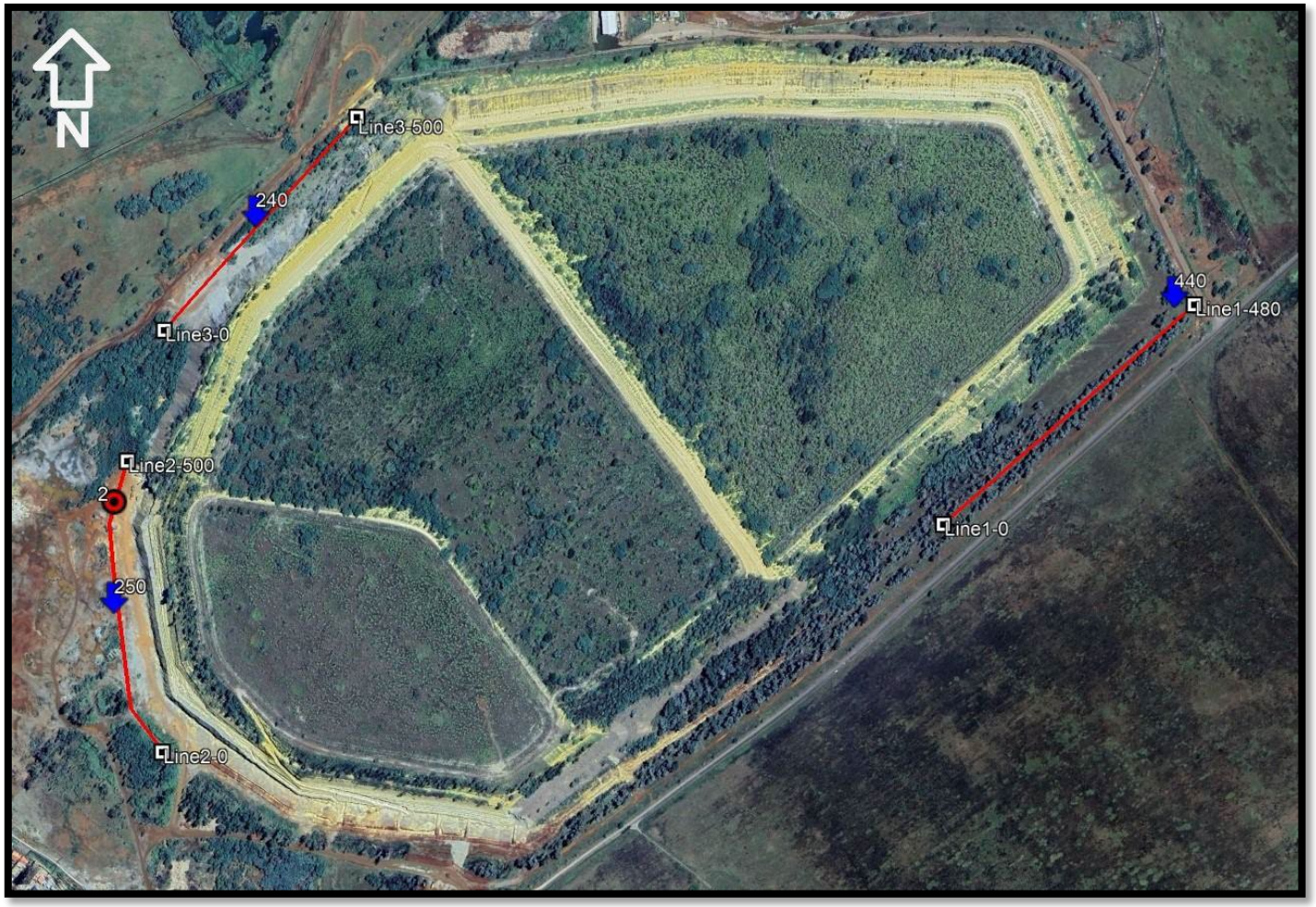


Figure 5. Geophysical survey layout

5.4 Drilling Program

Based on the geophysical survey, three drilling positions were identified around the footprint area of Libanon TSF (Table 4 and Figure 5). The percussion drilling program was carried out during October 2024, by Redirile Drilling.

Two groundwater characterisation and monitoring boreholes were drilled at each of the 3 target areas (Figure 5) – the one borehole was drilled to a depth of 80 m below surface, with the aim of characterising and monitoring the deeper fractured aquifer. The second borehole was drilled 30 m deep, with the aim of monitoring potential groundwater flow, quality and possible connection between the deeper fractured aquifer and the shallow weathered aquifer in the area.

Data collected include the recording of geological formations at 1 metre intervals, water strike depths, the cumulative final blow yield and final rest water level. A summary of the results is presented in Table 4.

The borehole construction details are as follows:

- Deep boreholes (80 m) – 177 mm diameter solid steel casing from surface to 30 m below surface. Beyond this depth the diameter of the borehole is 165 mm.
- Shallow boreholes (30 m) – drill diameter is 203 mm with 177 mm steel casing installed over the full depth of the borehole. The bottom 12 m was perforated.

The geological profiles intercepted by the percussion drilling program are presented in Appendix C.

Two of the 6 new percussion boreholes produced a measurable groundwater level, post drilling (boreholes Lib BH3s and Lib BH3d). The other four boreholes produced no water and remained dry post closure. There were no measurable blow yields with only seepage water observed for boreholes Lib BH3s and Lib BH3d (Table 4).

The depth of weathering varies between 25 and 35 m bgl (Table 4).

Table 4. Drilling summary October 2024

		Borehole ID	Lib-BH 1s	Lib-BH 1d	Lib-BH 2s	Lib-BH 2d	Lib-BH 3s	Lib-BH 3d
Borehole Location	WGS84	Latitude	26°20'03.12"S	26°20'02.78"S	26°20'25.33"S	26°20'20.09"S	26°20'05.07"S	26°20'04.77"S
		Longitude	27°37'37.77"E	27°37'38.00"E	27°36'40.63"E	27°36'39.13"E	27°36'45.05"E	27°36'45.14"E
		Elevation	1599 mamsl	1598 mamsl	1616 mamsl	1609 mamsl	1602 mamsl	1601 mamsl
Borehole Data	Borehole Depth (m)		30	60	18	50	30	80
	Blow Yield (L/hr)		Dry	Dry	Dry	Dry	Seepage	Seepage
	Water Strike depth (m)		None	None	None	None	None	None
	Main Strike Geology		--	--	--	--	--	--
	Borehole Geology		Clays, chert, dolomite	Quartzite, clays, dolomite Cavity at 48-60m	Quartzite, clays	Sandstone, quartzite, clays	Lava, sandstone, quartzite, clays	Lava, sandstone, quartzite, clays, dolomite
	Solid Steel Casing (170mm ID)		0 – 18m	0 - 48m	0 – 6m	0 - 30m	0 – 18m	0 - 48m
	Perforated Steel Casing (170mm ID)		18 – 30m	none	6 – 18m	none	18 – 30m	none
	Static Water Level (mbgl)		Dry	Dry	Dry	Dry	20.87	77.17
	Depth of Weathering (m)		25	30	18+	35	30+	32

5.5 AQUIFER TESTING

Following completion of the drilling programme, an aquifer test programme was initiated to determine the hydrogeological characteristics of the local aquifers, where possible.

VSA Leboa Consulting was appointed by Water Hunters to conduct yield testing of the newly drilled boreholes. Only 5 of the 6 boreholes were available for yield testing, consisting of shallow (30 m) and deep (80 m) boreholes. Borehole Lib BH1d (deep borehole) intercepted a cavity at depth and was not tested.

The aquifer test program includes defining:

- Borehole drawdown and recovery characteristics.
- Aquifer hydraulic parameters:
    - Transmissivity (T) defined as the product of the average hydraulic conductivity (K) and the saturated aquifer thickness. It is a measure of the rate of flow under a unit hydraulic gradient through a cross-section of unit width over the whole saturated thickness of the aquifer. The unit of measurement is m^2/day.
- Characterisation of aquifer flow boundaries such as low permeable, no-flow or recharge boundaries. No-flow or low permeable boundaries refer to a lower transmissive structure (e.g., fracture with a lower conductance or low permeable dyke) or aquifer boundary (limit of aquifer – no-flow boundary) that results in an increase in groundwater drawdown during borehole abstraction. Recharge boundaries relate often to leakage from surface water bodies.

Prior to the aquifer test, static groundwater levels are measured in the pumping boreholes to enable drawdown calculations during test pumping. During the test, the abstraction rate is continuously monitored by means of electronic flow meters and calibrated by manually measuring the time it takes to fill a container of known volume, with a stopwatch and drum.

The testing methodology and results were received from VSA Leboa Consulting, upon completion of the test program. The aquifer test data and drawdown graphs are presented in Appendix D.

For this project maximum drawdown pump tests were conducted on the two low yielding boreholes (boreholes Lib BH3s and Lib BH3d), followed by a recovery test after each test. Slug tests were conducted on three of the dry boreholes (slug in / infiltration tests) (Lib BH1s, Lib BH2s and Lib BH2d). These processes are discussed in more detail below.

A **slug test** is a controlled field experiment performed to estimate the hydraulic properties of aquifers and aquitards in which the water level in a control environment is caused to change suddenly (rise or fall) and the subsequent water-level response (displacement or change from static) is measured through time in the borehole. Slug tests are also referred to as rising-head or falling-head tests to describe the direction of water-level recovery in the borehole following test initiation (HydroSOLVE, Inc).

The goal of a slug test, as in any aquifer test, is to estimate hydraulic properties of an aquifer system such as hydraulic conductivity. Aquifer properties are estimated from a slug test by fitting mathematical models to displacement data using curve matching. Curve matching may involve fitting type curves or straight lines to the measured data (HydroSOLVE, Inc).

At Libanon TSF, three of the dry boreholes were tested by introducing a large volume of water in the dry hole and measuring the height of the water column inside the borehole after slug introduction and then measuring the rate of change in the water column height for at least 1 hour. VSA Leboa Consulting concluded that the slug test analysis shows some heterogeneity in the aquifer system, with hydraulic conductivity (k-value) values ranging from 0.000003 m/d to 0.0035 m/d (Table 5). The average k-value is 0.001 m/d, based on the model fits, was determined from the slug test. Large variations in the k-values were observed, mostly due to the analytical solutions fitting the data and heterogeneity in die geology formations.

Table 5. Summary of the aquifer parameters (hydraulic conductivity in m/day) based on the slug tests

BH ID	Slug In/Out	Aquifer properties (Slug Test)			
		Bouwer-Rice		KGS Model	
		K-value	*Yo-value*	*K-value*	*Ss-value*
BH2B	In	0.0035	4	0.000140	1.00E-02
BH2A	In	0.0025	0.7	0.0021	5.00E-04
BH1B	In	0.00057	3.2	0.00003	2.00E-04

The **maximum drawdown test** is a method developed as a rapid means of assessing the potential yield of boreholes. The results may indicate whether it is feasible to perform other tests on the borehole. The test involves measuring the water level response in a borehole to the rapid abstraction of water until pump inlet is reached. The flow rate / pumping rate is then reduced and continuously adjusted until a stable pumping level is maintained.

The **recovery test** follows directly after pump shut down, at the end of the SDT and CDT. The residual drawdown over time (water level recovery) is measured in production and observation boreholes until approximately 90% recovery is reached, or equal to test duration. Aquifer parameters and sustainable borehole yields can be derived from the time drawdown data by application of a variety of analytical methods.

Although these short-term tests cannot be considered as the ideal way of evaluating the long-term sustainability of a groundwater resource, it does provide a quick and simple way of evaluating the short-term performance characteristics of a borehole. It must be emphasised that calculations done from test pumping data are only representative of the aquifer characteristics in the immediate surrounding of the borehole. Factors such as aquifer transmissivity as well as the length of a test, will determine the area of influence reached during testing (the longer the test, the greater the area of influence and more accurate the predictions).

A summary of the test programme is given in Table 6. The pumping test data is used during the calibration of the groundwater numerical model.

The recovery of the groundwater table after abstraction, or introduction of the slug is a good indicator of the aquifer's transmissivity and recharge. The recovery data (for the tested boreholes) indicate that the recovery is slow, and that full recovery (100%) was not achieved within the predetermined testing timeframe (Table 6).

Table 6. Summary table of the yield testing results

Borehole ID	Lib-BH 1s	Lib-BH 1d	Lib-BH 2s	Lib-BH 2d	Lib-BH 3s	Lib-BH 3d
Borehole Depth (m)	30	60	18	50	30	80
Static Water Level (m bgl)	Dry	Dry	Dry	Dry	20.87	77.17
Test pump depth (m bgl)	No test. No water level. No slug test due to sinkhole	Slug Test (Slug In)	Slug Test (Slug In)	Slug Test (Slug In)	29.5	79.0
Available drawdown (m)					7.01	4.77
Steps (60 minutes)					1 (20 min)	1 (40 min)
Max step yield (L/hr)					648	108
Constant Discharge Duration (hrs)					--	--
Maximum drawdown					Full, 6.55 m	Full, 4.79 m
Pumping level at end of test					29 m below surface	79 m below surface
Slug test rise in water level (m) (Slug In)		3.1	0.76	5.40	--	--
Recovery Time		2% in 50 min.	25% in 1 hr	42% in 1 hr	81% in 20 hrs	6% in 3 hrs
Potential Yield		--	--	--	0 L/hr	0 L/hr
T value (m^2/day)		--	---	--	0.5	0.1
Bouwer-Rice K-value (m/d)		0.00057	0.0025	0.0035	--	--
Water Sample	No	No	No	No	Yes	Yes

Groundwater samples were collected from two of the new boreholes during the aquifer test programme. The results are presented in Section 5.7.

5.6 Groundwater Availability Assessment

No information could be recorded during the hydrocensus on the volumes of groundwater used in the borehole identified (Lib 1, see Figure 1).

The Libanon TSF is underlain by dolomite, which typically forms major aquifers. The former DWAF published 1:500 000 scale hydrogeological map borehole yield classification is summarised below. The map considers all available data, including blow yields. The regional distribution of borehole yield on the published maps indicates the following:

- Karst aquifers: Yields in these aquifers are often more than 5 litres per second (L/s). However, data from the boreholes drilled around the Libanon TSF suggest much lower yields – less than 0.5 L/s in the residual dolomite (wad) intersected.
- Intergranular and fractured aquifers: Groundwater occurs in intergranular interstices and in fractures, notably associated with crystalline rocks, but also with sedimentary rocks. These types of aquifers are associated with the Hekpoort andesite as well as the Timeball Hill and Strubenkop Formations. The yields of these aquifer typically vary between 0.5 to 2 L/s.

5.7 Groundwater Quality

During the August 2024 hydrocensus only one borehole was identified, and a groundwater sample was collected (borehole Lib 1) (Table 8). Another two groundwater samples were collected during the aquifer test program (Table 8).

A sterilized 500 millilitre (ml) sample bottle was used and filled to the top, for each borehole sampled. Samples were stored in a cooler box during the site assessment. The water samples were analysed for basic inorganic parameters and the results were compared against the SANS 241:2015 Drinking Water Standards.

The water samples were submitted to Aquatico Laboratories for analysis. Aquatico is a SANAS accredited laboratory (South African National Accreditation System). The water samples were analysed for basic inorganic parameters and the results were compared against the SANS 241:2015 Drinking Water Standards. The DWS's Drinking Water Standard was also considered.

The samples were taken using a single valve, decontaminated bailer, during the aquifer test program (prior to testing). The hydrocensus sample was collected from the pump discharge line.

The water quality results are presented in Table 8 and the laboratory certificates are presented in Appendix E. Refer to Figure 1 for borehole localities. Based on the water quality results the following conclusions were drawn (SANS 241:2015 comparison):

- Chronic Health effects:
    - Total Iron – The speciation of iron is also related to the pH and Eh of water. An elevated iron concentration (exceeding the chronic health limits) was recorded for

borehole Lib-BH3s (7.62 mg/L), with the SANS limit set at 2 mg/L (Table 8). The concentration of dissolved iron in water is also dependent on the occurrence of other heavy metals or could be related to the local Karoo and dolomite geology or leaching from the TSF.

Borehole Lib-BH3s is on the downstream side (west) from Libanon TSF. The total iron concentrations were below the detection limit for the other two sampled sites.

- Manganese – Manganese is a relatively abundant element, constituting approximately 0.1% of the earth's crust. Borehole Lib-BH3s measured a manganese concentration that could result in chronic health effects (22.2 mg/L) (Table 8). The health impact limit is set at 0.4 mg/L. Manganese tends to precipitate out of solution to form a black hydrated oxide which is responsible for staining problems.

  The manganese concentration could be related to the local Karoo and dolomite geology or leaching from the TSF. The manganese concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.

- Sulphate – Sulphate forms salts with various cations such as potassium, sodium, calcium, magnesium, barium, lead and ammonium (DWAF, 1996). Sulphate is a common constituent of water and arises from the dissolution of mineral sulphates in soil and rock. Since most sulphates are soluble in water it tends to accumulate to progressively increasing concentrations. Contamination by sulphate is to be expected in waters contaminated by processing activities, due to the oxidation of sulphides in the ore and waste.

  Borehole Lib-BH3s exceeds the health guideline limits for sulphate with a measured concentration of 1623 mg/L. The health limit set at 500 mg/L) (Table 8).

  The sulphate concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.

- Nickel – An elevated nickel concentration was recorded for Lib-BH3s (0.136 mg/L). The maximum SANS guideline health limit is 0.07 mg/L. The nickel concentrations were below the detection limit for the other two sampled sites.

- Aesthetic / Operational effects:
  - Ammonium – The chemistry of ammonia is very complex, especially where transition metals are present in water, and while ammonia itself is of relatively low toxicity, this is not necessarily the case for some of its organometallic complexes. Taste and odour complaints are likely to occur if the ammonia concentration exceeds 1.5 mg/L. High concentrations of ammonia can also give rise to nitrite, which is potentially toxic, especially to infants. The ammonium concentration for borehole Lib-BH3s exceeds the aesthetic limits for drinking water (13.0 mg/L) with the aesthetic limit set at 1.5 mg/L.
  - Total hardness – Very hard total hardness values were measured at the two downstream boreholes at Libanon TSF – Lib-BH3s and Lib-BH3d. Scaling is likely to occur in water heating appliances.

The DWS uses a water classification system where the water is defined in different classes based on a fitness for use classification (see Table 7). The element concentrations are like the SANS guideline limits, but with the DWS system a classification is assigned to the water sample, e.g., Class 2 water.

Table 7. DWS water quality "fitness for use" classes

Water use	Categorisation	Description
Domestic	Class 0	Water of ideal quality, which has no health or aesthetic effects, and which is suitable for lifetime use without negative effects. No treatment necessary.
	Class 1	Water of good quality, suitable for lifetime use with few health effects. Aesthetic effects may be apparent. Home treatment will usually be sufficient.
	Class 2	Water which poses a definite risk of health effects, following long term or lifetime use. However, following short-term or emergency use, health effects are uncommon and unusual. Treatment will be required in order to render the water fit for continued use.
	Class 3	Water is unsuitable for use, especially by children and the elderly, as health effects are common. Conventional or advanced treatment necessary

Based on the DWS classification system the sampled water is categorized as:

- Hydrocensus borehole Lib 1 – Class 0 water (Water of ideal quality).
- Libanon TSF Downstream borehole Lib-BH3s – Class 4 water (water is unsuitable for use) due to the sulphate and manganese concentrations and then Class 3 (water is unsuitable for use) due to the total iron concentration.
- Libanon TSF Downstream borehole Lib-BH3d – Class 1 (Water of good quality) due to the Total Hardness, and the calcium and fluoride concentrations. The rest of the parameters measured were in the Class 0 range.

The chemicals of concern for the Libanon TSF project area, associated with the recent sampled results are Manganese, Iron, Sulphate and Nickel. Based on the SANS241 drinking water guidelines and on the sampled water results, the groundwater from borehole Lib-BH3s is not fit for human consumption (unless treated).

A groundwater study by Rösner et al, 1998 (WRC Report K5/797/0/1) concluded that groundwater near tailings dams is affected by salt loads. The groundwater quality improved with increasing distance down gradient from the pollution source, mainly because of dilution and solid speciation. Once contaminants have migrated through the unsaturated zone, into the groundwater zone, the rate of lateral movement increases by orders of magnitude. The implication of this is that although there is a dilution effect because of contact with groundwater, the potential impact on the environment is extended in a spatial and temporal sense.

A TSF can potentially add sulphate, iron, chloride, calcium, magnesium, manganese and aluminium to the local groundwater system, if the management of contaminated water on site is not effective, but also through seepage to the underlaying aquifers. Metals like cobalt, copper, nickel and zinc are often elevated. In general, sulphate concentrations around the tailings complexes vary between 417 and 4700 mg/L.

Table 8. Groundwater quality – 2024

	DWS Drinking Water Guideline Limits					SANS241:2015 Drinking Water Standard Limits		LIB 1	Lib-BH3s	Lib-BH3d
	Class 0	Class 1	Class 2	Class 3	Class 4	Aesthetic effects	Chronic health effects			
pH	5-9.5	***4.5-5 or 9.5-10***	4-4.5 or 10-10.5	3-4 or 10.5-11	<3 or >11	≥5 to ≤9.7		6.92	6,24	8,28
Electrical Conductivity	<70	***70-150***	150-370	370-520	>520	Aesthetic ≤170		3.48	**317**	54,8
TDS	<450	***450-1000***	1000-2400	2400-3400	>3400	Aesthetic ≤1200		30.0	**2644**	318
Total Alkalinity								3.30	65,7	219
Bicarbonate Alk.								3.29	65,7	215
Total Hardness	<200	***200-300***	300-600	>600		more than 180 mg/l, very hard		7	**1489**	**276**
Total Nitrogen								1.41	27,2	1,18
Total Kjeldahl Nitrogen								<0.5	26,2	<0,5
Total oxidised nitrogen								1.41	0,996	1,12
Aluminium		***0 - 0,15***	0,15 - 0,5	>0,5		Operational ≤ 0,30		<0.002	<0.002	<0.002
Arsenic	<0,01	***0,01-0,05***	0,05-0,2	0,2-2	>2		Chronic health ≤0,01	<0.006	<0.006	<0.006
Calcium	<80	***80-150***	150-300	>300				0.92	**269**	**42,4**
Copper	<1	***1-1,3***	1,3-2	2-15	>15		Chronic health ≤2	<0.002	<0.002	<0.002
Total Iron	<0,5	***0,5-1***	1-5	5-10	>10	Aesthetic ≤0,3	Chronic health ≤2	<0.004	**7,62**	<0,004
Magnesium	<70	***70-100***	100-200	200-400	>400			1.14	**198**	41,2
Manganese	<0,1	***0,1-0,4***	0,4-4	4-10	>10	Aesthetic ≤0,1	Chronic health ≤0,4	<0.001	**22,2**	0,017
Potassium	<25	***25-50***	50-100	100-500	>500			<0.015	16,8	2,69
Sodium	<100	***100-200***	200-400	400-1000	>1000	Aesthetic ≤200		2.48	**181**	12,7
Chloride	<100	***100-200***	200-600	600-1200	>1200	Aesthetic ≤300		1.92	**275**	33
Fluoride	<0,7	***0,7-1***	1-1,5	1,5-3,5	>3,5		Chronic health ≤1,5	<0.263	0,635	**0,845**
Ammonium						Aesthetic ≤1,5		<0.008	13	0,059

	DWS Drinking Water Guideline Limits					SANS241:2015 Drinking Water Standard Limits		LIB 1	Lib-BH3s	Lib-BH3d
	Class 0	Class 1	Class 2	Class 3	Class 4	Aesthetic effects	Chronic health effects			
Un-ionized Ammonia	0 - 1	***1 - 2***	2 - 10	>10				<0.005	0,012	0,006
Nitrate	<6	***6 - 10***	10 - 20	20-40	>40		Acute health ≤11	1.40	0,938	1,1
Nitrite							Acute health ≤0,9	<0.065	<0,065	<0,065
Total organic carbon	<5	***5 - 10***	10 - 20	>20			Chronic health ≤10	1.67	3,21	2,2
Ortho Phosphate as P								0.332	<0,009	<0,009
Sulphate	<200	***200-400***	400-600	600-1000	>1000	Aesthetic ≤250	Acute health ≤500	<0.141	1623	38,7
Cadmium							Chronic health ≤0.003	<0.002	0,003	<0,002
Total Chrome	0 - 0,05		0,05 - 1	1 - 5	>5		Chronic health ≤0,05	<0.01	<0.01	<0.01
Nickel							Chronic health ≤0.07	<0.002	0,136	<0,002
Cobalt								<0.003	0,483	<0,003
Selenium							Chronic health ≤0.04	<0.002	<0,002	0,004
Uranium							Chronic health ≤0.03	<0.015	<0.015	<0.015
Zinc	0 - 5	**5 - 10**	10 - 50	50 - 700	>700	Aesthetic ≤5		<0.002	<0.002	<0.002
Boron							Chronic health ≤2.4	<0.013	<0.013	<0.013
Barium							Chronic health ≤0.7	<0.002	0,024	0,056
Beryllium								<0.005	<0.005	<0.005
Molybdenum								<0.004	0,223	0,073
Strontium								<0.007	1,21	0,082
Tungsten								<0.000001	0,0431	<0.000001
							DWS Classification	**0**	**4**	**1**

The pyrite present in the tailings and sand material is oxidised in the presence of oxygen and water to form ferrous sulphate and sulphuric acid. Both reactions result in an acidic pH, and high sulphate and metal concentrations, leading to Acid Mine Drainage; often measured in leachate from these TSFs. The rate at which pyrite oxidation takes place within the TSF varies and decreases with depth. The addition of lime during the gold recovery process raises the pH to neutral conditions when tailings are deposited on the facilities. Negative quality impacts are expected when the material is disturbed again and exposed to oxygen and water.

Libanon TSF is surrounded by mining, residential and agricultural areas. Many pollution sources (mining activities and poor waste and sanitation management) can contribute to groundwater contamination. It will be difficult to define the contaminants and concentration at all point sources in the area.

5.8 Date and Season of the Investigation

The hydrocensus was completed during August 2024 during the dry, winter season in Gauteng. The 2024 fieldwork programme was completed between October and November 2024, which represents the end of the dry season conditions.

6 Hydrogeology

This section presents a general understanding of the site conditions in terms of geology, groundwater occurrence, groundwater level and water quality. According to Barnard (2000) various aquifer types are found in the area i.e., weathered and fractured aquifers. The Transvaal Supergroup and the Witwatersrand formations present aquifers that have a combination of loose unconsolidated/ weathered material overlaying hard rock formations, in which fractures, fissures or joints potentially hold water. Groundwater is often encountered in both the saturated weathered material below the regional groundwater rest level and in the transition zone between weathered and fresh formations.

6.1 Regional Geology

The regional surface geology for the project area is presented in Figure 3. Regionally the geology consists of formations of the Karoo, Transvaal, Ventersdorp and Witwatersrand Supergroups. Gold mineralisation is present in conglomerates of the Witwatersrand Supergroup. The Ventersdorp Contact Reef, Kloof Reef and the Middelvlei Reef were extensively mined in the Kloof underground workings. The Kloof Celemanzi (Kloof 10 Shaft) is located immediately southwest of the Libanon TSF, as indicated on Figure 3. The northern section of Kloof Mine was previously known as Venterspost and Libanon Mines. These northern sections have been mined out, but some of the Kloof Shafts remain open to dewater the old underground workings to preserve regional gold mining activities. The depth of the Ventersdorp Contact Reef underground workings is at least 800 to 1000 m below surface with deeper mining associated with reefs lower in the geological succession. The lower unit of the Witwatersrand Supergroup comprises the West Rand Group and the upper unit the Central Rand Group. The West Rand Group is divided into three subgroups including the Hospital Hill, Government Reef and Jeppestown Formations. These comprise mainly shale, quartzite, banded ironstone, tillite and intercalated lava flows. North of Libanon TSF, the Government Formation outcrops. The Ventersdorp Supergroup overlies the Wits formations and comprises mainly andesitic lavas and related volcanic pyroclastics.

The overlying Transvaal Supergroup formations are of specific interest to this study. The Black Reef quartzite, which is present at the base of the Transvaal Supergroup outcrops north of the project area. Of the Transvaal Supergroup Formations, the Chuniespoort Group are of most significance, as the Libanon TSF is located on outcropping Malmani dolomite. The dolomite varies in thickness regionally from around 200 to 1500 m. Underneath the Libanon TSF, the base of the dolomite is at an elevation of 1000 to 800 mamsl and dips in a southerly direction (Jones and Wagener, 2013).

Refer to Section 4.3 for more details.

6.2 GEOCHEMISTRY

During tailings deposition and after closure, seepage from the tailings facility walls is largely removed by the drain systems. A study has shown that the top 3 metres of an old TSF indicate low element concentrations, as leaching from rainfall most probably flushed out the minerals. Deeper into the TSF the pH is much lower and element concentrations higher, but due to stable conditions that include low permeability and low oxygen levels, metal and salt leaching does not happen readily (Irene Lea, 2016). This could potentially change when the reclamation process introduces high volumes of water and oxygen.

The prerequisite for AMD is the generation of acid at a faster rate than it can be neutralised by any alkaline materials in the system, with pyrite being the most common mineral in AMD formation. The oxidation of pyrite occurs in the following steps:

$$2FeS_2 + 7O_2 + 2H_2O = 2Fe^{2+} + 4SO_4^{2-} + 4H^+ \quad (1)$$
$$4Fe^{2+} + 10H_2O + O_2 = 4Fe(OH)_3 + 8H^+ \quad (2)$$
$$2Fe^{2+} + O_2 + 2H^+ = 2Fe^{3+} + H_2O \quad (3)$$
$$FeS_2 + 14Fe^{3+} + 8H_2O = 15Fe^{2+} + 2SO_4^{2-} + 16H^+ \quad (4)$$

The intensity of acid generation is determined by chemical parameters such as pH, temperature and oxygen concentration in the different stages and the surface area of the exposed metal sulphides (Nengovhela, October 2006).

The reclaimed slurry and any water must be removed from the exposed surfaces (immediately) to avoid seepage of contaminated water into the shallow weathered aquifers.

6.2.1 ACID GENERATION CAPACITY

The potential for risk of acid mine drainage resulting in increased heavy metal and sulphate concentrations in local surface water and groundwater was flagged as a risk in the scoping report for the project (Kongiwe, 2024). It is thought that the risk of AMD would specifically be influenced if runoff from the tailings reclamation operations is not adequately managed through efficient stormwater management structures. To assess this risk, a comparison between electrical conductivity (EC) and pH in the three available groundwater samples was made and is presented in Figure 6. Electrical conductivity is an indication of the ability of water to conduct electrical current in the presence of dissolved ions. High electrical conductivity indicates elevated ion and by comparison salt content in the water and hence contamination. Also shown on Figure 6 are the SANS241:2015 drinking water standards for pH (>5; <9.7) and EC (170mS/m) for comparison.

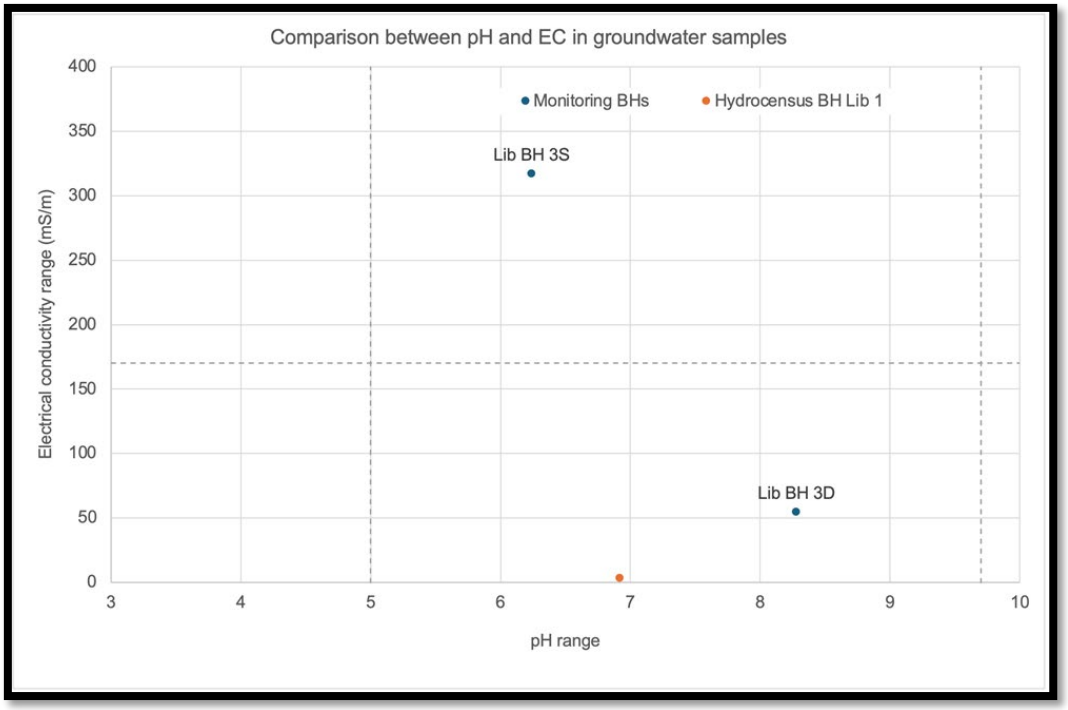


Figure 6. Comparison between pH and EC in groundwater samples

The results indicate that the hydrocensus borehole (Lib 1) and the deep monitoring borehole sampled at the Libanon TSF footprint (Lib BH3d) have good quality water with neutral to alkaline pH conditions and low dissolved salt content. The pH conditions are controlled by the effect of the dolomitic aquifer, which is alkaline in geochemical composition, on groundwater quality. The data suggests that groundwater not affected by tailings deposition has a low risk of acidification.

Borehole Lib BH3s, the shallow borehole located northwest of the Libanon TSF indicates the impact of the facility on groundwater quality. This borehole has a slightly acidic pH, but elevated dissolved salts. Groundwater quality pertaining to the modelling presented in this report are discussed later.

The information presented above are based on groundwater quality data and not acid base accounting of the tailings material. It is however noted that reclamation of the TSF will remove the potential source of acidification.

6.3 Hydrogeological Conceptualisation

6.3.1 Monitoring Boreholes

As discussed in Section 5, three sets of shallow and deep monitoring boreholes were drilled up and down gradient of the Libanon TSF during 2024. The locations of these boreholes are presented in Figure 1 and details obtained from the fieldwork programme are provided in Table 9.

Table 9. Summary of monitoring borehole information

Borehole ID	Lib BH1D	Lib BH1S	Lib BH2D	Lib BH2S	Lib BH3D	Lib BH3S
Borehole Depth (m)	60*	30	50*	18*	80	30
Depth of weathering (m)	±30	25	35	±18	32	±30
Static Water Level (m bgl)	Dry	Dry	Dry	Dry	71.17	20.87
Final drawdown during aquifer test (m)	Not tested	-	-	-	4.26	6.50
Recovery (%)	-	-	-	-	7.04	81.85
Potential Yield (L/s)	Cavity	-	Thick wad	-	0.01	0.03
Aquifer test transmissivity (m^2/d)	-	-	-	-	0.1 – 0.5	0.5 – 0.9
Slug test permeability (m/d)		5.7E-4 – 3E-4	2.5E-3 – 2.1E-3	3.5E-3 to 1.4E-4		

* Denotes borehole not drilled to the planned depth due to the presence of dolomitic cavities or thick residual dolomite (wad).

6.3.2 Unsaturated Zone

The depth to groundwater in this area is deep because the dolomitic aquifer is largely dewatered in the Venterspost Compartment. Jones & Wagener (2013) reports that the groundwater table in the dewatered compartments are more than 100 m below surface. The unsaturated zone on a regional scale therefore comprises of residual dolomite (wad) and weathered Karoo sediments located in deep solution cavities or grykes to relatively fresh fractured dolomite pinnacles between major solution cavities that extend to depth. It is further reported that the lag between rainfall events and a response in groundwater levels is between 12 and 18 months. This suggests that rainwater does percolate through the unsaturated zone towards the deeper regional groundwater table in the dewatered compartments.

The field data obtained from the newly drilled monitoring boreholes indicate that the weathered dolomitic aquifer underneath the Libanon TSF footprint is largely dewatered.

Field data from the three sets of shallow and deep monitoring boreholes confirms that the weathered dolomitic aquifer is dewatered to a depth of at least 60 m east and west of the Libanon TSF. Both the shallow and deep boreholes (Lib BH1 and Lib BH2) in these positions were dry. A dewatered dolomitic cavity was intersected from approximately 48 m below surface in Lib-BH1d. Above the cavity, thick residual dolomite (wad) is present to at least a depth of 30 m below surface. The drilling logs for Lib-BH2d does not indicate the presence of a cavity, but thick residual dolomite (wad) was intersected to a depth of at least 35 m in this area. It is likely that these boreholes were drilled into a gryke structure.

The groundwater table in Lib-BH3d is deeper than 70 m below surface. Residual dolomite is present to a depth of around 30 m in this borehole, but fresh dolomite was intersected below this depth. It is likely that Lib-BH3d and Lib-BH3s are in a pinnacle of fresh dolomite located between grykes that is associated with the Venterspost Dyke. Borehole Lib-BH3d is situated on the eastern side of the Venterspost Dyke and therefore possibly within the Bank Compartment rather than the Venterspost

Compartment. The Bank Compartment is not as significantly dewatered along its eastern edge (see Figure 8). It is unfortunately not possible to accurate estimate the regional extent of the gryke and fresh dolomitic pinnacle underneath the Libanon TSF. The gravity survey completed by the Council for Geoscience over the dolomitic aquifer (see Figure 3 (Jones & Wagener (2013)) was used to estimate these to some extent. To do this, the major grykes (blue shaded area) were traced as best possible and the remaining areas were assumed to be fresh dolomite pinnacles. The outcome of this is presented in Figure 7. It is shown that the major grykes are orientated roughly parallel to the main compartment-forming dykes and post-Transvaal faults. The hydraulic conductivity (permeability) of the residual dolomites intersected in the new monitoring boreholes is discussed in Section 6.3.4.

6.3.3 Saturated Zone

The information that will be used to characterise the local and regional dolomitic aquifer characteristics was inferred from the newly drilled monitoring boreholes around the Libanon TSF as well as from published information for Kloof Mine. The following aquifers are present:

- Weathered dolomitic aquifer: This aquifer was formed as a result of karstification. This happens when rainwater containing carbon dioxide taken up from the atmosphere (and which forms a weak acid) infiltrates along fractures, faults and joints in the dolomite. The weak acid leaches the carbonate minerals creating residual dolomite, wad, grykes and cavities. During the dissolution process, residues such as silica as well as manganese oxides and hydroxides remain behind, often forming thick brown to orange clay, referred to as wad. Karstification is further characterised by sinkholes and cavities, which are often filled with groundwater where the dolomitic compartments are not dewatered. Fault zones facilitate preferential weathering and create preferential flow conduits to groundwater. The vertical extent of the weathering is mostly controlled by the lithostratigraphy but is generally accepted that the base of the dolomite on average about 200 m below surface regionally. The aquifer comprises an extensive cover of residual solution debris and in places younger Karoo sediments. Karstification is however irregular and highly heterogeneous with hydraulic conditions varying from phreatic to confined, as indicated by the gravity survey presented in Figure 4 and its interpretation in Figure 7. There is general agreement that the weathered dolomitic aquifer is the significant source of water within the dolomites (Jones & Wagener, 2013). The Venterspost dolomitic compartment has however been largely dewatered, as discussed above. The depth of weathering underneath the Libanon TSF is at least 30 meters below surface and the groundwater table fluctuates significantly over short distances.
- Fractured dolomitic aquifer: It is anticipated that groundwater occurrence in fresh dolomite will mainly be along fractures and faults, similar to a fractured rock aquifer. At depth karstification will be less pronounced. The fractured aquifer is finely crystalline with little primary porosity. Due to this, the fractured dolomitic aquifer is expected to yield significantly less groundwater compared to the weathered dolomite. It is thought that the comparatively low storage capacity of this aquifer has led to the relatively rapid dewatering of the Venterspost Compartment (Jones & Wagener, 2013). Based on the information presented above, it will be assumed that this aquifer is present at an average depth of below 200 m below surface.
- Fractured Transvaal strata aquifer: This aquifer is located south of the Libanon TSF and is associated with the Hekpoort lavas and Timeball Hill, Strubenkop and Silverton shale (see Figure 3). Jones & Wagener (2013) reports that this aquifer is not hydraulically connected and act independently of the dolomitic aquifers. In addition, this aquifer will not affect

groundwater conditions at the Libanon TSF, which is located on the weathered dolomitic aquifer.

6.3.4 Hydraulic Conductivity and Transmissivity of the Aquifers

The aquifer transmissivities and hydraulic conductivities obtained from the field testing are summarised in Table 10. The availability of field measured aquifer parameters allows for the development of a site-specific groundwater model, which improves the confidence in the outcome of the simulations presented in this report. This data also enables more accurate conceptualisation of the geological and geohydrological features that will affect the outcome of the impact predictions presented in this report in this complex geological setting.

It is shown that the permeabilities of the residual dolomite are very low, on average 9.93E-4 m/d and varying between 1.4E-4 and 2.5E-3 m/d. All three boreholes on which tests could be completed were dry with residual dolomite extending at least to an average depth of 26 m.

Aquifer tests could be completed on boreholes Lib-BH3s and Lib-BH3d. During the tests, the shallow borehole was pumped drying within 16 minutes at a rate of 0.18 L/s (648 L/hr) but recovered by 81% in 20 hours. The deep borehole was pumped dry in 40 minutes at a rate of 0.03 L/s (108 L/hr) and only recovered by 6% in 3 hours. This suggests that the residual dolomite underneath the Libanon TSF has a very low yield, but that some groundwater seeps into the comparatively fresh dolomite pinnacle in this position over time, thus recharging the aquifer. This groundwater probably originates from within the lateral extent of the dolomite pinnacle and is stored in what is perceived to be significant storage capacity contained in secondary porosity as a result of karstification of the weathered dolomite. Borehole yields calculated from the field data vary between 0.01 and 0.03 L/s, which is well below the regional dolomitic aquifer average of 5 L/s.

Table 10. Summary of site-specific aquifer parameters obtained from field data

Borehole ID	Lib BH1d	Lib BH1s	Lib BH2d	Lib BH2s	Lib BH3d	Lib BH3s
Borehole Depth (m)	60*	30	50*	18*	80	30
Static Water Level (m bgl)	Dry	Dry	Dry	Dry	71.17	20.87
Aquifer test transmissivity (m^2/d)	-	-	-	-	0.1 – 0.5	0.5 – 0.9
Slug test permeability (m/d)		3E-4 - 5.7E-4	2.1E-3 - 2.5E-3	1.4E-4 - 3.5E-3		
Possible borehole yield (L/s)					0.01	0.03

In addition to the site-specific data, regional aquifer parameters are available from Jones & Wagener (2013). Regional aquifers present and information available for these are listed in Table 11. The incorporation of regional aquifer parameters allows for the integration of the regional hydrogeology with more accuracy during simulations.

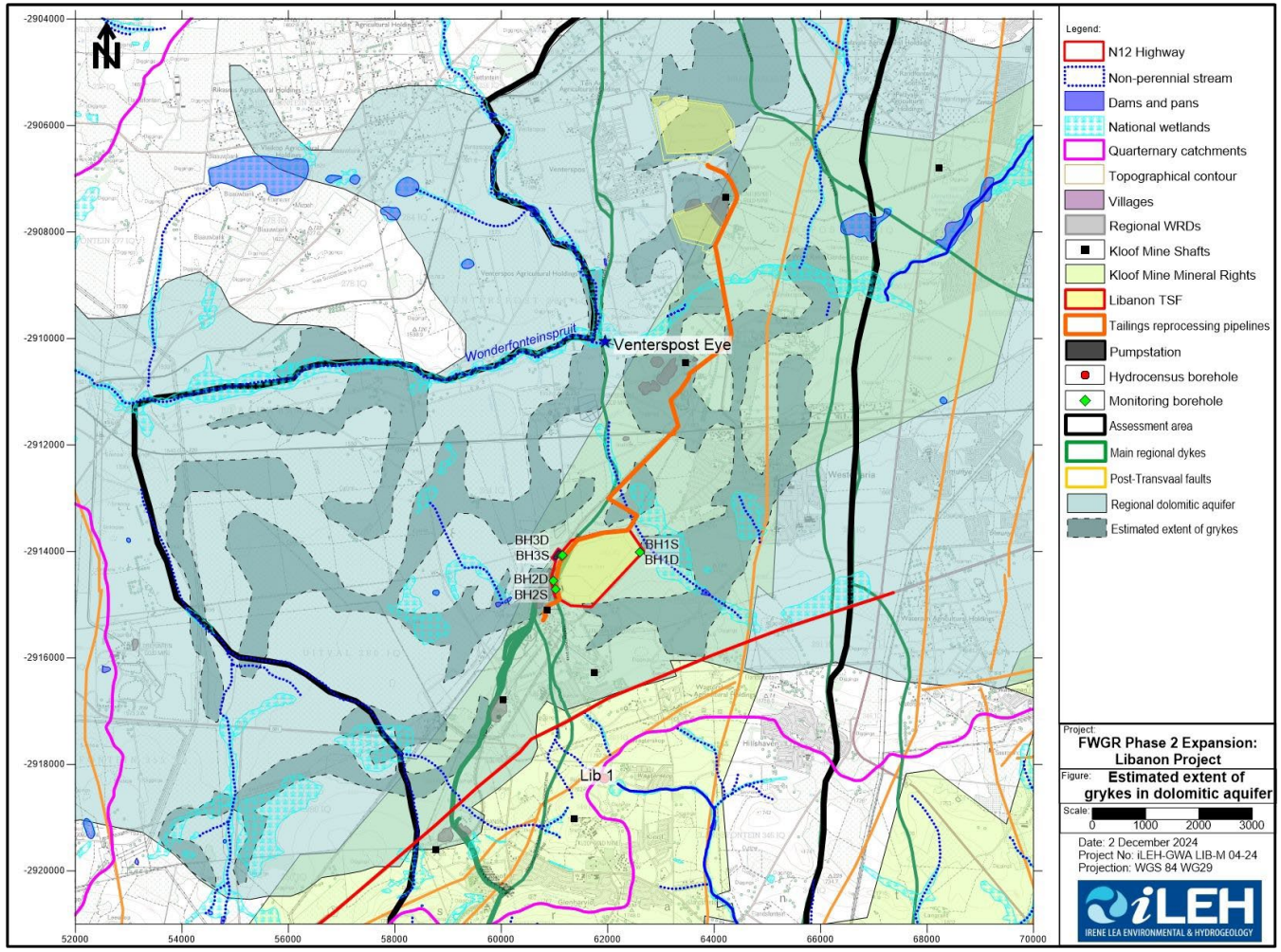


Figure 7. Estimated extent of grykes in the weathered dolomitic aquifer

Table 11. Literature-based aquifer parameters used to conceptualise regional aquifers

Aquifer	Horizontal permeability (m/d) or Transmissivity (m^2/d)	Porosity %)	Recharge rate (% of MAP)	Source
Weathered dolomite	Dyke contact: 0.02m/d Dyke contact: 0.75m^2/d Maximum: 1000m^2/d Average: 30m/d Oaktree Fm: 12m/d Monte Christo Fm: 40m/d	10	Venterspost Compartment: 8.5 – 27 Dolomitic aquifer: 12.7%	Jones & Wagener (2013)
Fractured dolomite	100m^2/d Average: 1m/d	0.1%		
Weathered Karoo	0.6			
Fractured Transvaal	1	6		

6.3.5 GROUNDWATER LEVELS

As discussed earlier, the Venterspost Compartment is dewatered, mainly from Kloof Mine. It is reported that the Celemanzi (Kloof No 10) Shaft pumps around 40 ML/d to maintain underground water levels at a depth that would enable regional gold mining in other mining areas. Groundwater levels in the various compartments are demonstrated in the schematic cross section in Figure 8 (from Jones & Wagener, 2013). Groundwater level data from the 1950's to the 1980's suggest a decline of between 80 m and 120 m in the water table in the weathered dolomitic aquifer underneath the Libanon TSF. It is estimated that the groundwater level in this compartment is around 1400 mamsl based on Figure 8. This means the depth to the regional groundwater table is more than 100 m below surface at the project location.

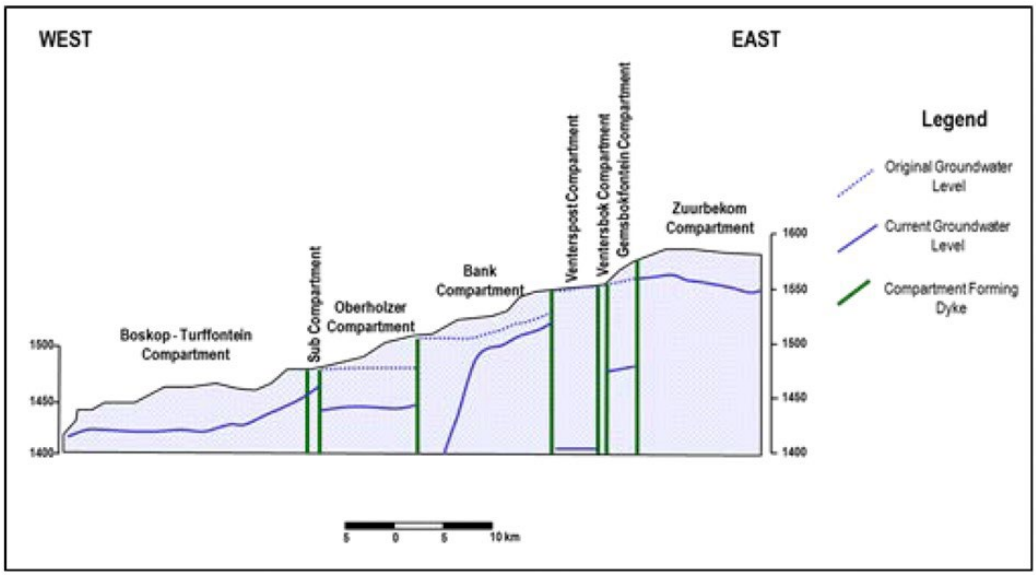


Figure 8. Schematic cross section showing groundwater levels in the dolomitic compartments

As discussed above and below, on a local scale perched aquifer conditions are expected in the residual dolomite, as rainwater percolates into the karstified aquifer.

Information presented in Jones & Wagener (2013) indicates that there is a 77% correlation between groundwater level and topographical elevations in the weathered dolomitic aquifer. If this correlation is high, it implies that groundwater flow patterns follow the topography and that groundwater discharges to local rivers and streams as baseflow. The 77% correlation suggests that there is still some relationship between groundwater elevation and topography in the weathered dolomitic aquifer, but that dewatering has lowered groundwater levels significantly in places, thus skewing this correlation. In comparison for example, the correlation between groundwater and topographical elevation in the Transvaal fractured aquifer to the south is 98%.

The Venterspost Eye is located north of the Libanon TSF. This eye is currently dry due to the dewatering of the compartment. In pre-mining conditions, the natural fountains formed where groundwater decanted from one dolomitic compartment to the next at the lowest topographical elevation. These eyes formed where the compartmentalising dykes pushes groundwater to surface, in the case of the Venterspost Eye, the Venterspost Dyke.

The dewatering of the compartment affects groundwater levels in the weathered dolomitic aquifer. Field data shows that the aquifer is largely dewatered at the Libanon TSF footprint. All but two of the boreholes drilled were dry. As discussed earlier, it is thought that the dry boreholes are in grykes that could be delineated to some extent from the gravity survey completed by the Council for Geoscience.

The set of shallow and deep boreholes that contained some groundwater are located on a comparatively fresh dolomitic pinnacle, based on the gravity survey, which is probably associated with the position of the Venterspost Dyke. In the deep borehole, the groundwater level is deeper than 70m below surface, reflecting the regional impact of the dewatered compartment. The fact that a groundwater level could be measured in this position probably attributed to the percolation of rainwater into the dolomitic pinnacle and the presence of increased porosity to facilitate storage of this groundwater.

In the shallow borehole, the depth to groundwater is around 20 m, which also suggests percolation of rainwater from surface as well as infiltration from the Libanon TSF that is retarded in the vertical flow direction by the presence of the thick wad. This groundwater probably sits on a pocket of low permeability wad as a perched aquifer near surface.

A groundwater level could not be measured in the hydrocensus borehole Lib 1 as it was welded shut.

With only two groundwater level measurements in one location, it is not possible to generate a groundwater flow map for the Libanon TSF. Groundwater is however expected to regionally flow with the topography in a northeasterly direction towards the Wonderfonteinspruit. Groundwater will also flow vertically down to the regional groundwater table controlled by the dewatering of the compartment.

On a local scale, the presence of shallow groundwater conditions and groundwater flow will be influenced by the presence of dolomitic grykes and pinnacles, the rate of recharge of rainwater, the presence of zones of increase porosity and the vertical retardation of groundwater flow because of the presence of thick zones of wad. This is expected to be a highly irregular pattern, which is difficult

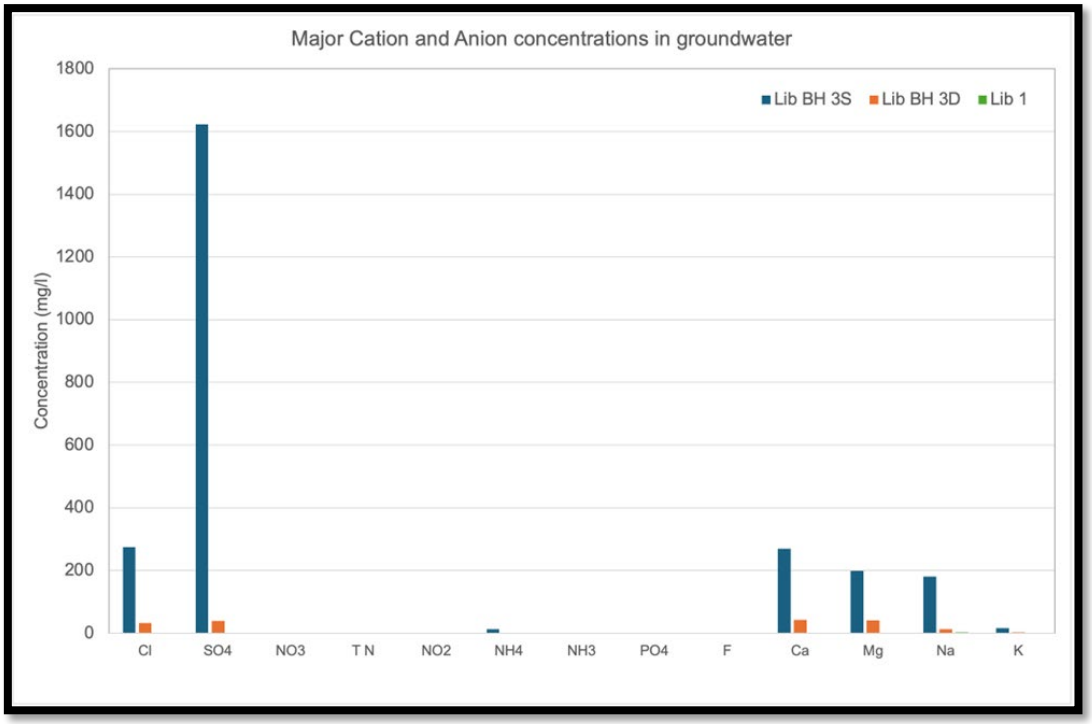
to accurately estimate. For this assessment, the extent of the dolomitic grykes and pinnacles as delineated in Figure 7, will be used to approximate this irregular pattern.

6.3.6 GROUNDWATER POTENTIAL CONTAMINANTS

To identify the potential contaminants to groundwater for this impact assessment, a comparison between major cations, anions, as well as trace metal concentrations for the three boreholes sampled is presented in Figure 9. Impacts on groundwater quality associated with the Libanon TSF is demonstrated by groundwater quality information for borehole Lib-BH3s.

In terms of major cations and anions, sulphate is by far the most significant element of concern, with a concentration of above 1500 mg/l for Lib-BH3s. Elevated sulphate concentrations are typical of the impact of gold tailings on groundwater quality, as it is a product of sulphide oxidation.

In terms of metals, manganese and iron concentrations are significantly elevated. Manganese concentrations exceeding 20 mg/L are probably more reflective of the geochemical character of the residual dolomite (wad) than the impact of the Libanon TSF on groundwater quality. Manganese is one of the byproducts of dolomite dissolution, as discussed earlier. Iron is also to some extent a byproduct of dolomite dissolution, but it is also a characteristic element of the oxidation of sulphide minerals. For this reason, sulphate and iron will be used as the two indicator elements for this impact assessment.



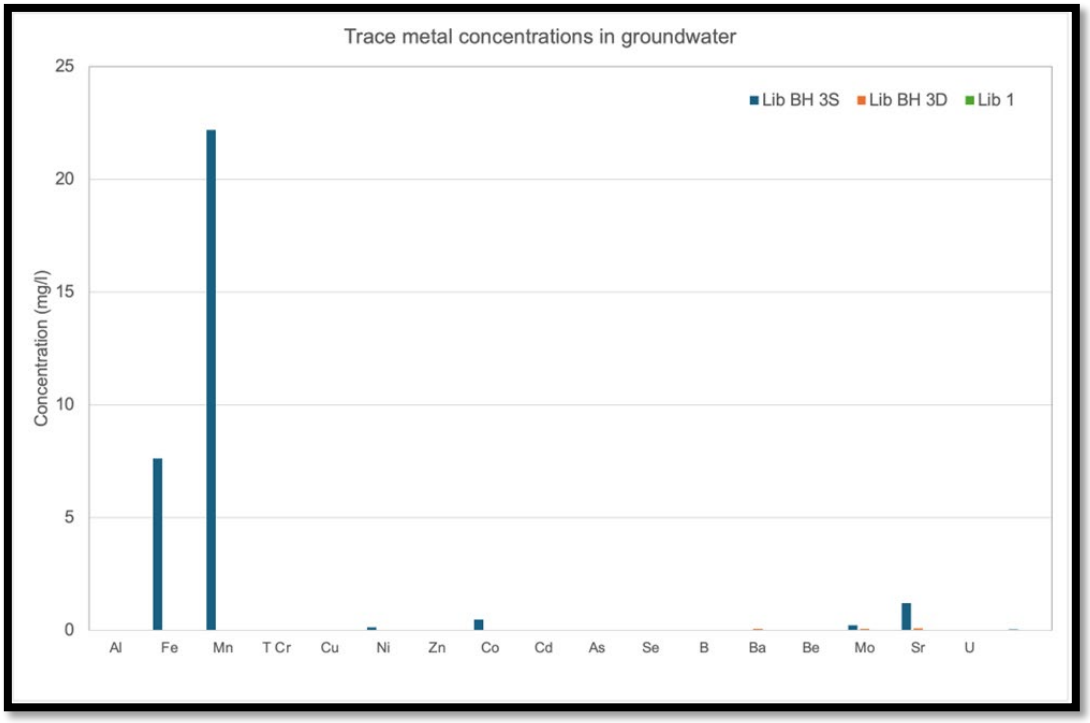


Figure 9. Comparison of major and trace elements in groundwater

The information presented in Table 13 will be used to conceptualise the source term for the impact assessment. This is discussed below.

The concentrations of iron and sulphate are compared to pH and Electrical conductivity levels in groundwater in Table 12. This information will be used to formulate the source term for the project.

Table 12. Concentrations of indicator element in groundwater

Element	pH	Electrical Conductivity (mS/m)	Iron (mg/L)	Sulphate (mg/L)
SANS241:2015 Drinking Water Standard	**5.0 - 9.7**	**170**	**0.3 - 2**	**250 - 500**
Lib1	6,92	3	0,004	0
Lib BH2S	6,24	317	7,620	1623
Lib BH3D	8,28	55	0,004	39

6.4 Aquifer Characterisation and Vulnerability

Based on aquifer classification methodology published in the Aquifer Classification Map Series of South Africa (DWS, 2012), the weathered dolomitic aquifer present in the project is classified as a major aquifer that is high-yielding and contains water of good quality.

This is however not the case at the Libanon TSF footprint, as newly drilled monitoring boreholes confirm that the weathered aquifer is dewatered with very low yields that are significantly below regional averages.

The project is also located in a zone delineated as aquifers that are most vulnerable and with a high susceptibility to contamination. Available information suggests that groundwater quality in shallow perched aquifer conditions at the Libanon TSF is impacted by historical tailings deposition, making the groundwater unfit for use. It is however noted that removal of the TSF will result in the elimination of the source to groundwater contamination and will therefore result in a positive long-term impact on groundwater in this zone delineated as most vulnerable.

Based on the information above, as well as the methodology described by Parsons (1995), the aquifer protection classification is rated as moderate. This is because groundwater has been impacted by mining activities and the dolomitic compartment is dewatered.

7 CONCEPTUAL HYDROGEOLOGICAL MODEL

The conceptual hydrogeological model is best demonstrated at the hand of the cross section presented Figure 10. The location of the figure is shown on Figure 3. This west-east cross section is taken across the Venterspost Compartment through the Libanon TSF. The following components of the conceptual hydrogeological model is indicated on the cross section:

- The Libanon TSF is located on outcropping residual dolomite. The depth of the residual dolomite is highly variable and cannot be predicted with accuracy. To the west of the TSF, a gryke structure is present, which is associated with the West Rand Fault zone. Dry boreholes drilled around the TSF (BH1s&d and BH2s&d) were drilled into gryke structures which are dewatered.
- A fresh dolomite pinnacle is present underneath the TSF footprint. Within this structure, the depth of weathering is shallower, measured to extend to around 30 m in the boreholes drilled.
- Perched aquifer conditions are likely in the upper 30 m of the residual dolomite around borehole Lib-BH3s. The presence of groundwater at this elevation is attributed to percolation of rainwater to pocket of increased porosity within the otherwise low permeable residual dolomite. The extent of this pocket cannot be estimated with certainty.
- Comparatively shallow groundwater conditions are present on the edge of the Venterspost Dyke, possibly within the Bank Compartment. No dolerite was intersected in borehole Lib-BH3d, which means it is likely that the borehole was drilled east of the near vertical dyke. The gravity survey completed in this area indicates the presence of a pinnacle of fresh dolomite, most likely associated with the Venterspost Dyke.
- The Venterspost Compartment is dewatered to a depth of approximately 1400 mamsl. Information on the base of the dolomitic aquifer presented in Jones & Wagener (2013) indicates that the base of the dolomite is at elevations of 900 to 1000 mamsl underneath the Libanon TSF.

Aquifer parameters that will be assigned to the components of the conceptual model are discussed above. The availability of this information will enable inclusion of the hydrogeological features and site characteristics into the model to achieve the most accurate impact predictions possible.

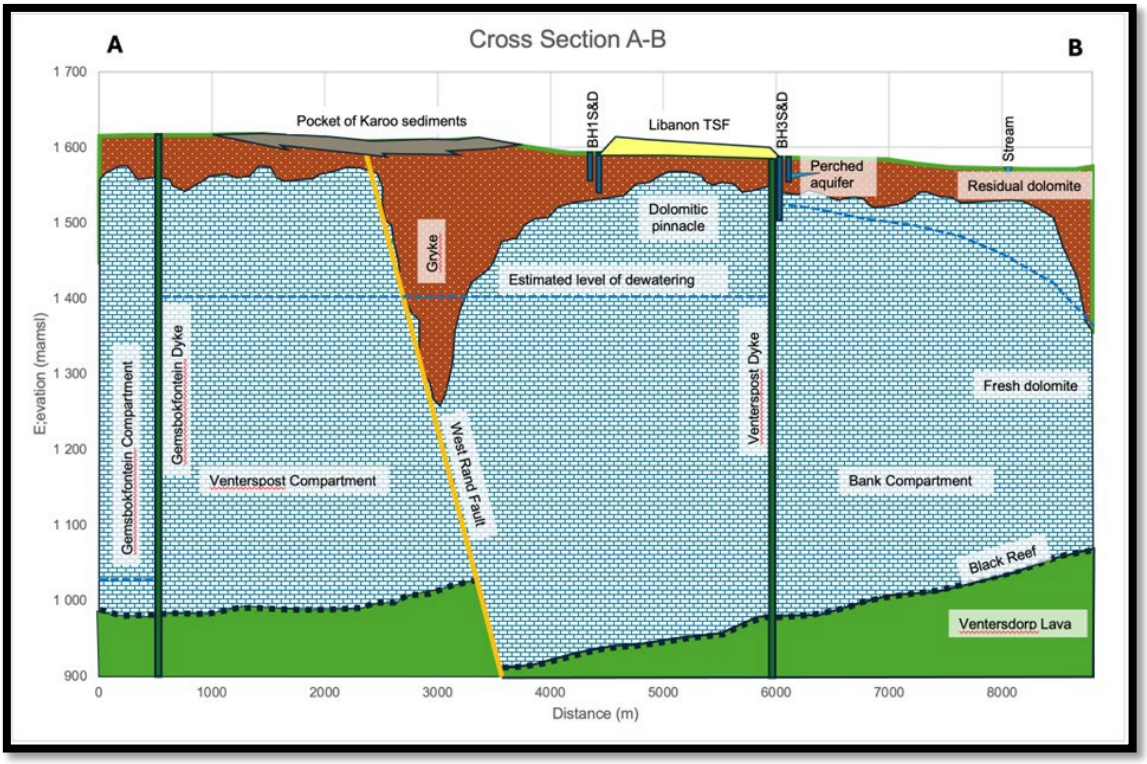


Figure 10. Schematic cross section through the project area

8 SOURCE TERM

8.1 SEEPAGE QUALITY

To account for the inherent uncertainty associated with numerical groundwater models, three seepage quality scenarios will be tested during simulations. These are based on geochemical simulations presented in Jones & Wagener (2013) for TSFs in the region, mainly associated with Kloof Mine, as well as the groundwater quality dataset for Lib-BH3s. This borehole reflects the impact of historical tailings deposition on groundwater quality.

Starting sulphate and iron concentrations based on this information is presented in Table 13. These concentrations will be adjusted during simulations to match field measured data.

Table 13. Source term: Long-term leachate quality

Scenario	Sulphate concentration (mg/L)	Iron concentration (mg/L
Best case	500	2
Likely case	1500	8
Worst case	3000	15

8.2 Operational Seepage Volume

The operational seepage volumes associated with the tailings reclamation project is based on information presented in Jones & Wagener (2013) on recharge rates and experience with similar reclamation projects elsewhere. These seepage volumes take into consideration that the tailings will be hydro-mined, which means that water will be introduced during the operational phase. It is noted that the reclamation projects are implemented with dedicated stormwater management measures to control and capture the runoff of dirty water. This will facilitate the recirculation of dirty water during the mining process.

The operational seepage volumes that will be applied take the stormwater management measures as well as the capture and re-use of dirty water into consideration. The volumes that will be applied during simulations are presented in Table 14. The rates are presented as a percentage of the mean annual precipitation.

Table 14. Source term: Leachate volume

Scenario	Estimated seepage rate (% of MAP)
Best case	1%
Likely case	4%
Worst case	10%

9 Potential Pathways and Receptors

Based on the available dataset, the following aquifer pathways are identified for the project:

- Vertical flow through the unsaturated horizon from the tailings reclamation area to the underlying weathered dolomitic aquifer.
- Vertical and horizontal flow through the weathered dolomitic aquifer over the tailings reclamation area. Groundwater is likely to flow preferentially within fresh dolomitic pinnacles over relatively short distances. Infiltration of this water will take place along zones of deeper weathering like grykes as well as along regional post-Transvaal age faults. There are however no post-Transvaal faults present underneath the Libanon TSF footprint or down gradient of it. This flow pattern will further be highly irregular.
- Preferential vertical flow will take place to the elevation of the regional groundwater table that will be controlled by the extent to which the Venterspost Compartment is dewatered. This vertical flow path will be highly irregular, and it is possible that seepage from the Libanon TSF may not reach the regional dewatered groundwater table as flow in the vertical direction is expected to be very slow.
- Perched aquifer conditions are expected in the upper 30 m of the residual dolomite where vertical flow is retarded by the presence of thick wad. These conditions will also be highly irregular and cannot be predicted with accuracy. One borehole intersected perched aquifer conditions, which are associated with a fresh dolomite pinnacle and the Venterspost Dyke.
- Regional compartmental forming dykes form impermeable barrier to groundwater flow. Within the project area, the Venterspost Dyke and the Gemsbokfontein Dyke form the boundaries of the Venterspost Compartment.

The following receptors were identified:

- The weathered dolomitic aquifer receives contaminated leachate that has historically infiltrated from the Libanon TSF.
- Groundwater flow in this weathered dolomitic aquifer is erratic, as the compartment is largely dewatered. Infiltration of seepage from the Libanon TSF may percolate vertically to the regional groundwater table controlled by underground dewatering. There is a small likelihood that this seepage eventually enters the Kloof underground workings. The pathway that could facilitate this is not clearly understood, as the Ventersdorp Contact Reef underground workings is at least 800 to 1000 m below surface. It is not likely that the Libanon TSF could contribute a measurable salt load to the underground workings.
- It is thought that groundwater flow will be on a regional scale towards the Wonderfonteinspruit. As groundwater flow is erratic and highly irregular in the dewatered Venterspost Compartment, it is unlikely that long-term contamination associated with the Libanon TSF could reach this stream.
- Two non-perennial streams with associated wetlands are located northeast and southwest of the TSF. It is likely that these streams will be the receptors of contaminated groundwater originating from the TSF. The locations of these streams and wetlands are indicated on Figure 1.

The potential pathways and receptors are summarised in Table 15.

Table 15. Pathways and receptors

Pathways	Receptors
Runoff and seepage	Non-perennial streams and wetlands northeast and southwest of the TSF
Fresh dolomite pinnacles in the weathered dolomitic aquifer	Low possibility of the Wonderfonteinspruit
Perched aquifer conditions in the upper 30 m of the residual dolomite	Low possibility of the Kloof underground workings

10 KEY ASSUMPTIONS AND LITERATURE-BASED DATA INPUTS

The numerical modelling used to complete the impact prediction for the project is based on the following assumptions:

- The geometry of the aquifers present was inferred from the published geological map presented in Figure 3. The regional structural geology as well as the extent of quaternary catchment boundaries were also considered in defining the assessment area.
- Aquifer conceptualisation was completed with the fieldwork dataset obtained from the six new monitoring boreholes drilled around the TSF footprint area as well as information obtained from a regional hydrocensus for the Libanon TSF as well as the Venterspost North TSF and Venterspost South TSF and the Kloof No 1 TSF. The other TSFs form part of a regional tailings reclamation project. Groundwater impact assessments for these will be considered in separate reports.

- The extent of the dolomitic pinnacles and grykes present in the residual dolomite underlying the Libanon TSF were inferred from the gravity survey completed by the Council for Geoscience (see Figure 4). The extent of the grykes were traced from this figure as accurately as possible. It was assumed that these structures extend to at least 30 m below surface in the vicinity of the TSF, based on the logs of the new monitoring boreholes. This is an important aspect of the project, as the flow of groundwater in the immediate vicinity of the TSF will be controlled by these weathering patterns as well as the position of the Venterspost Dyke. The latter is accurately mapped as presented and discussed in Jones & Wagener (2013).
- Aquifer parameters or borehole construction details were not available for the hydrocensus borehole. It was assumed that the Venterspost boreholes target the weathered dolomitic aquifer and the Kloof boreholes the Transvaal fractured aquifer.
- It was assumed that pinnacles of relatively fresh dolomite present between grykes form the preferential flow paths to groundwater in the immediate vicinity of the project area. This assumption is based on the 2024 field dataset. The presence of a comparatively shallow groundwater table in the vicinity of Lib-BH3s and Lib-BH3d is attributed to the presence of such a pinnacle. The impact of the Venterspost Dyke in this position is also noted and was considered during simulations.
- Regional aquifer parameters were obtained from published reports. The list of reports considered are presented in the references at the end of the report. Work completed by Jones & Wagner (2013) has specific relevance to this project. Regional aquifer parameters considered from this report are presented in Table 11.
- The extent of dewatering of the Venterspost Compartment is controlled by dewatering from Kloof Mine. It is understood that at present, approximately 40 ML/d is pumped from the Celemanzi (Kloof No 10) Shaft. This rate was used to calibrate the rate of recharge to the regional dolomitic aquifer based on the assumption that most of the water pumped from the compartment originates from recharge to the weathered dolomitic aquifer. It is acknowledged that the compartment-forming dykes have been mined out in places in the underground workings, thus reducing their effectiveness as groundwater flow barriers. Some water pumped from Kloof Mine may therefore originate from other dolomitic compartments, for example the Bank Compartment. The extent to which this takes place is not known with the current dataset. This interaction is however not expected to significantly impact the outcome of the predictions presented in this report.
- It is assumed that the Venterspost Compartment is dewatered to an elevation of approximately 1400 mamsl. This level was used in the model to simulate the dewatering of the dolomitic aquifer within the compartment.
- The source characterisation for the project is based on groundwater quality data obtained from groundwater quality in Lib-BH3s, which is representative of the impact of historical tailings deposition on groundwater quality. It is acknowledged that the quality of tailing seepage may be different to that measured in groundwater. For this reason, calibration of the source term against the groundwater monitoring data as well as a sensitivity analysis through scenario modelling will be completed.
- While monitoring boreholes drilled on the eastern and western side of the TSF are dry, it was assumed that current and future impacts on groundwater quality extend over the footprint area of the Libanon TSF. The TSF is mostly located on a dolomite pinnacle, which is likely to act as a preferential flow area for recharged rainwater. It is however acknowledged that groundwater flow in the Venterspost Compartment will ultimately be in a vertical direction to the level of dewatering.

- There is currently no information available to characterise the timeline of the historical tailings deposition and management in the project areas. For this reason, assumptions had to be made on when these TSF were established and how long they were operational. This information is considered tentative and should be revised if more specific information becomes available.
- Only advective transport of contaminants was simulated. Assumptions made regarding advection, are discussed below. While it is acknowledged that attenuation will take place in the soils and specifically the residual dolomite, there is currently insufficient information available to quantify the extent to which this takes place. As such, simulations are based on the precautionary principle and take the worst-case scenario into consideration.

11 GROUNDWATER MODELLING

11.1 NUMERICAL MODELLING OBJECTIVES

The objectives of the numerical modelling presented in this report are based on the requirements of the EIA process and the water use licence application requirements. The following objectives are therefore reported:

- Estimate the impact of the proposed Libanon TSF Reclamation Project at the end of the construction and operational phases of the project on groundwater quality. No significant impacts on groundwater levels are expected.
- Predict the long-term impact of the project on groundwater quality post closure and rehabilitation.
- Evaluate the effect that tailings removal and footprint rehabilitation would have on groundwater quality.
- Develop a groundwater monitoring program based on the outcome of the impact prediction study.
- Develop a groundwater management program geared at reducing the impacts on groundwater quality identified.

11.2 MODEL CONSTRUCTION

The numerical modelling was undertaken according to accepted industry principles and standards, including the South African Department of Water and Sanitation's Best Practice Guideline for Impact Prediction (DWS BPG G4, 2008).

The numerical model for the project was constructed using MODFLOW and MT3DS. MODFLOW is a modular three-dimensional groundwater flow model and MT3DS a modular three-dimensional solute transport model published by the United States Geological Survey. MODFLOW and MT3DS use finite difference discretization and flow codes to solve the governing equations. MODFLOW and MT3DS are a widely used simulation codes, which are well documented. MODFLOW is used to simulate groundwater flow rate and direction. MT3DS is superimposed on the MODFLOW simulation results and is used to predict the rate and direction of contaminant movement in the aquifers.

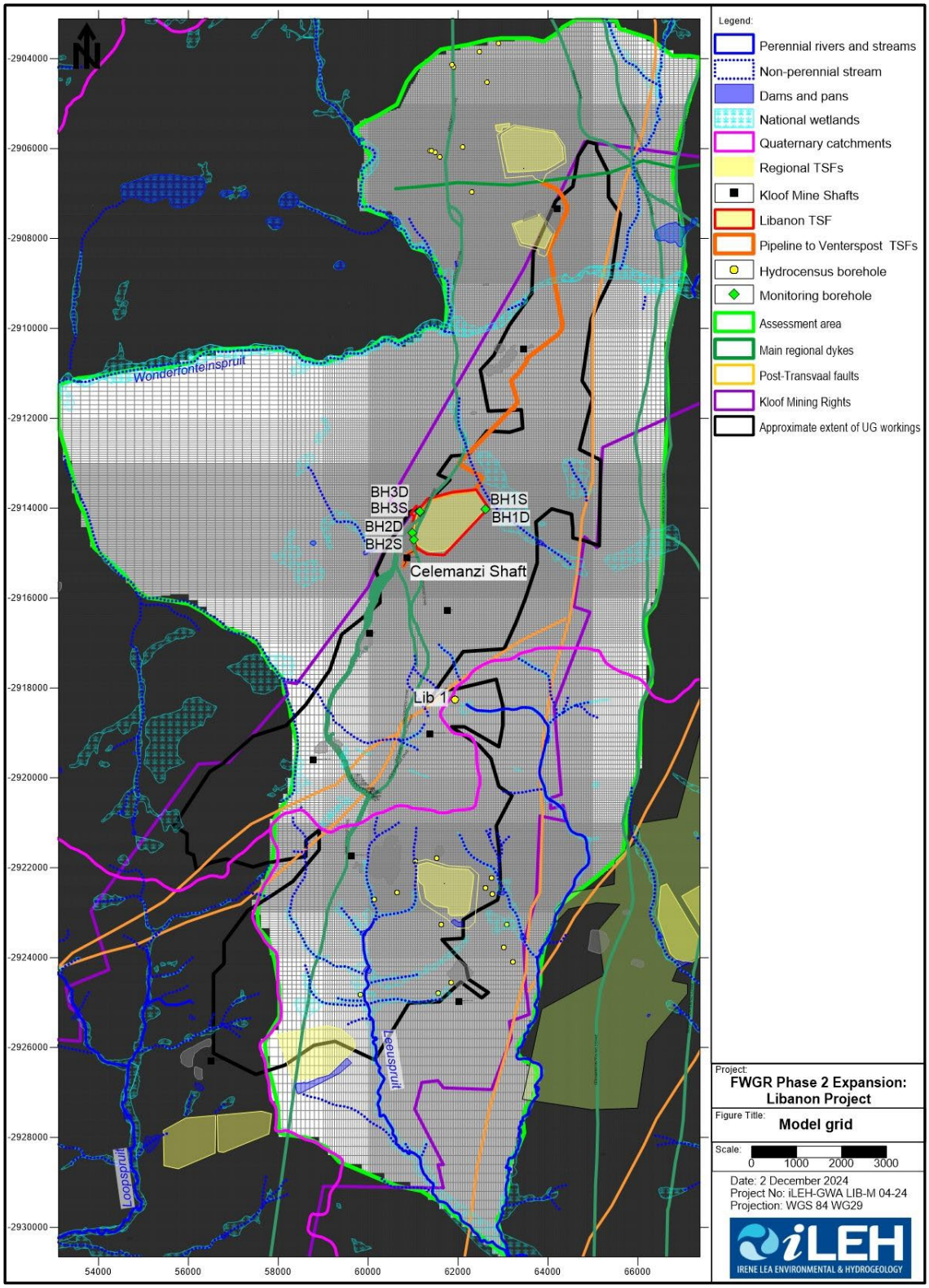


Figure 11. Model grid

To accommodate the regional assessment area over which simulations will be undertaken, the model area was refined into block cells of 25 m by 25 m around the project areas and the model grid size was gradually increased away from this area of interest to 200 m by 200 m (Figure 11). The finer grid allowed more detailed simulations around the areas of interest.

The positions where rivers and streams exit the model area were simulated as Dirichlet boundaries. The eastern model boundary coincides with the Gemsbokfontein Dyke, which was assumed to be a barrier to groundwater flow and was included as no-flow boundary. This dyke forms the eastern boundary of the Venterspost Compartment. Streams and rivers that form model boundaries are simulated as Neuman boundaries. Perennial rivers, streams and wetlands inside the model boundary were simulated as discrete zones.

Four layers were included in the model. The upper two layers presents residual dolomitic aquifer, as this aquifer is the main receiving water body for the TSF. The third layer represents the underlying weathered dolomitic aquifer, which is considered a major aquifer regionally. The lower layer represents the deeper fractured dolomitic aquifer and was also used to include the extent of dewatering of the Venterspost Compartment.

All units used during simulations were presented in metres (length) and days (time).

11.3 Groundwater Elevation and Gradient

The 2024 measured groundwater water levels in regional hydrocensus boreholes as well as the newly drilled monitoring boreholes were used to calibrate the model for this assessment. The locations of these boreholes are indicated on Figure 11. It is noted that the dolomitic aquifer is largely dewatered in the Venterspost Compartment. This complicates the numerical modelling process, as dry layers can lead to unstable modelling conditions. To mitigate this, pre-mining groundwater levels were generated as the starting water levels for the assessment area. This information was inferred from Jones & Wagener (2013).

During simulations, the dewatering of the dolomitic aquifer was calibrated through adjustments and water balance calculations to match the reported dewatering rate of 40 ML/d. This is discussed in more detail below. The extent of the underground workings was inferred from maps presented in Jones & Wagener (2013) as indicated on Figure 11, which indicates that the Libanon TSF is undermined at depth.

11.4 Conceptual Groundwater Model

The parameters that will be used during groundwater modelling, as derived from field data, assumed or obtained from literature, are presented in Table 10 and Table 11. These will be used as a starting point during model calibration for this phase of the project and will be adjusted to minimise the model calibration error, as discussed below.

11.5 Numerical Model

11.5.1 Model Input Files and Integration

The conceptual model discussed above was used to construct the numerical model for the project area. Aquifer parameters from the existing dataset were gradually adjusted during calibration, as discussed below, to enable a model representative of measured and observed conditions within the

general constraints of numerical modelling. A numerical model is an approximation of the real system based on aquifer conceptualisation. The level of accuracy depends on the data available, however groundwater models are inherently prone to uncertainty as it is not possible or practical to obtain field data for every aquifer variation that affects groundwater flow and contaminant movement in the aquifers. The field data set indicates a complex hydrogeological setting with significant variations in groundwater levels and aquifer conditions over very short distances superimposed on a regionally dewatered dolomitic aquifer. The occurrence and movement of groundwater will therefore be controlled by a complex set of factors, which were integrated into the model as best possible within the considerable time constraint under which this project had to be completed.

The geometry of the numerical model is based on the conceptualisation of the aquifers and on the regional geological setting. The geological formations are included as discrete zones in the model, as discussed above. This includes the regional dykes and faults that control groundwater availability in the compartment.

The topographical surface was interpolated from the Digital Terrain Model (DTM) and incorporated into the model to ensure that the elevations of the mechanisms used to simulate the streams reflect actual topography as best possible.

The initial water levels in the model layers were kriged from available information, including field measurements, pre-mining groundwater level conditions and the DTM.

During contaminant transport modelling it was assumed that horizontal and vertical transverse dispersivity is 0.01. The effective molecular diffusion coefficient is 8,64E-5 m^2/d and the longitudinal dispersivity is 50 m. The latter was calculated using the empirical equation developed by Neuman (1990) for the average travel distance of groundwater in this setting.

No chemical reaction was taken into consideration during simulations. As such the contaminant transport simulations are conservative and will therefore represent maximum anticipated travel distances for the plumes that are governed only by the groundwater flow rates. This approach complies with the principles of the precautionary principle.

The timelines considered during modelling are presented in Table 16. No detailed information is available to accurately reflect historical tailings deposition. Some of the dates are therefore assumptions. These are indicated with an asterisk (*).

Table 16. Assumed timeline used during simulations

Simulation period	Start date	End date	Time (years)	Description
1	1934	2000's*	>65 years	Historical operational phase
2	1955	Present day	70	Compartment dewatering phase
3	2025	2026	1	FWGR ramp-up period
4	2027	2039	10	FWGR operational period
5	2040	2041	1	FWGR ramp down and rehabilitation period
6	2042	2142	100	Long-term simulation

11.6 CALIBRATION RESULTS

Calibration of a numerical model refers to the demonstration that the model is capable of reproducing field-measured data, which are the calibration values. Calibration is achieved when a set of parameters, boundary conditions, source terms and stresses are found that produce simulated heads and concentrations that match field measured data within the calibration criteria set for the project. This is an important step in the modelling project, which ensures that model results are reliable.

Calibration was completed with groundwater level measurements in boreholes identified as part of the regional hydrocensus as well as those obtained from the newly drilled monitoring boreholes. The calibration criteria set for the project are presented in Table 17. The complexity of the model setup and the fact that the dolomitic aquifer is dewatered during simulations were taken into consideration in the calibration criteria. These conditions complicate numerical modelling, as discussed earlier.

Table 17. Calibration criteria

Requirement	Acceptability criteria	Compliance
Model convergence	Maximum change in head of 0,1 m	Complied with (see discussion below)
Water balance	Difference between inflow and outflow <1%	Complied with (see discussion below)
Root Mean Square Error	<8 m for targets	Complied with (see discussion below)
Calibration error	At least 80% of targets with <8 m error between simulated and measured head	Complied with (see discussion below)

The calibrated groundwater levels for the residual (shallow groundwater levels) and weathered dolomitic (deeper groundwater levels) aquifers are presented in Figure 12 and Figure 13. Areas where no contours are drawn indicated sections of the dolomitic aquifer that is dewatered. The contours are based on the conceptual model, including the anticipated groundwater flow in dolomitic grykes and pinnacles. As shown, groundwater flow patterns are irregular and vary significantly over short distances. This complicates the calibration process, especially within the significant time constraints in which to complete this project. The contours presented in Figure 12 and Figure 13 are however reflective of field measured groundwater levels and are therefore considered sufficient to complete this impact assessment.

The results of the model calibration process are presented in Figure 14 and Table 18. It is shown that the calibration error (the difference between measured and simulated head) is less than 8 m for all but 4 of the groundwater levels measured in the hydrocensus boreholes. This provides a calibration error target of 80%, which complies with the calibration criteria. This calibration error can be improved if more time is available to spend on model calibration. The sum of the residuals is -18.3 m, which suggests that the model slightly over-estimates groundwater levels. This can be improved by including the impact of dewatering on the Ventersdorp Compartment with more accuracy with more time available to do so.

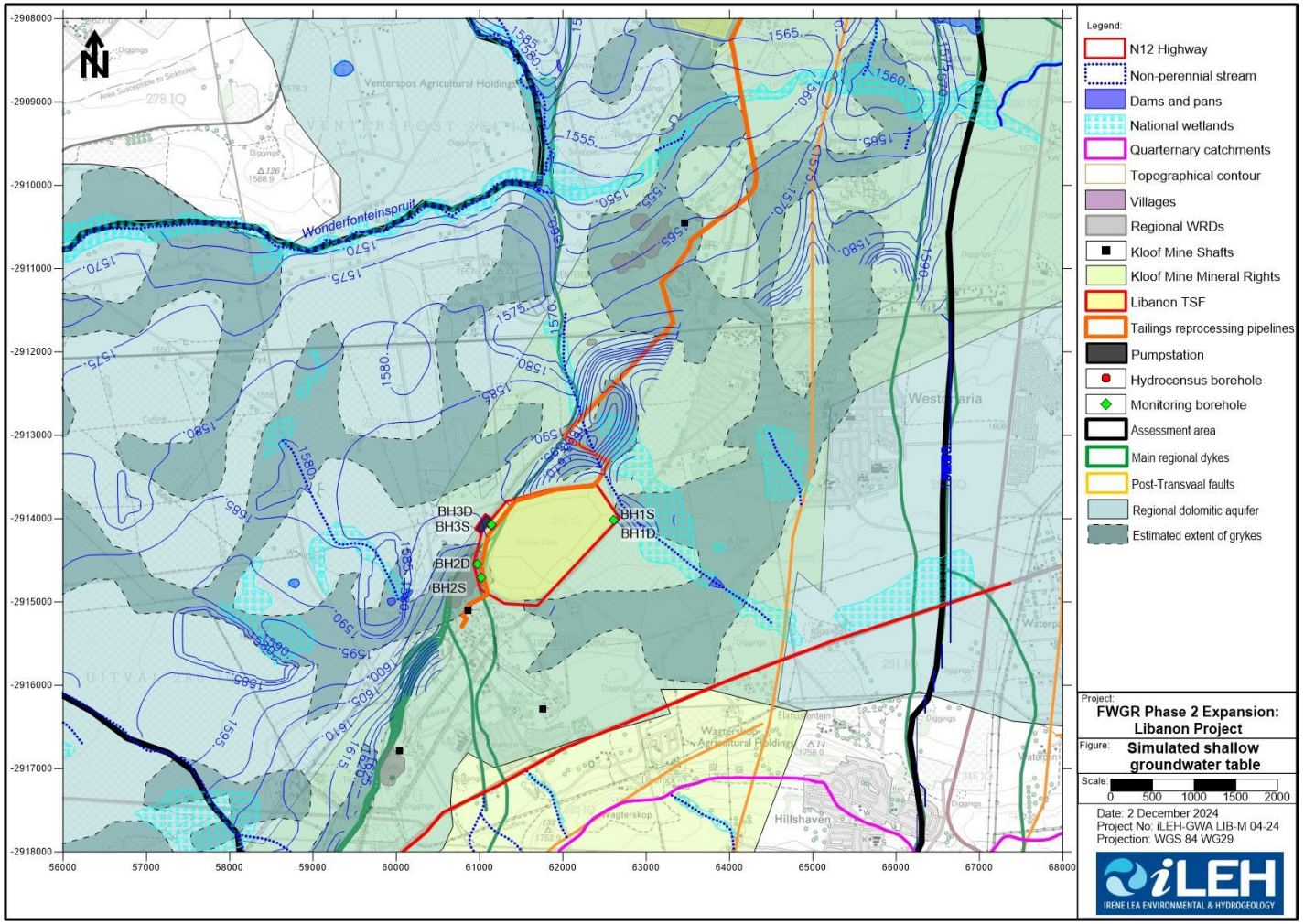


Figure 12. Calibrated groundwater levels in the residual dolomitic aquifer

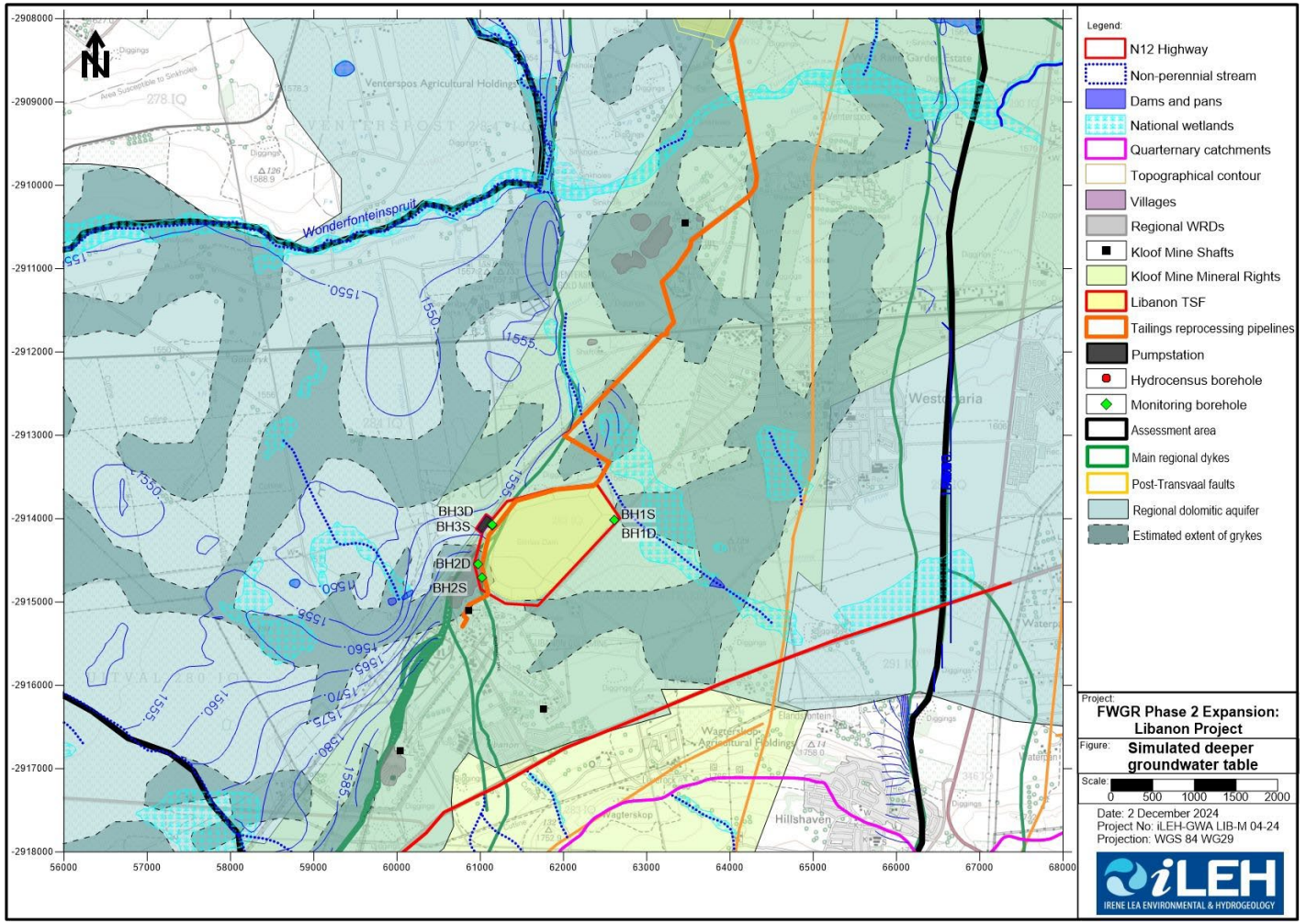


Figure 13. Calibrated groundwater levels in the deeper weathered dolomitic aquifer

The root mean square error, which provides an indication of the goodness of fit during calibration, is 7,59 m, which is within the criteria limit of 8 m.

The water balance error calculated with the numerical model is 0.1%, which also complies with the acceptable calibration criteria set.

Factors that influence the calibration process and results include the following:

- The time available to spend on model calibration. Due to the complexity of the hydrogeological setting, systematic adjustment of aquifer parameters as well as aquifer conceptualisation is time-consuming.
- Discrepancies in the elevations recorded for the hydrocensus borehole. The coordinates for the hydrocensus and monitoring boreholes were recorded with a hand-held GPS.
- The absence of borehole logs with which to characterise the aquifer conditions that the groundwater level in hydrocensus borehole represent.
- The way dewatering of the Venterspost Compartment was included is based on data from Jones & Wagener (2013) as well as a single 2024 dewatering rate received for the Kloof Celemanzi (Kloof No 10 Shaft). Since dewatering has a significant impact on groundwater levels and flow patterns in the immediate vicinity of the Libanon TSF, it is important to improve the accuracy of the dewatering process. This can be achieved by obtaining more accurate data to delineate the underground workings a well as an improved understanding of the history and extent of compartment dewatering.
- Limited groundwater level data is available around the TSF. This is due to the impact of dewatering of the dolomitic compartment and not because of poor field data. However, the lack of groundwater level data affects the accuracy with which modelling can be completed, as the depth to groundwater in dry boreholes is not known. This is mitigated to some extent through the fact that the level of dewatering in the compartment is known.
- The highly irregular groundwater flow patterns around the TSF are based on the complex geomorphology of the weathered dolomitic aquifer. The extent of dolomitic grykes and pinnacles could be inferred from the gravity survey completed by the Council for Geoscience, but there is a level of uncertainty in this approach.
- As mentioned earlier in this report, the modelling code assumes a continuous porous medium, which means that the aquifers are simulated using average parameters. The heterogeneity of the weathered dolomitic aquifer as well as the regional structural geology was incorporated as discrete zones during simulations, which counters the assumed continuous porous medium theory where data is available.

Table 18. Calibration results

Borehole ID	Measured head (mamsl)	Simulated head (mamsl)	Residual (m)
BH3D	1529,83	1537,32	-7,49
BH3S	1581,13	1586,23	-5,10
KG114	1661,32	1656,13	5,19
KG108	1628,38	1619,35	9,03
BH2 WRD1	1614,72	1618,24	-3,52
BH2 WRD1	1612,22	1618,46	-6,24
KG206	1570,84	1581,45	-10,61
BH2 WRD4	1588,27	1580,58	7,69
BH1 WRD4	1591,80	1581,56	10,24
KG111	1617,21	1609,56	7,65
DP104	1593,81	1598,98	-5,17
DP109	1591,02	1598,56	-7,54
KG105	1630,41	1624,35	6,06
KG106	1625,40	1623,57	1,83
Kloof2	1623,30	1621,36	1,94
KG119	1604,78	1611,37	-6,59
Ven 2	1610,66	1603,57	7,09
Ven 3b	1593,30	1600,38	-7,08
Ven 5	1582,10	1590,58	-8,48
Ven 6	1578,05	1585,26	-7,21

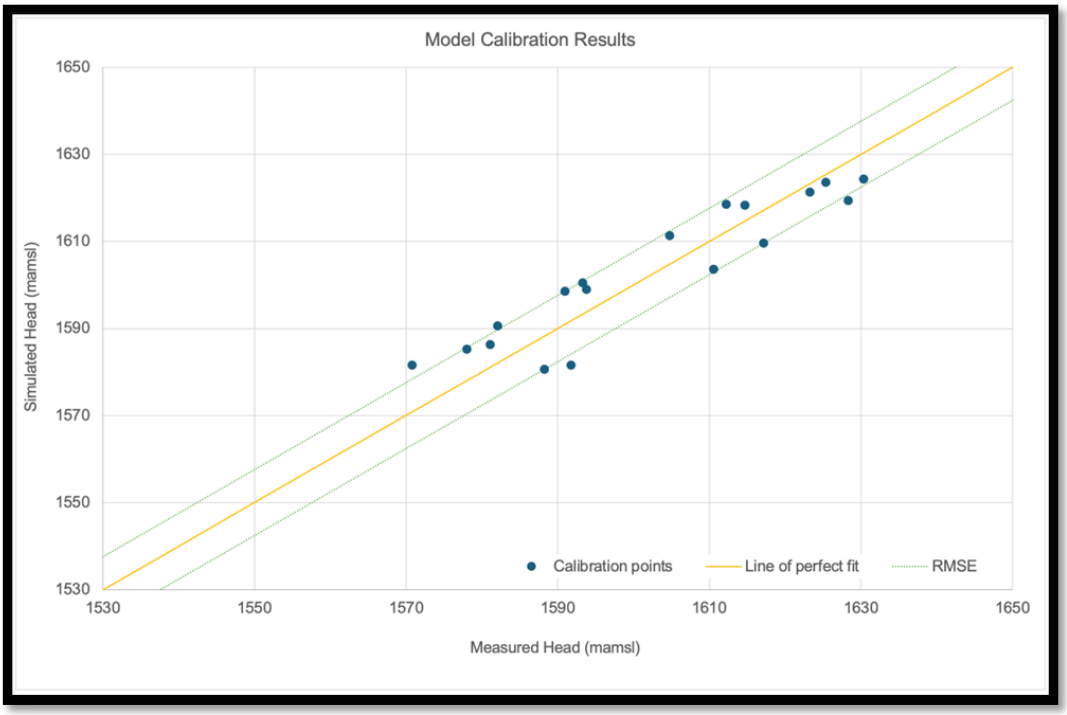


Figure 14. Calibration results

Model calibration can be improved once additional monitoring information becomes available from the proposed monitoring program. Sufficient time should also be allowed to complete model calibration to a high standard. Model-recalibration and verification can be undertaken with additional monitoring data as well as improved data on the mechanisms that affect compartment dewatering. Groundwater monitoring requirements are discussed later in this report.

11.6.1 Model Sensitivity

A sensitivity analysis was completed on the model parameters used to simulate the residual and weathered dolomitic aquifers. The purpose of the sensitivity analysis is to quantify the uncertainty in the calibrated model caused by uncertainty in the estimates of aquifer parameters, stresses and boundary conditions. The level of heterogeneity of the aquifer material can never be accurately measured with field data. The uncertainty of the impact of heterogeneity on simulations is therefore assessed as part of the sensitivity analysis.

The results of a sensitivity analysis can be used to identify data gaps and to plan for additional fieldwork, including monitoring requirements, once the modelling has been completed.

The comparative sensitivity for the parameters included during calibration is presented in Figure 15. The comparative sensitivity provides an indication of how sensitive the model is to changes in each parameter, compared to the other parameters tested. A low value indicates a low sensitivity and a high value a high sensitivity. The results indicate the following:

- The model is sensitive to changes in the rate of ambient recharge to the aquifers.
- The model is also sensitive to changes in the permeability of the residual and weathered dolomitic aquifers.
- The model is also sensitive to changes in the specific yield of the residual dolomitic aquifer as well as the storage coefficient for the weathered dolomitic aquifer, but to a lesser extent.

As discussed in the calibration section above, model sensitivity can be addressed through additional calibration with groundwater monitoring data that will become available from the operations once the monitoring program is implemented.

Data from the new monitoring boreholes were used to estimate the permeability of the residual and weathered dolomitic aquifers. It is however likely that this permeability may vary significantly over the project area, based on the depth of weathering, the presence of grykes and the clay content of the weathered zone.

The rate of recharge can be calculated from groundwater level monitoring data, which is analysed against on-site rainfall data. As part of this calculation, the storage coefficients can be estimated with more certainty.

11.6.2 Assessment of Uncertainties

The accuracy of the modelling project depends on the quality of the input data and the available information. Even with an unchanging environment, impacts are difficult to predict with absolute certainty. Predictions were undertaken with the calibrated flow model, which is a simplified version of reality. The model represents a tool that can be used to assess the impact of the proposed tailings reclamation activities on the aquifers and to identify data gaps. The calibration error is discussed above and is acceptable within the limitations of the study. The model should however be updated

and verified with site-specific monitoring information, when it becomes available. Calibration against hydrographs (groundwater level fluctuation with time) and on-site rainfall data will be of specific value in improving the current understanding of aquifer parameters.

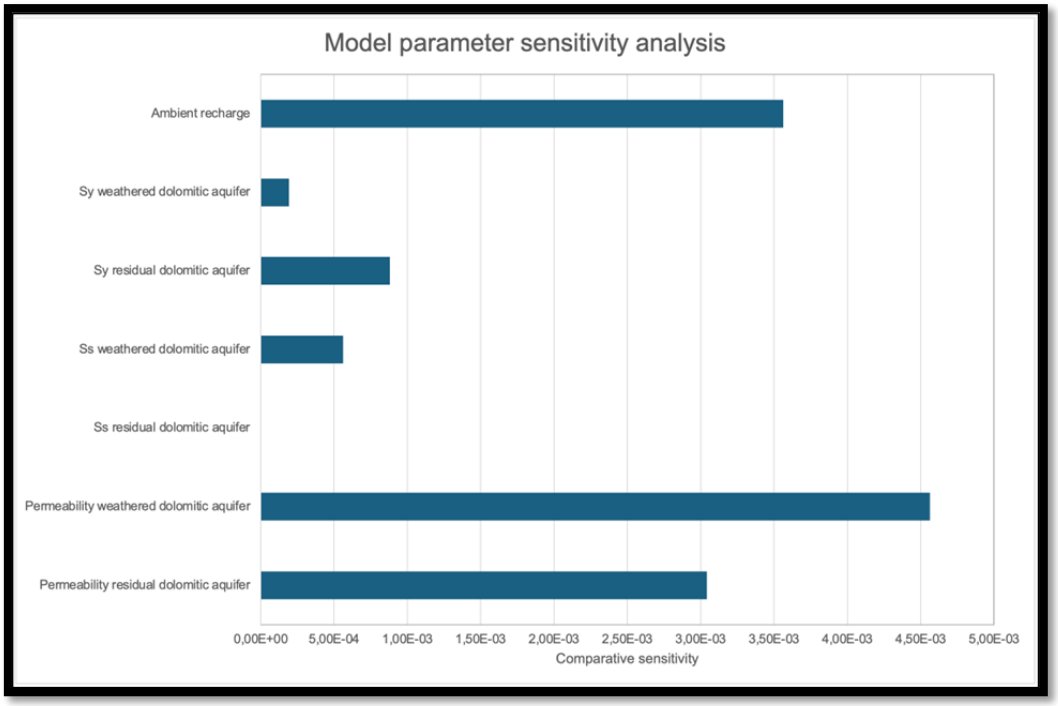


Figure 15. Sensitivity analysis

Uncertainties are approached conservatively, based on the precautionary principle, to ensure that the predictions and impact assessment in this report addresses the maximum potential impact of the proposed development. The uncertainties in the model include:

- **Uncertainties regarding borehole depth, construction and geology intersected**: This information is not available for the hydrocensus borehole. For this reason, it was assumed that the hydrocensus borehole targets the weathered quartzite aquifer.
- **Uncertainties regarding the borehole elevations**: The elevations used during simulations were inferred from hand-held GPS measurements and inaccuracies may occur.
- **Uncertainties regarding the mechanisms and extent of dewatering of the Venterspost Dolomitic Compartment**: The extent of underground mining and the depth of the dewatering in the compartment was approximated from literature-based information.
- **Mathematical modelling uncertainties**: It is not possible with the available information to quantify the heterogeneity present in the aquifers simulated. For this reason, there are inherent uncertainties in the model. The level of confidence in the model can be improved with the incorporation of additional monitoring data, as discussed above.

The uncertainties listed above can be reduced or eliminated through continuation of the groundwater monitoring program at the project. It can further be reduced by integrating the results of the groundwater monitoring program proposed in this study.

11.7 Results of the Model

The results of the modelling are presented below.

12 Hydrogeological Impacts

12.1 Preamble

There are positive and negative impacts reported for tailings reclamation. Lieferink (2012) provides the following positive impacts related to water resources, for this process:

- Removal will partially remove one of the sources of water pollution and ingress.
- Removal will expose the natural soil layer, allowing vegetation growth after rehabilitation.
- Significant long-term benefits, provided that the footprint is adequately rehabilitated and remediated.

Conversely, Lieferink (2012) reports that negative impacts will also manifest. From a water management perspective, the following is applicable:

- Not completing the reclamation of the project, thus leaving a portion of the source of contamination behind.
- Selective extraction of value from portions of a site and not rehabilitating the full extent of the footprint.
- Elevated levels of residual radioactivity in the soils, restricting reuse.
- Introduction of large volumes of water and oxygen into anaerobic tailings which exacerbates pollution. The process of reclamation therefore imposes a greater duty of care.

12.2 Plume Delineation

The outcome of the simulations is presented as sulphate and iron concentration contour maps that delineate the anticipated plumes for the three scenarios tested. These are based on the source term discussed earlier. The three operational scenarios tested are:

- **Best case scenario**: comparatively good quality seepage during reclamation and low seepage infiltration, equivalent to dry conditions, to the underlying aquifers.
- **Likely scenario**: measured quality seepage during reclamation and moderate seepage infiltration rates, equivalent to average conditions, to the underlying aquifers.
- **Worst case scenario**: comparatively poor quality leachate during reclamation with higher seepage infiltration, equivalent to wet conditions, to the underlying aquifers. This scenario is also presented as an indication of long-term impacts if the Libanon TSF is not removed, i.e. the No Project option.

The impact assessment was completed for the residual and weathered dolomitic aquifers. Since vertical flow will be prominent underneath the TSF and in the absence of attenuation in the unsaturated zone, potential contamination from surface is likely to affect both aquifers over time. As discussed earlier, it is acknowledged that attenuation is likely in the unsaturated zone. In the absence of geochemical data to quantify attenuation, only advective groundwater flow is considered. This is a conservative approach that tend towards maximum possible impact zones.

Simulated zones of impact on groundwater quality are presented for operational as well as for the anticipated post-closure long-term conditions below. Operational impacts for the three scenarios tested are similar due to the comparatively short period during which tailings will be reclaimed, the low aquifer permeabilities and the perceived latent impacts of historical tailings deposition. For this reason, impacts associated with the likely operational conditions are presented below.

To facilitate comparison between long-term impacts, the simulated sulphate and iron plumes that delineate the zones of significant impact on groundwater quality are overlain on a single map for sulphate and iron. To incorporate the level of uncertainty with regards to groundwater flow conditions in the residual and weathered dolomitic aquifers, the estimated zone impact in terms of drinking water standards is presented for the potential worst case only.

The estimated zone of impact in terms of drinking water standards therefore presents the maximum zone of impact post closure, following the precautionary principle. Groundwater within this zone is likely to exceed drinking water standards for sulphate and iron, making the groundwater potentially unfit for use. For sulphate, this zone is delineated by the 250 mg/L concentration contour and the 0.3mg/L concentration contour for iron. These are indicated in a dashed line with yellow fill.

The zones of significant impact delineate areas where the concentrations of sulphate and iron, and by implication other salts and metals, are likely to exceed concentrations that could pose a health risk if ingested. Groundwater in these zones will therefore not be fit for use. For sulphate, this zone is delineated by the 1000 mg/L concentration contour and for iron the 1 mg/L concentration contour. These are indicated in a red line with red fill.

The extent of the contours is based on domestic use guidelines after DWAF (1996), as detailed in Table 19. Where these differ from the SANS241:2015 Drinking Water Standards, the SANS standards were used. This approach is taken to enable delineation zones of significant risk to health associated with the project.

Table 19. Health risks associated with indicator elements (after DWAF, 1996)

Concentration range (mg/L)	Effects
Sulphate	
0 – 250	No health or aesthetic effects are expected
250 - 500	Tendency to develop diarrhoea in sensitive and some non-adaptive individuals. Slight taste noticeable
400 - 600	Diarrhoea in most non-adapted individuals. Definite salty or bitter taste
600 - 1000	Diarrhoea in most individuals. Pronounced salty or bitter taste
>1000	Diarrhoea in all individuals. Very strong salty and bitter taste
Iron	
0 – 0.3	No acute or chronic health effects. The groundwater is generally well tolerated
0.3 – 1	Adverse aesthetic effects (taste) and slimy coatings in plumbing. No health effects
1 - 10	Pronounced aesthetic effects (taste and slimy coatings) with slight health effects in young children and sensitive individuals
10 - 30	Chronic health effects with increasing risk of acute health effects. Severe aesthetic effects (taste and slimy coatings)

12.3 REHABILITATION MEASURES CONSIDERED

During the rehabilitation phase of the project, it was assumed that all tailings will be removed, that the soil will be shaped to create a free-draining surface and that all radiation will be removed. It is noted that this rehabilitation scenario will not reverse the cumulative impact of historical tailings deposition. For this reason, a residual impact will remain post-closure of the project in the long-term.

The rehabilitation will be completed down to a red earth footprint. As mentioned above, the area will be shaped for correct storm water management. During rehabilitation, all project infrastructure will be removed, and a final radiological survey will be undertaken. Thereafter the property will be handed over to the landowner. The final land use will be at the discretion of the landowner.

12.4 GENERAL OUTCOME FOR ALL SCENARIOS

The overall outcome of the simulations is summarised as follows:

- Simulations suggest that the private borehole south of the Libanon TSF fall outside the anticipated groundwater impact zones delineated for the project. This borehole will therefore not be affected by the tailings reclamation project.
- The plumes are expected to migrate regionally in a north-westerly direction towards the Wonderfonteinspruit in the residual and weathered dolomitic aquifers. It is highly unlikely that plumes associated with the Libanon TSF could reach this stream, even in the long-term. This is because aquifer permeabilities are low and the plumes are anticipated to move less than 50 m per year. In addition, vertical groundwater flow to the level of dewatering in the compartment will prevail until underground dewatering ceases and groundwater levels have regionally rebounded. Previous studies completed on the Kloof underground workings estimate that groundwater levels could recover within 20 years after pumping ceases to an elevation of 1560 mamsl. This is the elevation of the Venterspost Eye from which the compartment is expected to decant into the Wonderfonteinspruit once groundwater levels reach this elevation. Under these conditions the residual dolomitic aquifer underneath the Libanon TSF is expected to remain dewatered, as the current groundwater level in Lib-BH3s is at 1581 mamsl. The deeper weathered aquifer may however recover to 1560 mamsl, thus rewatering Lib-BH3d by approximately 40 m.
- On a local scale, groundwater flow will be towards the two non-perennial streams northeast and southwest of the Libanon TSF. It is likely that groundwater impacted by the TSF has already reached the stream 200 m northeast of the TSF.
- Flow in the residual and weathered dolomitic aquifers will be controlled by the presence and extent of dolomitic grykes and pinnacles, which was delineated based on a gravity survey completed for the aquifer. Preferential flow is expected in the dolomitic pinnacles. The grykes are expected to be significantly more clay-rich and therefore have lower permeabilities and groundwater flow conditions.
- A small northwestern portion of the Libanon TSF is located within the adjacent Bank Dolomitic Compartment. The boundary between the Venterspost and Bank Compartments is formed by the Venterspost Dyke that transects the northwestern edge of the Libanon TSF. Groundwater levels on the eastern edge of this compartment are not lowered significantly, based on the available dataset (Figure 8). Preferential flow is therefore likely to take place in this area, as the dolomitic aquifer is not as significantly dewatered compared to the Venterspost Compartment.

- The shape of the plumes is affected by the aquifer parameters as well as the calculated dispersion in the formations. Of most significance is the presence and extent of dolomitic grykes as well as regional post-Transvaal age dykes and faults. Dispersion especially plays a role in the extent to which lower concentrations of sulphate and iron would spread from the TSF. Dispersion can account for the spread of contamination that is not necessarily driven by groundwater flow.
- The zones of significant risk to groundwater quality delineated by the 1000 mg/L sulphate and the 1 mg/L iron concentration contours are expected to be restricted mainly to the footprint of the Libanon TSF. The extent of the zones of significant risk to groundwater reduces for Scenarios 2 and 3. This highlights the importance of implementing a sound water balance during operations and controlling the quality of leachate associated with the TSF. It is noted that FWGR has already committed to measures to control the factors and for this reason, long-term impacts are expected to approximate the likely scenario.
- The historical impact of tailings deposition is expected to continue to affect groundwater quality associated with the project areas in the long-term, even if FWGR removes the tailings as part of the proposed project. This is because the contamination already present in the aquifers will continue to move slowly down gradient, away from the TSF along groundwater flow patterns. For this reason, the shape of the plumes remains similar for the three scenarios tested. The difference is the concentration of contaminants within the plumes and a reduction in the extent of the zone of unacceptable impact after tailings reclamation, as mentioned.
- The extent of the iron plume is larger compared to that of sulphate. This is because lower water quality objectives are imposed on manganese compared to sulphate.

12.5 Impact Prediction

12.5.1 Impact at the end of the Operational Phase

The impact of tailings reclamation at the end of the operational phase is presented for iron and sulphate in the residual and weathered dolomitic aquifers in Figure 16. The simulations indicate the following:

- The zone of impact in terms of drinking water standards is not expected to extend more than 200 m from the TSF for sulphate and not more than 500 m for iron concentrations. No private borehole is present in this zone of impact. It is likely that the plume has reached the non-perennial stream northwest of the TSF. Groundwater near to or entering the stream as baseflow is not expected to exceed concentrations that would signify significant impacts.
- The zone of significant impact on groundwater quality is expected to be restricted mainly to the footprint of the TSF. It is acknowledged that portions of the residual and weathered aquifer within the TSF footprint is likely to be dewatered. From an impact assessment perspective, it was assumed that groundwater is likely to be affected over the entire footprint area.

Based on the impact assessment discussed above, the consequence rating for the operational phase, within the context of historical pre-existing impacts, is presented as follows:

- Magnitude: Moderate –
- Spatial scale: Site or local

- Duration: Medium term
- Probability: Possible

12.5.2 Long-Term Scenarios

As discussed earlier, the long-term impact of three operational scenarios were tested as part of impact predictions completed. The outcome of these is presented in Figure 17 for sulphate and iron for a period 100 years after rehabilitation of the TSF footprint. The following is concluded from the information presented:

- The zone of impact delineated in terms of drinking water standards is expected to expand in the long-term and migrate towards the two non-perennial streams on either side of the TSF. Groundwater flow and the extent of the zones of impact on groundwater quality will be controlled by the location of the Venterspost dyke as well as the dolomitic grykes. Preferential flow is anticipated in comparatively fresh dolomitic pinnacles compared to the grykes. The dyke will form a boundary to groundwater flow in the dolomitic aquifer.
- The sulphate plume is not expected to migrate more than 500 m from the TSF. The iron plume may extend further from the TSF mainly because it is delineated by much lower concentrations compared to sulphate. It is possible that the iron plume may migrate a further 500 m from the estimated operational plume in the long-term.
- The zone of significant impact on groundwater quality are compared for the three scenarios in the figure. As discussed earlier, the worst-case scenario can also be used to approximate the “Do Nothing” option. Under the conditions of aquifer conceptualisation, it is likely that the plume delineated by the 1000 mg/L sulphate concentrations contour could extend more than 200 m from the TSF footprint for this case. The worst-case scenario iron plume is also expected to extend approximately 350 m beyond the TSF footprint. No private boreholes are located within the zone of significant risk to groundwater quality. It is also unlikely that these zones would reach the non-perennial stream northwest of the TSF. There is a small risk that the zone of significant impact may however reach the northeastern stream.
- The most significant outcome of the likely and best-case scenarios is a reduction in the zone of significant impact on groundwater quality. Simulations suggest that both the sulphate and iron plumes could be reduced to within the TSF footprint area in the long-term. As discussed earlier, FWGR has developed stormwater management measures to at least achieve the conditions of the likely scenario. For this reason, long-term impacts on groundwater quality are anticipated to be restricted to the TSF footprint area and therefore not significantly impact on water resources.

Based on the impact assessment discussed above, the consequence rating for the worst-case scenario is presented as follows:

- Magnitude: Major –
- Spatial scale: Site or local
- Duration: Long-term
- Probability: Possible

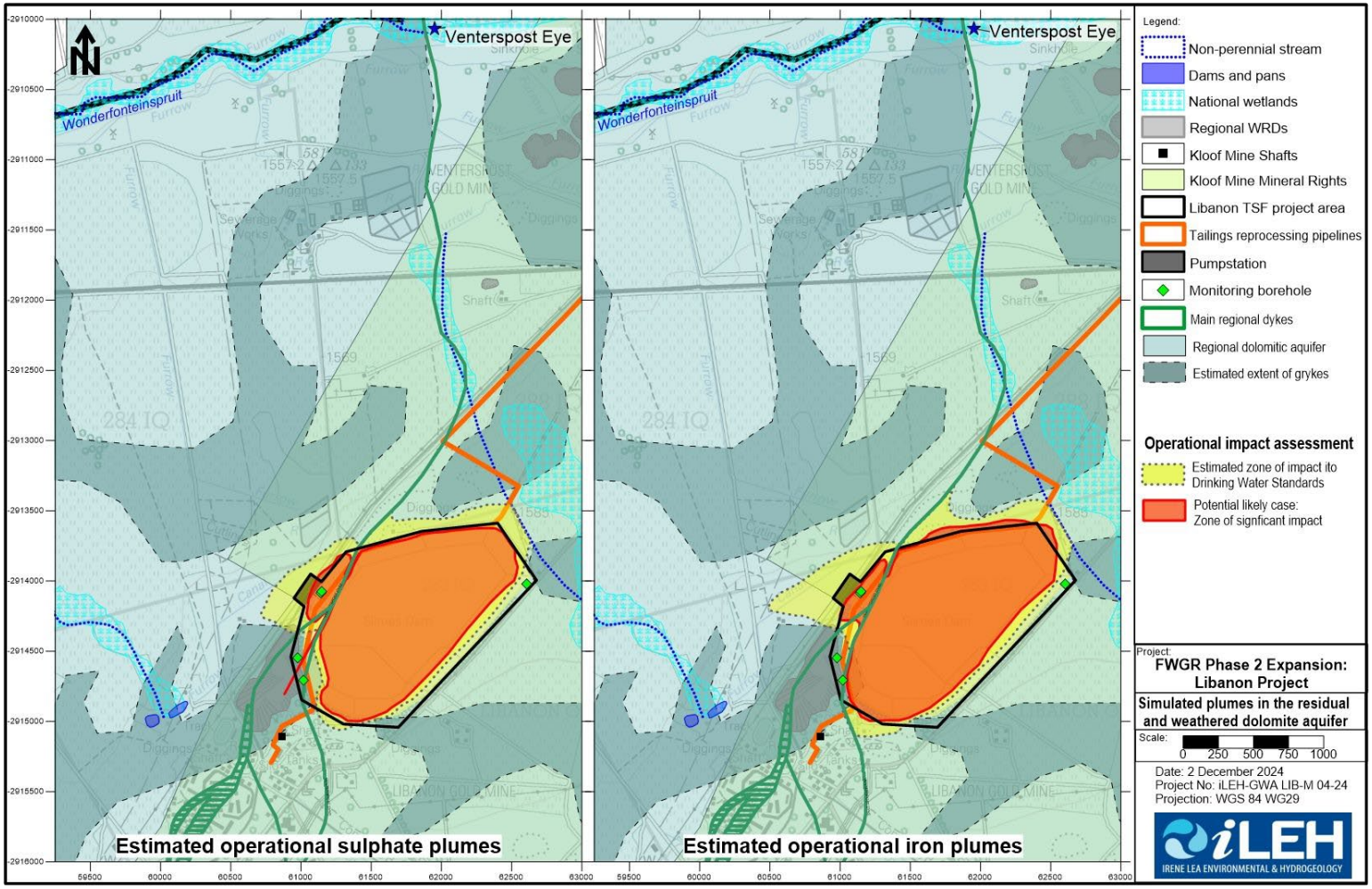


Figure 16. Simulated sulphate and iron plumes at the end of reclamation

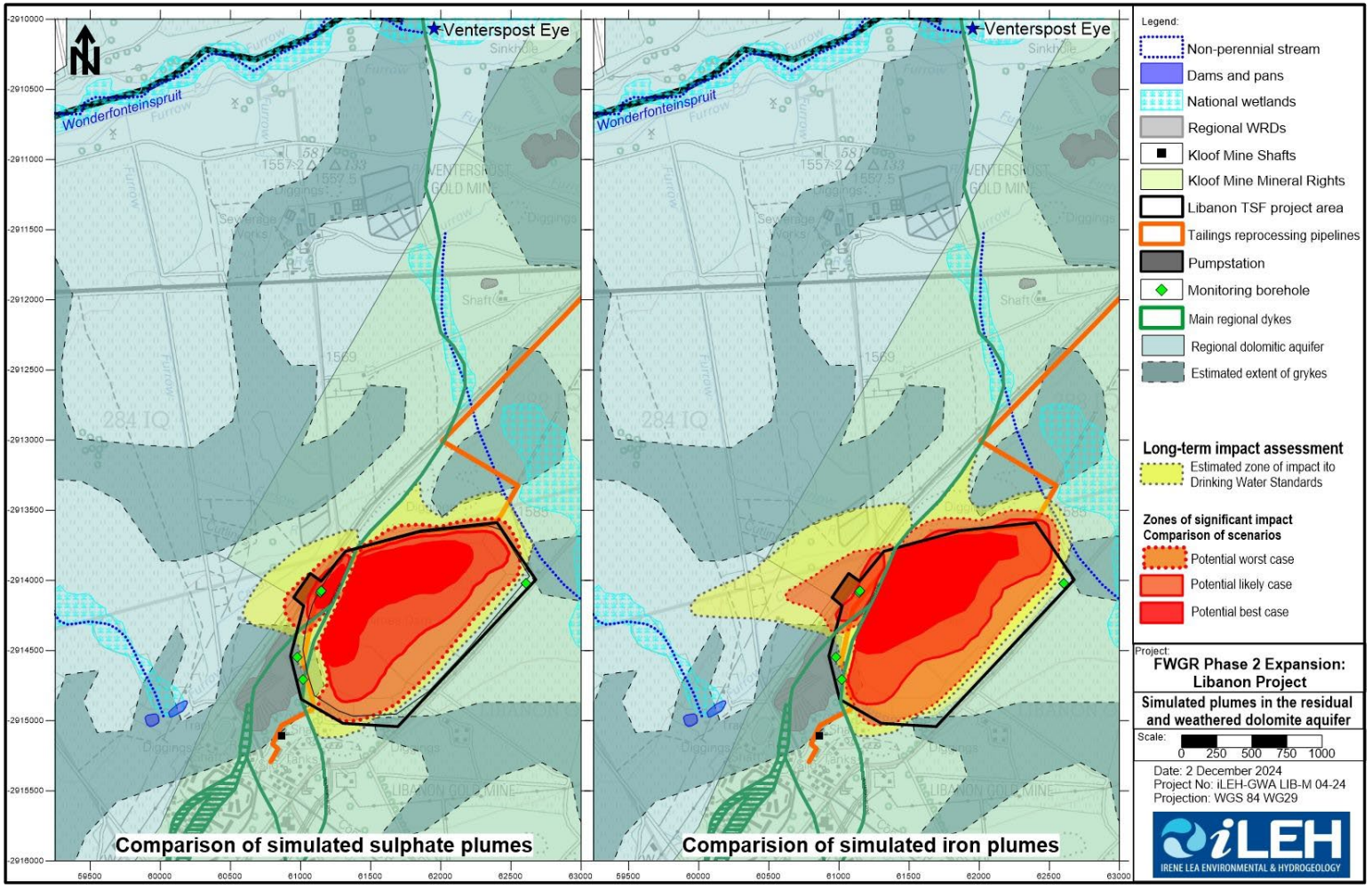


Figure 17. Anticipated long-term sulphate and iron plumes

12.6 CUMULATIVE IMPACTS

There are no other TSFs in the immediate vicinity of the Libanon TSF. For this reason, no cumulative impacts of tailings deposition could be considered. The project was however considered at the hand of regional gold mining activities and the impact of dolomitic compartment dewatering, as discussed above.

12.7 RISK OF DECANT

No risk of decant was flagged for this project.

13 GROUNDWATER IMPACT ASSESSMENT

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 Table 20, Table 21 and Table 22 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.
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.

13.1 Part A: Defining Consequence in Terms of Magnitude, Duration and Spatial SCALE

The definitions in Table 20 are used to define the consequence in Part B.

Table 20. 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

13.2 Part B: Determining Consequence Rating

Rate consequence based on definition of magnitude, spatial extent and duration (Table 21).

Table 21. 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

13.3 Part C: Determining Significance Rating

Rate significance based on consequence and probability (Table 22).

Table 22. 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

The impact assessment is based on the Kongiwe assessment methodology, as presented above. Groundwater management and mitigation options are presented in Chapter 15.

13.4 Construction Phase

Historical negative groundwater quality impacts have been observed in the new boreholes drilled at Libanon TSF during 2024. The groundwater presents salt and metal concentrations (e.g., Sulphate, Iron, Nickel and Manganese) that exceed SANS 241 Drinking Water Health Limits, as well as the DWS' Drinking Water Quality Objectives.

The prescribed groundwater monitoring program in this report must be implemented in the six new shallow and deep monitoring boreholes before reclamation commences and be maintained

throughout the life of the project. Based on good time-series monitoring data the impacts can be defined and delineated and additional mitigation measures implemented.

No additional impact is expected on the groundwater quantity and quality during the construction phase. Construction will be conducted in a relatively short period compared to the operational and post-closure phases. Additional impacts on the groundwater environment are therefore rated as Low (Table 23).

In the long term, the reclamation of the TSF will have a positive impact on the groundwater environment as the current negative pollution source will be removed and with time the contaminant concentrations will reduce.

Table 23. Construction Phase water quality impacts

NATURE OF THE IMPACT: I*mpact on the local 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	Possible
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	Yes. Combined impact with other mining activities in the area, including landfill site activities and waste and sanitation management problems. Refer to Chapter 14.	

Mitigation measures

- Implement a groundwater monitoring program at Libanon TSF before reclamation starts to effectively measure the groundwater status and impacts of the reclamation activities on the groundwater environment and changes in groundwater qualities and levels. Refer to Section 17.1.
- Develop sound surface runoff management plans to ensure that all dirty runoff is contained and diverted to the paddocks. No pooling of water on surface allowed.
- Ensure that paddocks are designed to contain all dirty water generated during the reclamation process, to prevent overflows and spillages.

13.5 Operational Phase - Reclamation

The following impacts can be expected during the reclamation process:

13.5.1 Groundwater Quality

When the TSF is disturbed during reclamation, the water quality is expected to deteriorate due to the introduction of oxygen and water. There is a risk of acidification under these conditions. Historically the sources of pollution in the area include:

- Contaminated storm water runoff from the TSF and the landfill site and residential areas;
- Seepage water from the various slimes dams and paddocks, possibly containing high sulphates and metals; and
- Recharge of contaminated water by means of seepage from the TSF and any unlined storm water channels.

The impact of tailings reclamation at the end of the operational phase is presented in Section 12.5.1, for iron and sulphate in the weathered and fractured aquifers (Figure 16).

Groundwater quality will be negatively affected with a potential increase in salt loads, especially sulphate, manganese and iron concentrations during the reclamation activities. The old tailings material contains pyrite minerals and when exposed to oxygen and water during reclamation will result in the formation of acidic conditions. The risk of groundwater contamination during the hydraulic mining will be moderately negative in view of the existing impacts, if the surface water management and containment guidelines are followed during the reclamation process (Table 24).

The groundwater impact simulations, of tailings reclamation at the end of the operational phase indicate the following:

- The zone of impact in terms of drinking water standards is not expected to extend more than 200 m from the TSF for sulphate and not more than 500 m for iron concentrations. No private borehole is present in this zone of impact. It is likely that the plume has reached the non-perennial stream northwest of the TSF. Groundwater near to or entering the stream as baseflow is not expected to exceed concentrations that would signify significant impacts.
- The zone of significant impact on groundwater quality is expected to be restricted mainly to the footprint of the TSF. It is acknowledged that portions of the residual and weathered aquifer within the TSF footprint is likely to be dewatered. From an impact assessment

perspective, it was assumed that groundwater is likely to be affected over the entire footprint area.

- The historical impact of tailings deposition is expected to continue to affect groundwater quality associated with the project areas in the long-term, even if DRDGOLD removes the tailings as part of the proposed project. This is because contamination already present in the aquifers will continue to move downgradient, away from the site. With time, the concentrations will reduce if tailings reclamation proceeds, because of dilution from fresh rainwater in the catchment. The aquifers present underneath the TSF have low permeabilities and therefore transmit groundwater very slowly.
- The extent of the iron plume is larger compared to that of sulphate. This is because lower water quality objectives are imposed on iron compared to sulphate.

The implementation of sound housekeeping during the operational phase of the project, including the containment, reuse and recycling of stormwater, is expected to reduce impacts on groundwater quality, possibly resulting in an impact of medium significance. Groundwater mitigation measures proposed are listed below.

It is important that all tailings material is removed, and that selective tailings reprocessing does not take place. Partially removed TSF material would result in unacceptable long-term impacts on groundwater. Complete removal of the Libanon TSF should however have a long-term positive impact on the groundwater quality, as the source of contamination is removed. A significant reduction in long-term impacts can furthermore be achieved if the footprint soils are ameliorated to reduced salt and metal concentrations in the impacted soils to within tolerable interim targets, as set for the Wonderfonteinspruit water quality.

Monitoring of groundwater quality and water levels is recommended with continuous review and updating of the monitoring network based on the monitoring results. See Section 17.

13.5.2 Groundwater Quantity

The proposed TSF reclamation will not have any significant impacts on the groundwater quantity (

Table **25**). The reclamation activities will be driven by water jetting. Large volumes of water are used in the process. There is a possibility that water will seep into the underlaying formations, but the additional recharge should be negligible and should have no impact on the groundwater table elevation.

Table 24. Operational Phase water quality impacts

NATURE OF THE IMPACT: ***Groundwater pollution during reclamation***		
	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 term	Long term
Magnitude *(Major, Moderate, Minor)*	Major -	Moderate -
Probability *(Definite, Possible, Unlikely)*	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**High**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	Yes. Combined impact with other mining activities in the area, including landfill site activities and waste and sanitation management problems. Refer to Chapter 14.	

Mitigation measures

- Develop sound surface runoff management plans to ensure that all dirty runoff is contained and diverted to the paddocks. No pooling of water on surface allowed.
- Commit to remove all tailings material and to monitor the quality of soils in the footprint areas. If soil monitoring suggests unacceptably high salt and metal concentrations, soil amelioration should be considered.
- Monitor groundwater quality in all boreholes identified. The groundwater monitoring network efficiency must be assessed and new monitoring boreholes drilled, if required. Additional mitigation measures need to be implemented if pollution is migrating off site.
- Ensure that paddocks can contain all dirty water generated during the reclamation process to prevent overflows and spillages.

Table 25. Operational Phase water quantity impacts

NATURE OF THE IMPACT: ***Reduction in aquifer yield***		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (positive or negative)	**Positive**	**Positive**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Medium Term > 18 months < 5 years	Medium Term > 18 months < 5 years
Magnitude *(Major, Moderate, Minor)*	Minor -	Minor +
Probability *(Definite, Possible, Unlikely)*	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Mitigation measures ❖ Develop sound surface runoff management plans to ensure that all dirty runoff is contained and diverted to the paddocks. No pooling of water on surface allowed. ❖ Ensure that paddocks can contain all dirty water generated during the reclamation process to prevent overflows and spillages. ❖ Monitor groundwater levels in all boreholes.		

13.6 DECOMMISSIONING AND CLOSURE

13.6.1 GROUNDWATER QUALITY

Groundwater quality is expected to improve over time as the source of contamination will be removed and the TSF footprint will be reinstated as far as possible (Table 26). This is with the assumption that all TSF material is removed, and efficient surface water management is maintained.

Due to the relatively short period over which decommissioning and closure will take place, the positive impacts may not be immediately visible in monitoring programmes. The anticipated improvements in groundwater quality are expected to occur post-closure, in the long-term.

The zone of impact over which sulphate or manganese concentrations would exceed acute health standards will reduce in the long-term but is not expected to dissipate. Historical groundwater

contamination will most likely continue to move through the aquifers. The removal of the TSFs is however expected to reduce the zone of impact in the long-term.

The reclamation impact is anticipated to be positive after the tailings material has been removed. Soil and groundwater assessment studies are recommended for the footprint areas, when all tailings material has been removed, to determine the status of these environments. The area over which groundwater quality would exceed unacceptable levels would be reduced. This is because of the removal of the source to groundwater contamination and flushing with clean rainwater recharge.

Rehabilitation of the soil in the footprint area of the historical TSF is required to stabilise the pH and minimise infiltration of contaminated water.

Table 26. Decommissioning and Closure Phase water quality impacts

NATURE OF THE IMPACT: ***Water quality impacts when TSF has been removed***		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (positive or negative)	**Positive**	**Positive**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Long term	Long term
Magnitude *(Major, Moderate, Minor)*	Minor +	Moderate +
Probability *(Definite, Possible, Unlikely)*	Possible	Possible
Calculated Significance Rating (Low, Medium, High)	**Medium**	**Medium**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	Yes. Combined impact with other mining activities in the area, including landfill activities and waste and sanitation management problems. Refer to Chapter 14.	
Mitigation measures ❖ Monitor groundwater quality in all boreholes.		

❖ Maintain sound surface runoff management to ensure that all dirty runoff is contained and diverted to the paddocks.

13.6.1 Groundwater Quantity

There will be no impacts on the groundwater quantity during decommissioning and closure (Table 27). The reclamation activities and addition of water will have stopped and any form of seepage to the subsurface will reduce and ultimately stop, apart from precipitation.

Table 27. Decommissioning and Closure Phase water quantity impacts

NATURE OF THE IMPACT: ***Reduction in aquifer yield***		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Impact Status: (positive or negative)	**Positive**	**Positive**
Extent *(Local, Regional, International)*	Local	Local
Duration *(Short term, Medium term, Long term)*	Medium Term > 18 months < 5 years	Medium Term > 18 months < 5 years
Magnitude *(Major, Moderate, Minor)*	Minor +	Minor +
Probability *(Definite, Possible, Unlikely)*	Definite	Definite
Calculated Significance Rating (Low, Medium, High)	**Low**	**Low**
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	No	
Cumulative impacts (yes or no)	No	
Mitigation measures ❖ Monitor groundwater levels in all boreholes.		

14 CUMULATIVE IMPACTS

Cumulative impacts 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 high salt or metal loads to a river that combine to cause a reduction in the use of the resource 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 and can include both direct and indirect impacts.

The Libanon TSF project is near mining activities, a landfill site, agricultural activities and formal residential developments. Cumulatively all these activities contribute to the surface and groundwater quality impacts identified during the Libanon TSF study and could also impact the groundwater resources, especially in terms of quality (Table 28).

Establishing a groundwater monitoring program (Section 17) is required to assess the implications that reclamation will have on the aquifers and to identify if poor quality groundwater will reach a sensitive receptor. The monitoring data recorded as operations progress must be used to update the monitoring program.

Table 28. Cumulative impact rating

	OVERALL IMPACT OF THE PROJECT CONSIDERED IN ISOLATION	**CUMULATIVE IMPACT OF THE PROJECT AND OTHER PROJECTS IN THE AREA**
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	Major
Probability *(Definite, Possible, Unlikely)*	Definite	Definite
Calculated Significance Rating (Low, Medium, High)	Medium	Medium
Reversibility: (Reversible or Irreversible)	Reversible	Reversible
Irreplaceable loss of resources: (Yes or No)	No	No
Can impacts be enhanced: (Yes or No)	Yes	Yes
Mitigation measures ❖ Ensure that contaminated surface and groundwater from the adjacent mining and landfill activities are effectively managed and that polluted water is not allowed to enter the Wonderfonteinspruit.		

15 GROUNDWATER MANAGEMENT MEASURES

Based on the outcome of the information presented in this report, several groundwater management measures are proposed for the project. Adequate quality control measures are needed to ensure that the methodology conforms to specification and that management targets have been achieved. This requires environmental monitoring while reclamation is in progress. In addition, upon completion of the reclamation, additional monitoring and management activities may be necessary if contamination remains in any form on the site.

The following objectives and targets are proposed for groundwater management during and after completion of the Libanon TSF reclamation project:

- Implement a management plan aimed at reducing and/or eliminating adverse impacts on the receptors identified, including vertical flow to the residual and weathered dolomitic aquifers as well as horizontal flow to watercourses. The management plan must be earmarked at achieving conditions comparable to the at least likely case scenario presented in this report. Where possible, conditions applied for the best-case scenario should be planned for (Table 13 and Table 14).
- Track and record the progress of implementation of all groundwater management measures.
- Implement sufficient monitoring procedures to measure the effectiveness of groundwater management measures.
- Analyse the information obtained from all monitoring programmes against compliance targets to establish trends and to determine the need to trigger additional actions to reduce adverse impacts.
- Should the trends indicate adverse impacts on groundwater levels and/or quality, implement suitable measures within the shortest possible time to remediate and/or eliminate such adverse impacts identified.

15.1 OVER-ARCHING GROUNDWATER MANAGEMENT MEASURES

Several broad over-arching groundwater management measures should be implemented by FWGR for the project to minimise impacts on groundwater, as detailed in Table 29.

Table 29. General groundwater management measures

Construction Phase
A dedicated groundwater monitoring network must be established in the new boreholes.
Make provision for sufficient groundwater level and quality monitoring budget to implement the groundwater monitoring programme, before the reclamation starts.
Develop effective surface runoff management plans to ensure that all dirty runoff is contained and removed off site as soon as possible. Avoid ponding of water over exposed areas.
Ensure that cut-off trenches with sumps are designed to contain all dirty water generated during the desilting to prevent overflows and spillages.
Implement sound house-keeping measures to prevent and clean spills, address leaks and undertake regular inspections. Ensure that the record-keeping procedure is in place and that instructions given are carried out.
Measure rainfall on site.
A dedicated groundwater monitoring network must be established in the new boreholes.
Operational Phase
Complete regular inspections of trenches and sumps, specifically noting incidences of overflow and leakage. If the latter is identified, measures must be taken to rectify immediately.
Maintain sound house-keeping measures to prevent spills and leaks.
Continue with the groundwater monitoring program.
Measure rainfall on site.
Record all groundwater-related complaints and deal with each complaint within the agreed upon timeframe.
Decommissioning and Closure Phase
Complete all reclamation and rehabilitation to a satisfactory level, focussing specifically on the water drainage and collection system.
Ensure that all tailings material is removed from the footprint. Soils must be tested to identify potential risks to groundwater contamination post closure.
Continue with the groundwater monitoring period for a minimum of two years after completion of the rehabilitation. The continued need for groundwater monitoring will depend on the outcome of the final closure assessment.

The following specific groundwater management measures are recommended, based on the outcome of this assessment. The measures are related to two broad impacts, namely the availability of groundwater and the quality of groundwater.

15.2 Measures to Address Impacts on Groundwater Availability

It is noted that the weathered dolomitic aquifer is regionally dewatered, which significantly reduces groundwater availability in the area. Despite this, the following specific measures are recommended to minimise and/or eliminate the impacts on groundwater levels and availability:

- Groundwater levels must be monitored on a quarterly basis in the new monitoring boreholes to establish trends and to flag possible impacts. It is noted that the project is not expected to affect groundwater levels significantly.
- The private borehole identified during the hydrocensus is not located within the zones of impact delineated as part of this assessment.
- Ensure that an effective surface water collection and retention system is in place to ensure that all flow and collected water is directed towards the cut-off trenches with sumps and not allowed to freely drain away from the various silt holding areas. This will also reduce long-term impacts on groundwater quality, as discussed above.

15.3 Measures to Address Impacts on Groundwater Quality

The following specific measures are recommended to minimise and/or eliminate the impacts on groundwater quality:

- The following specific measures are recommended to reduce the risk of deterioration of effluent quality and the volume of leachate available for infiltration to the aquifers:
    - To minimise negative long-term impacts associated with the project, it is important that tailings reclamation must be completed to soil level at the site. All tailings must be removed.
    - No ponding must be allowed on exposed areas. Process water that is allowed to pond uncontrolled will increase the risk of infiltration to the underlying aquifers as well as the risk of deterioration in groundwater quality.
    - After rehabilitation, the footprint area must be made free draining to minimise infiltration of water to the aquifers.
    - Ensure that clean and dirty water is separated at the reclamation and drying areas, and that dirty water is contained. Contain dirty water in adequately sized and lined sumps. Prevent dirty water runoff from leaving the area.
- FWGR must implement a groundwater quality monitoring program in the new boreholes during reclamation. If the results of the monitoring indicate deterioration of quality to within the criteria specified for the worst-case scenario in this assessment, FWGR must investigate the sources of contamination and rectify any activity that results in acidification of leachate or ponding of leachate for extended periods of time. This will reduce the risk to groundwater quality in the long-term.
- A re-run of the contaminant transport simulations must be undertaken at least 5 years before closure once additional monitoring information is available, to improve long-term impact prediction and to ensure that closure groundwater management measures are effective.

16 Post Closure Management

16.1 Remediation of Physical Activity

The preferred remediation strategy for the Libanon TSF is to remove all tailings material. Once the footprint has been cleaned, it must be rehabilitated and made free draining.

Soil samples must be taken once rehabilitation has been completed for leach tests. The outcome of these tests must be used to confirm long-term risk of contamination to groundwater quality presented in this report.

16.2 Remediation of Storage Facilities

Not applicable.

16.3 Remediation of Environmental Impacts

As discussed above.

16.4 Remediation of Water Resources Impacts

Not applicable.

16.5 Backfilling of Pits

Not applicable.

17 Groundwater Monitoring

To monitor and prevent the spread of groundwater contamination, groundwater management procedures and practices must be implemented that are in line with accepted practices and in accordance with the requirements of the Environmental Management Plan (EMP). It is recommended to implement the groundwater monitoring program presented in this report to establish the extent of contamination in the shallow weathered and deeper fractured aquifers, during and after the reclamation activities. The key objectives of the groundwater monitoring program are to:

- Detect short and long-term trends;
- Recognise changes in groundwater quality and levels;
- Measure impacts and implement mitigation measures; and
- Develop improved monitoring systems.

Groundwater monitoring must be undertaken to establish the extent of contamination in the shallow weathered and deeper fractured aquifers, during and after the reclamation activities.

17.1 Monitoring Locations

A groundwater monitoring program must be implemented in the six new shallow and deep monitoring boreholes before reclamation commences and be maintained throughout the life of the project. It is not anticipated that additional monitoring boreholes will be required, based on the outcome of the impact assessment completed. The three sets of boreholes are close enough to the TSF to enable effective monitoring (Table 30). It is acknowledged that two sets of boreholes are currently dry. These should however continuously be checked and sampled if they are rewatered.

Table 30. Proposed groundwater monitoring positions

Monitoring ID	X Coordinate (WGTM 29)	Y Coordinate (WGTM 29)	Depth (m)	Purpose
Proposed new monitoring boreholes				
Lib1s and Lib1d* Lib2s and Lib2d* Lib3s and Lib3d	See Table 4			New monitoring boreholes, targeting shallow and deep aquifers immediately down gradient of the Libanon TSF

**Even though these boreholes are dry at present, continuous monitoring should be implemented, and the boreholes must be sampled for quality analyses if they are rewatered.*

17.2 MONITORING REQUIREMENTS

It is recommended that groundwater levels are monitored in all the boreholes listed in Table 30 on a quarterly basis. This information is important to improve the understanding of water level fluctuations and groundwater level rise and fall in response to rainfall. This information will be interpreted at the hand of on-site rainfall figures and will be used to improve the conceptual understanding of the aquifers.

The monitoring program must be used to establish sound baseline conditions against which future impact assessments can be evaluated. To keep continuity with the baseline information presented in this report, it is recommended that the elements listed in the groundwater quality analyses in this report are included in the monitoring program. These represents the most significant elements applicable to the project. The monitoring requirements are presented in Table 31.

Table 31. Groundwater monitoring requirements

Monitoring parameter	Element for analysis	Monitoring frequency	Monitoring trigger-response criteria
Depth to groundwater level in boreholes	Groundwater level	Quarterly	Variations by more than 3 m for 2 consecutive months should be investigated.
Water quality analysis in all boreholes and surface water monitoring positions listed in Table 30.	All elements included in the current analysis	Quarterly	Variations in concentrations by more than 15% for major cations and anions and more than 7% for metal concentrations for more than 2 consecutive months should be investigated. Any result that exceeds specified water quality objectives must be investigated when it occurs.
Rainfall	Rain depth (mm)	Daily on site	None

The monitoring trigger-response criteria listed in Table 31 must be reviewed on an annual basis and updated, based on the outcome of the monitoring programme results. All monitoring information must be entered into a spreadsheet for record keeping and analysis. Copies of the certificates of analyses must be kept on file for inspection. If significant exceedances are recorded during the monitoring programme, the following actions should be taken:

- Log the exceedances in the incident reporting system within 24-hours of it occurring.
- Undertake an investigation to identify causes of the exceedances.

- Implement the necessary remedial actions according to the outcome of the investigation and consultation with the affected parties.
- Report significant exceedances to the Environmental and General Managers as well as to the regulatory authority and track the incident until completion.

The results of the monitoring programme must be reported on a quarterly and annual basis for the purpose of internal FWGR water management. These reports must also be submitted to the authorities for review.

17.3 GROUNDWATER MONITORING REPORTS

Monitoring reports must contain the following information:

- Monitoring borehole location map;
- Geology map;
- All coordinates of the groundwater sampling sites;
- Certificates of analysis must be included for quality assurance. Monitoring results will be compared to South African National Standards (SANS241) and the Blesbokspruit catchment guideline limits;
- Time-series graphs for key indicator elements (e.g., pH, EC, TDS, Fe, Mn, Al, NO_3, SO_4);
- A discussion regarding observed trends and potential groundwater contamination; and
- Recommendations regarding possible amendments or additions to the groundwater monitoring programme, based on trends and other information observed.

17.4 QUALITY ASSESSMENT AND QUALITY CONTROL

Quality assurance means:

- Developing a system of activities to ensure that measurements meet defined standards of quality with a stated level of confidence;
- Defining monitoring objectives, quality control procedures to be followed and quality assessment;
- To define data quality objectives, including accuracy, precision, completeness, representativeness and comparability; and
- Designing a network, selecting sampling sites, selecting instruments and designing the sampling system, as discussed above.

All monitoring equipment must be maintained as required, and calibration must be undertaken on a regular basis.

To ensure that the Groundwater Monitoring Strategy complies with the above, it is important that analytical laboratories used should be accredited for each type of analysis required, to ensure that accurate analytical methods are used.

While only one or two of the common major ions found in waters may be specified as key indicators, it is necessary to analyse for the full suite of common ions for quality control purposes and to detect discrete events and long-term trends in anion composition.

Special attention must be paid to sampling methods and to preservation and handling of samples prior to analysis. pH and conductivity must be measured in the field.

Close attention must be given to siting, logging and construction of monitoring boreholes and assessment of their condition must be made quarterly.

The following sampling protocol is proposed:

- Sterilised plastic bottles, with a plastic cap and no liner within the cap are required for the sampling. Sample bottles should be marked clearly with the borehole name, date of sampling, water level depth and the sampler's name.
- Water levels should be measured prior to taking the sample, using a dip meter (m bgl).
- Each borehole to be sampled should be purged (to ensure sampling of the aquifer and not stagnant water in the casing) using a submersible pump or a clean, sterile bailer. At least three borehole volumes of water should be removed through purging; or through continuous water quality monitoring, until the electrical conductivity value stabilizes.
- The following field measurements should be recorded on a field form for each sampling point: pH, EC and temperature.
- Samples should be kept cool in a cooler box in the field and kept cool prior to being submitted to the laboratory.
- The pH and EC meter used for field measurements should be calibrated daily using standard solutions obtained from the instrument supplier.

18 Reasoned Opinion

It is the opinion of the project hydrogeologists that the reclamation of the Libanon TSF can proceed, provided that good surface water / storm water management measures are put in place and maintained throughout the life of the project. No ponding over exposed areas must be allowed. The project must further commit to complete tailings removal and not undertake selective tailings reclamation. In the short term there could be water quality impacts (increase in salts and metals) if water on the surface is not managed effectively. The risk of this impact will be confirmed through a dedicated groundwater monitoring programme in the new and hydrocensus boreholes. Analysis of the monitoring information must be considered as part of an updated risk assessment to be completed as part the closure application for the site. Overall, the project is expected to deliver a long-term positive impact on groundwater quality if the TSFs are removed and footprint areas are rehabilitated.

19 Conclusions and Recommendations

The Project:

In 2017, Sibanye Gold Limited, a subsidiary of Sibanye-Stillwater Limited, was granted the necessary approvals to execute a project known as the West Rand Tailings Retreatment Project (WRTRP). The project entails the reclamation of several historic tailings storage facilities in the West Rand, Gauteng. Tailings will be re-treated for gold recovery, with residue material being disposed onto the Regional TSF (RTSF). A commercial agreement was reached between DRDGOLD Limited and Sibanye resulting in the formation of Far West Gold Recoveries (Pty) Ltd (FWGR) in 2018.

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant, or any other future plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. An estimated amount of 600 000 tons/month of slurry is expected to be pumped from the TSF via existing pipelines to the Driefontein 2 Plant for beneficiation.

Libanon TSF is situated approximately 2 km west of Westonaria, in the Rand West City Local Municipality. Libanon TSF is approximately 170 hectares in extent and located on the farm Witkleigat 283 IQ 87IR. The project is in a regional gold mining area within the Kloof Mineral Rights Area.

The anticipated life span of the project is approximately 12 years. It is expected that there would be a 1-year construction and ramp-up period which would include the placement of infrastructure and site preparation, a 6-year Life of Operation, a 2-year ramp-down period and 3 years to rehabilitate the reclaimed site. Upon completion of reclamation, the footprint area will be assessed for contamination, particular in terms of radiation. Contaminated soils will be removed, and the land will be levelled to its original topography.

The proposed reclamation method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors / cannons to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being mined.

Environmental Setting:

The project is situated on a relatively flat plain that dips in a northerly direction towards the Wonderfonteinspruit. The flat plain is associated with dolomitic and Karoo Sequence outcrops. The undulating and hilly ground south of the TSF is formed by outcrops of the Timeball Hill and Rooihoogte Formations (Pretoria Group).

The Venterspost Eye is located approximately 3.6 km north of Libanon TSF, close to the Wonderfonteinspruit. This eye is dry at present because the dolomitic compartment in which it is situated has been dewatered by gold mines.

Libanon TSF falls in the Wonderfonteinspruit catchment, in the C23D quaternary catchment, forming part of the Vaal Water Management Area.

The Mean Annual Precipitation for the Blyvooruitsig weather station is 711 mm. The open water Mean Annual Evaporation is 1 454 mm, which is double the MAP of the area.

Regionally the geology consists of formations of the Karoo, Transvaal, Ventersdorp and Witwatersrand Supergroups. The Black Reef quartzite, which is present at the base of the Transvaal Supergroup, outcrops north of the project area. Of the Transvaal Supergroup Formations, the Chuniespoort Group are of most significance, as the Libanon TSF is located on outcropping Malmani dolomite. The dolomite varies in thickness regionally from around 200 to 1500 m. Underneath the Libanon TSF, the base of the dolomite is at an elevation of 1000 to 800 mamsl and dips in a southerly direction (Jones and Wagener, 2013).

South of Libanon TSF, formations of the Pretoria Group outcrop, including ferruginous shale and quartzite of the Timeball Hill Formation, Hekpoort lavas, as well as shale outcrops of the Strubenkop and Silverton Formations.

Some Karoo sediments have remained as inliers above the dolomite, delineated as the Vryheid Formation.

In addition to the regional post-Transvaal faults, regional diabase (dolerite) dykes have intruded into some of the north-easterly striking faults. Many of these faults penetrated the full Transvaal sequence as well as the underlying Ventersdorp and Witwatersrand Supergroups. These dykes have subdivided the dolomites in watertight compartments. The Libanon TSF is located on the western edge of the Venterspost Compartment and possibly to some extent on the Bank Compartment. The eastern boundary of the Venterspost Compartment is formed by the Gemsbokfontein No 2 Dyke and the western boundary by the Venterspost Dyke, which transects the western boundary of the Libanon TSF. The northern boundary of the dolomitic compartments is formed by the outcrop of the dolomite against the Black Reef Quartzite. The southern boundary is formed by the overlying Transvaal sediments.

Site Investigations:

Three sets of shallow and deep monitoring boreholes were drilled and tested as part of this project. The results of the drilling program indicate the presence of thick residual dolomite, referred to as wad underneath the Libanon TSF footprint. This material has very low permeabilities and act largely as an aquitard. One of the deeper boreholes intersected a cavity in the dolomitic formation, which complicated the drilling process.

Hydrocensus:

A hydrocensus was conducted across the study area during August 2024. The survey included the Libanon TSF property, plus accessible properties within a 4.5 km radius, and concentrated on identifying existing boreholes to enhance the knowledge of the groundwater systems and current groundwater use. Only one borehole was identified on one of the properties on the ridge to the south, but a groundwater level could not be measured due to security measures installed.

Locally surface drainage and possibly groundwater flow will be towards the Wonderfonteinspruit.

Information presented in Jones & Wagener (2013) indicates that there is a 77% correlation between groundwater level and topographical elevations in the weathered dolomitic aquifer. The 77% correlation suggests that there is some relationship between groundwater elevation and topography in the weathered dolomitic aquifer, but that dewatering has lowered groundwater levels significantly in places, thus skewing this correlation.

Borehole Drilling:

Based on a geophysical survey, three drilling positions were identified around the footprint area of Libanon TSF. The percussion drilling program was carried out during October 2024, by Redirile Drilling.

Two groundwater characterisation and monitoring boreholes were drilled at each of the 3 target areas. The one borehole was drilled to a depth of 80 m below surface, with the aim of characterising

and monitoring the deeper fractured aquifer. The second borehole was drilled 30 m deep, with the aim of monitoring potential groundwater flow, quality and possible connection between the deeper fractured aquifer and the shallow weathered aquifer in the area.

Two of the 6 new percussion boreholes produced a measurable groundwater level, post drilling (boreholes Lib BH3s and Lib BH3d). The other four boreholes produced no water and remained dry post closure. There were no measurable blow yields with only seepage water observed for boreholes Lib BH3s and Lib BH3d.

The set of shallow and deep boreholes that contained some groundwater are located on a comparatively fresh dolomitic pinnacle, based on the gravity survey, which is probably associated with the position of the Venterspost Dyke. In the deep borehole, the groundwater level is deeper than 70m below surface, reflecting the regional impact of the dewatered compartment. The fact that a groundwater level could be measured in this position probably attributed to the percolation of rainwater into the dolomitic pinnacle and the presence of increased porosity to facilitate storage of this groundwater.

In the shallow borehole, the depth to groundwater is around 20 m, which also suggests percolation of rainwater from surface as well as infiltration from the Libanon TSF that is retarded in the vertical flow direction by the presence of the thick wad. This groundwater probably sits on a pocket of low permeability wad as a perched aquifer near surface.

Aquifer Testing:

Following completion of the drilling programme, an aquifer test programme was initiated to determine the hydrogeological characteristics of the local aquifers, where possible. VSA Leboa Consulting was appointed by Water Hunters to conduct yield testing of the newly drilled boreholes. Only 5 of the 6 boreholes were available for yield testing. Borehole Lib BH1d (deep borehole) intercepted a cavity at depth and was not tested.

For this project maximum drawdown pump tests were conducted on the two water yielding boreholes (boreholes Lib BH3s and Lib BH3d), followed by a recovery test after each test. Slug tests were conducted on three of the dry boreholes (slug in / infiltration tests) (Lib BH1s, Lib BH2s and Lib BH2d). VSA Leboa Consulting concluded that the slug test analysis shows some heterogeneity in the aquifer system, with hydraulic conductivity (k-value) values ranging from 0.000003 m/d to 0.0035 m/d. The average k-value is 0.001 m/d, based on the model fits, was determined from the slug test. Large variations in the k-values were observed, mostly due to the analytical solutions fitting the data and heterogeneity in die geology formations.

It is shown that the permeabilities of the residual dolomite are very low, on average 9.93E-4 m/d and varying between 1.4E-4 and 2.5E-3 m/d. All three boreholes on which tests could be completed were dry with residual dolomite extending at least to an average depth of 26 m.

During the Aquifer tests on boreholes Lib-BH3s and Lib-BH3d, the shallow borehole was pumped drying within 16 minutes at a rate of 0.18 L/s (648 L/hr) but recovered by 81% in 20 hours. The deep borehole was pumped dry in 40 minutes at a rate of 0.03 L/s (108 L/hr) and only recovered by 6% in 3 hours. This suggests that the residual dolomite underneath the Libanon TSF has a very low yield, but that some groundwater seeps into the comparatively fresh dolomite pinnacle in this position over time, thus recharging the aquifer. This groundwater probably originates from within the lateral extent

of the dolomite pinnacle and is stored in what is perceived to be significant storage capacity contained in secondary porosity as a result of karstification of the weathered dolomite.

On a local scale perched aquifer conditions are expected in the residual dolomite, as rainwater percolates into the karstified aquifer.

The pumping test data is used during the calibration of the groundwater numerical model.

Groundwater Qualities:

During the August 2024 hydrocensus only one borehole was identified, and a groundwater sample was collected (borehole Lib 1). Another two groundwater samples were collected during the aquifer test program. The water samples were submitted to Aquatico Laboratories for analysis. Aquatico is a SANAS accredited laboratory.

Based on the water quality results the following conclusions were drawn (SANS 241:2015 comparison):

- Chronic Health effects:
    - Total Iron – An elevated iron concentration (exceeding the chronic health limits) was recorded for borehole Lib-BH3s (7.62 mg/L), with the SANS limit set at 2 mg/L. The concentration of dissolved iron in water is also dependent on the occurrence of other heavy metals or could be related to the local Karoo and dolomite geology or leaching from the TSF.

      Borehole Lib-BH3s is on the downstream side (west) from Libanon TSF. The total iron concentrations were below the detection limit for the other two sampled sites.
    - Manganese – Borehole Lib-BH3s measured a manganese concentration that could result in chronic health effects (22.2 mg/L). The health impact limit is set at 0.4 mg/L.

      The manganese concentration could be related to the local Karoo and dolomite geology or leaching from the TSF. The manganese concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.
    - Sulphate – Borehole Lib-BH3s exceeds the health guideline limits for sulphate with a measured concentration of 1623 mg/L. The health limit set at 500 mg/L).

      The sulphate concentrations were below detection limit or the SANS aesthetic limit for the other two sampled sites.
    - Nickel – An elevated nickel concentration was recorded for Lib-BH3s (0.136 mg/L). The maximum SANS guideline health limit is 0.07 mg/L. The nickel concentrations were below the detection limit for the other two sampled sites.

- Aesthetic / Operational effects:
    - Ammonium – The ammonium concentration for borehole Lib-BH3s exceeds the aesthetic limits for drinking water (13.0 mg/L) with the aesthetic limit set at 1.5 mg/L.
    - Total hardness – Very hard total hardness values were measured at the two downstream boreholes at Libanon TSF – Lib-BH3s and Lib-BH3d.

In terms of major cations and anions, sulphate is by far the most significant element of concern, with a concentration of above 1500 mg/l for Lib-BH3s. Elevated sulphate concentrations are typical of the impact of gold tailings on groundwater quality, as it is a product of sulphide oxidation.

In terms of metals, manganese and iron concentrations are significantly elevated. Manganese concentrations exceeding 20 mg/L are probably more reflective of the geochemical character of the residual dolomite (wad) than the impact of the Libanon TSF on groundwater quality. Manganese is one of the byproducts of dolomite dissolution, as discussed earlier. Iron is also to some extent a byproduct of dolomite dissolution, but it is also a characteristic element of the oxidation of sulphide minerals. For this reason, sulphate and iron will be used as the two indicator elements for this impact assessment.

The hydrocensus was completed during August 2024 during the dry, winter season in Gauteng. The 2024 fieldwork programme was completed between October and November 2024, which represents the end of the dry season conditions.

Groundwater Numerical Model:

The objectives of the numerical modelling are based on the requirements of the EIA process and the water use licence application requirements. The following objectives are reported:

- Estimate the impact of the proposed Libanon TSF Reclamation Project at the end of the construction and operational phases of the project on groundwater quality. No significant impacts on groundwater levels are expected.
- Predict the long-term impact of the project on groundwater quality post closure and rehabilitation.
- Evaluate the effect that tailings removal and footprint rehabilitation would have on groundwater quality.
- Develop a groundwater monitoring program based on the outcome of the impact prediction study.
- Develop a groundwater management program geared at reducing the impacts on groundwater quality identified.

The outcome of the simulations is presented as sulphate and iron concentration contour maps that delineate the anticipated plumes for the three scenarios tested. These are based on the source term discussed earlier. The three operational scenarios tested are:

- **Best case scenario**: comparatively good quality seepage during reclamation and low seepage infiltration, equivalent to dry conditions, to the underlying aquifers.
- **Likely scenario**: measured quality seepage during reclamation and moderate seepage infiltration rates, equivalent to average conditions, to the underlying aquifers.
- **Worst case scenario**: comparatively poor quality leachate during reclamation with higher seepage infiltration, equivalent to wet conditions, to the underlying aquifers. This scenario is also presented as an indication of long-term impacts if the Libanon TSF is not removed, i.e. the No Project option.

The impact assessment was completed for the residual and weathered dolomitic aquifers. Since vertical flow will be prominent underneath the TSF and in the absence of attenuation in the unsaturated zone, potential contamination from surface is likely to affect both aquifers over time.

Simulated zones of impact on groundwater quality are presented for operational as well as for the anticipated post-closure long-term conditions below. Operational impacts for the three scenarios tested are similar due to the comparatively short period during which tailings will be reclaimed, the low aquifer permeabilities and the perceived latent impacts of historical tailings deposition. For this reason, impacts associated with the likely operational conditions are presented.

To facilitate comparison between long-term impacts, the simulated sulphate and iron plumes that delineate the zones of significant impact on groundwater quality are overlain on a single map for sulphate and iron. To incorporate the level of uncertainty with regards to groundwater flow conditions in the residual and weathered dolomitic aquifers, the estimated zone impact in terms of drinking water standards is presented for the potential worst case only.

The estimated zone of impact in terms of drinking water standards therefore presents the maximum zone of impact post closure, following the precautionary principle. Groundwater within this zone is likely to exceed drinking water standards for sulphate and iron, making the groundwater potentially unfit for use. For sulphate, this zone is delineated by the 250 mg/L concentration contour and the 0.3mg/L concentration contour for iron. These are indicated in a dashed line with yellow fill.

The zones of significant impact delineate areas where the concentrations of sulphate and iron, and by implication other salts and metals, are likely to exceed concentrations that could pose a health risk if ingested. Groundwater in these zones will therefore not be fit for use. For sulphate, this zone is delineated by the 1000 mg/L concentration contour and for iron the 1 mg/L concentration contour. These are indicated in a red line with red fill.

The extent of the contours is based on domestic use guidelines after DWAF (1996). This approach is taken to enable delineation zones of significant risk to health associated with the project.

General Outcome for all Scenarios:

The overall outcome of the simulations is summarised as follows:

- Simulations suggest that the private borehole south of the Libanon TSF fall outside the anticipated groundwater impact zones delineated for the project. This borehole will therefore not be affected by the tailings reclamation project.
- The plumes are expected to migrate regionally in a north-westerly direction towards the Wonderfonteinspruit in the residual and weathered dolomitic aquifers. It is highly unlikely that plumes associated with the Libanon TSF could reach this stream, even in the long-term. This is because aquifer permeabilities are low and the plumes are anticipated to move less than 50 m per year. In addition, vertical groundwater flow to the level of dewatering in the compartment will prevail until underground dewatering ceases and groundwater levels have regionally rebounded. Previous studies completed on the Kloof underground workings estimate that groundwater levels could recover within 20 years after pumping ceases to an elevation of 1560 mamsl. This is the elevation of the Venterspost Eye from which the compartment is expected to decant into the Wonderfonteinspruit once groundwater levels reach this elevation. Under these conditions the residual dolomitic aquifer underneath the Libanon TSF is expected to remain dewatered, as the current groundwater level in Lib-BH3s is at 1581 mamsl. The deeper weathered aquifer may however recover to 1560 mamsl, thus rewatering Lib-BH3d by approximately 40 m.

- On a local scale, groundwater flow will be towards the two non-perennial streams northeast and southwest of the Libanon TSF. It is likely that groundwater impacted by the TSF has already reached the stream 200 m northeast of the TSF.
- Flow in the residual and weathered dolomitic aquifers will be controlled by the presence and extent of dolomitic grykes and pinnacles, which was delineated based on a gravity survey completed for the aquifer. Preferential flow is expected in the dolomitic pinnacles. The grykes are expected to be significantly more clay-rich and therefore have lower permeabilities and groundwater flow conditions.
- A small northwestern portion of the Libanon TSF is located within the adjacent Bank Dolomitic Compartment. The boundary between the Venterspost and Bank Compartments is formed by the Venterspost Dyke that transects the northwestern edge of the Libanon TSF. Groundwater levels on the eastern edge of this compartment are not lowered significantly, based on the available dataset (Figure 8). Preferential flow is therefore likely to take place in this area, as the dolomitic aquifer is not as significantly dewatered compared to the Venterspost Compartment.
- The shape of the plumes is affected by the aquifer parameters as well as the calculated dispersion in the formations. Of most significance is the presence and extent of dolomitic grykes as well as regional post-Transvaal age dykes and faults. Dispersion especially plays a role in the extent to which lower concentrations of sulphate and iron would spread from the TSF. Dispersion can account for the spread of contamination that is not necessarily driven by groundwater flow.
- The zones of significant risk to groundwater quality delineated by the 1000 mg/L sulphate and the 1 mg/L iron concentration contours are expected to be restricted mainly to the footprint of the Libanon TSF. The extent of the zones of significant risk to groundwater reduces for Scenarios 2 and 3. This highlights the importance of implementing a sound water balance during operations and controlling the quality of leachate associated with the TSF. It is noted that FWGR has already committed to measures to control the factors and for this reason, long-term impacts are expected to approximate the likely scenario.
- The historical impact of tailings deposition is expected to continue to affect groundwater quality associated with the project areas in the long-term, even if FWGR removes the tailings as part of the proposed project. This is because the contamination already present in the aquifers will continue to move slowly down gradient, away from the TSF along groundwater flow patterns. For this reason, the shape of the plumes remains similar for the three scenarios tested. The difference is the concentration of contaminants within the plumes and a reduction in the extent of the zone of unacceptable impact after tailings reclamation, as mentioned.
- The extent of the iron plume is larger compared to that of sulphate. This is because lower water quality objectives are imposed on manganese compared to sulphate.

Impact at the end of the Operational Phase:

The impact of tailings reclamation at the end of the operational phase is presented for iron and sulphate in the residual and weathered dolomitic aquifers in Figure 16. The simulations indicate the following:

- The zone of impact in terms of drinking water standards is not expected to extend more than 200 m from the TSF for sulphate and not more than 500 m for iron concentrations. No private

borehole is present in this zone of impact. It is likely that the plume has reached the non-perennial stream northwest of the TSF. Groundwater near to or entering the stream as baseflow is not expected to exceed concentrations that would signify significant impacts.

- The zone of significant impact on groundwater quality is expected to be restricted mainly to the footprint of the TSF. It is acknowledged that portions of the residual and weathered aquifer within the TSF footprint is likely to be dewatered. From an impact assessment perspective, it was assumed that groundwater is likely to be affected over the entire footprint area.

Based on the impact assessment discussed above, the consequence rating for the operational phase, within the context of historical pre-existing impacts, is presented as follows:

- Magnitude: Moderate –
- Spatial scale: Site or local
- Duration: Medium term
- Probability: Possible

Long-Term Scenarios:

As discussed earlier, the long-term impact of three operational scenarios were tested as part of impact predictions completed. The outcome of these is presented in Figure 17 for sulphate and iron for a period 100 years after rehabilitation of the TSF footprint. The following is concluded from the information presented:

- The zone of impact delineated in terms of drinking water standards is expected to expand in the long-term and migrate towards the two non-perennial streams on either side of the TSF. Groundwater flow and the extent of the zones of impact on groundwater quality will be controlled by the location of the Venterspost dyke as well as the dolomitic grykes. Preferential flow is anticipated in comparatively fresh dolomitic pinnacles compared to the grykes. The dyke will form a boundary to groundwater flow in the dolomitic aquifer.
- The sulphate plume is not expected to migrate more than 500 m from the TSF. The iron plume may extend further from the TSF mainly because it is delineated by much lower concentrations compared to sulphate. It is possible that the iron plume may migrate a further 500 m from the estimated operational plume in the long-term.
- The zone of significant impact on groundwater quality are compared for the three scenarios in the figure. As discussed earlier, the worst-case scenario can also be used to approximate the “Do Nothing” option. Under the conditions of aquifer conceptualisation, it is likely that the plume delineated by the 1000 mg/L sulphate concentrations contour could extend more than 200 m from the TSF footprint for this case. The worst-case scenario iron plume is also expected to extend approximately 350 m beyond the TSF footprint. No private boreholes are located within the zone of significant risk to groundwater quality. It is also unlikely that these zones would reach the non-perennial stream northwest of the TSF. There is a small risk that the zone of significant impact may however reach the northeastern stream.
- The most significant outcome of the likely and best-case scenarios is a reduction in the zone of significant impact on groundwater quality. Simulations suggest that both the sulphate and iron plumes could be reduced to within the TSF footprint area in the long-term. As discussed earlier, FWGR has developed stormwater management measures to at least achieve the

conditions of the likely scenario. For this reason, long-term impacts on groundwater quality are anticipated to be restricted to the TSF footprint area and therefore not significantly impact on water resources.

Based on the impact assessment discussed above, the consequence rating for the worst-case scenario is presented as follows:

- Magnitude: Major –
- Spatial scale: Site or local
- Duration: Long-term
- Probability: Possible

A preliminary groundwater monitoring network is presented in Table 30. If additional private boreholes are identified within a 1 km radius, they must be included in the monitoring programme.

Soil and groundwater assessments of the TSF footprint area are recommended after removal of the tailings material to define the status of these environments and determine mitigation, management and monitoring requirements, post-removal.

DRDGOLD must ensure that an effective surface water collection and retention system is in place to ensure that all flow and collected water is directed towards the paddocks and not allowed to drain freely away from the TSF areas. Pooling of water must not be allowed on open surfaces, except if lined.

The reclaimed slurry and any water must be removed from the exposed surfaces (immediately) to avoid seepage of contaminated water into the shallow weathered and deeper fractured and karst aquifers.

Ensure that paddocks are designed to contain all dirty water generated during the reclamation process to prevent overflows and spillages.

Recommendations listed in Table 29 and Table 31, plus Section 15 to Section 17 need to be followed.

Reasoned Opinion:

It is the opinion of the project hydrogeologists that the reclamation of the Libanon TSF can proceed, provided that good surface water / storm water management measures are put in place and maintained throughout the life of the project. No ponding over exposed areas must be allowed. The project must further commit to complete tailings removal and not undertake selective tailings reclamation.

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Appendix A

CVs



Curriculum Vitae

Lucas Andries Smith (Pr.Sci.Nat)

Independent Hydrogeological Consultant

Principal Hydrogeologist

QUALIFICATIONS

MSc Geohydrology, IGS (UFS) Bloemfontein, South Africa, 2003.

Baccalaureus Technology Geology, Technicon Pretoria, South Africa, 1997.

National Diploma Geotechnology, Technicon Pretoria, South Africa, 1992.

EMPLOYMENT HISTORY

Department of Water and Sanitation – 17 years.

ERM Consulting – 3.5 years.

Digby Wells Environmental – 5.5 years.

ASST Group – 12 months.

Current – Director, Groundwater Abstract Pty Ltd

FIELDS OF SPECIAL COMPETENCE

- Water use assessments (hydrocensus)
- Geophysical investigations
- Borehole drilling and rehabilitation studies
- Aquifer testing
- Community water supply and resource management
- Mine dewatering, water supply and management programmes
- Groundwater quality assessments
- Groundwater, catchment and impact assessments
- Design and management of water monitoring programmes
- Integrated Water and Waste Management Plans
- Water Use License Applications and compliance assessments
- Geochemistry assessments and waste classification
- Staff management
- Project management

SUMMARY OF COMPETENCIES

Lucas has 27 years of experience in the field of hydrogeology. Before moving to environmental consulting he was a principal hydrogeologist at the Department of Water Affairs and Forestry (now Dept. Water and Sanitation) (South Africa) where he devoted 17 years to groundwater research and exploration programmes; rural water supply-, larger municipal water supply-, and government water supply schemes projects; artificial groundwater recharge projects; as well as borehole and aquifer development and remediation projects.

He executed and managed different hydrogeological projects, focussing on aspects such as community water supply programmes, geophysical investigations, characterisation of aquifers, pollution studies, in-stream flow requirements, hydraulic fracturing, dolomite and karst investigations and monitoring, chemical borehole rehabilitation (biofouling) and hydro-chemical analyses.

Over the past 10 years Lucas' environmental consulting experiences include the Southern African and Central- and West African mining sectors, as well as Energy sectors (Eskom and alternatives) where he manages groundwater and surface water resource evaluations and interaction, as well as conceptualising and quantification of groundwater flow/contaminant transport, ultimately for input to Environmental and Social Impact Assessments (ESIA), Environmental Management Programme reports (EMPr), Feasibility Studies and mine water management. Integrated water management is key to any business, mine, industry, or communities to ensure a sustainable resource for the environment and local communities to benefit from.

At Digby Wells Environmental Lucas was part of the EXCO committee; where he managed a team of 14 surface and groundwater specialists and several projects.

He served on the H&S Committee at ERM and Digby Wells where he also served as Chairperson for the H&S Committee for 1 year.

Lucas is a dedicated employee, husband, farther, patriot; and passionate about managing and protecting our natural resources and the environment.

RECENT RELEVANT PROJECT EXPERIENCE

During the 27 years in the Water Geosciences industry Lucas was involved in many projects where he served as team member on many field works and research programmes; he managed staff and various projects throughout Africa and even as far as Pakistan, and played a prominent role in being the overall Sponsor on projects, as well as acting as key client manager for clients like Sasol and Universal Coal.

A list of clients and projects over the last couple of years can be provided on request, but due to the extent of the experience it has been omitted from this CV.

PERSONAL DETAILS

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REFERENCES

Dr Eddie van Wyk (Golder Associates). Line Manager at the Department of Water Affairs at the time and fellow hydrogeologist.

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Karabo Lenkoe-Magagula (Kimopax). Unit Manager at Kimopax and fellow hydrogeologist.

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Hesma Cockrell (SMN International). Old colleague and served as Unit Manager under Lucas at Digby Wells and fellow hydrogeologist.

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ABBREVIATED CV Irene Lea

Personal Information

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Postal Address:	PO Box 363, Dunnottar, 1590, South Africa
Telephone no:	011 363 2926
Fax no:	086 672 9900
Email:	irene@ileh.co.za

Employment

Current Position:

Consulting Hydrogeologist
Sole Proprietor, Irene Lea Environmental and Hydrogeology cc (ILEH)
September 2009 – Present

Previous Employment:

Pamodzi Gold and its predecessors – Group Environmental Manager (Dec 2002 – July 2009)
Groundwater Consulting Services – Water Unit Manager (Jan 1996 – Nov 2002)
CSIR – Staff Hydrogeologist (January 1992 – December 1995)

Professional Registration

Professional Natural Scientist (SACNASP, Reg. No. 400107/97)

Education

B.Sc. Geology and Mathematics, University of Stellenbosch, 1988 - 1990
B.Sc. (Hons) Geology, University of Stellenbosch, 1992
M.Sc. Geohydrology, Institute for Groundwater Studies, University of the Free State, 1996 - 1997

Experience

Irene Lea has 30 years' experience in the field of geohydrology. She has a M.Sc. in Geohydrology and is a registered Professional Natural Scientist. Her focus includes numerical groundwater flow and contaminant transport modelling, integrated water and waste management strategies, water and salt balances, rehabilitation and closure projects, the development of environmental management programmes and risk assessments. She has successfully completed projects over a broad range of fields, including mining, mineral processing, chemical industries, waste disposal, transport, agriculture and power generation. A project that she managed was nominated and short listed for a Nedbank Green Mining Award in 2006.

Recent Projects

Groundwater flow and contaminant transport modelling:

- AECI Modderfontein Industrial Complex, Groundwater Impact Assessment (SRK, 2012)
- Exxaro Arnot Colliery – Groundwater Impact Assessment (Golder and Associates, 2012)
- Transalloys Industrial site – Groundwater Impact Assessment (Jones & Wagener, 2012)
- Tschudi Copper Mine – Dewatering and groundwater supply (Jones & Wagener, 2012)
- Harmony Kalgold – Optimisation of abstraction boreholes and TSF EIA (Jones & Wagener, 2013)
- Fry Metals – Contaminant Transport Model to evaluate rehabilitation options (Rison, 2013)
- Assmang Chrome - Machadodorp Works Contaminant Transport Model (ESS, 2014)
- Sebilo Resources – Perth Manganese Numerical Groundwater Model (Sebilo Resources, 2014)
- Rand Gold Mali Loulo Mine – Updated Groundwater Impact Assessment (Digby Wells Environmental, 2015)
- South Deep – Numerical simulations for the closure of a Tailings Storage Facility (Rison, 2015)
- Dwarsrivier Mine – Groundwater flow and contaminant transport model (EnviroGistics, 2015)
- Withok Tailings Storage Facility – Numerical simulations for re-commissioning of TSF (Ergo Mining, 2015)
- Fry Metals – Contaminant Transport Model update (Rison, 2015)
- Tetra4 Virginia Gas Project – Groundwater specialist input and numerical modelling (EIMS, 2016)
- DRD Gold – Numerical groundwater model for Withok Tailings Storage facility (Beric Robinson Tailings, 2016)
- Tetra4 Virginia Gas Project – Follow-up numerical modelling (EIMS, 2017)
- City of Cape Town Kalbaskraal Waste Disposal Project – Numerical modelling (Cliffe Decker Hofmeyr, 2017)
- Lephalale Coal Mines – Geohydrological modelling (ASST, 2017)
- Dwarsrivier Mine – Follow-up numerical groundwater flow and contaminant transport model (Envirogistics, 2017)
- Prieska Copper Mine – Geohydrological impact assessment, including numerical modelling (ABS Africa, 2017)
- Umsimbithi eMakhazeni Project - Geohydrological impact assessment, including numerical modelling (Kongiwe, 2018)
- City of Cape Town Kalbaskraal Waste Disposal Project – Numerical modelling (Cliffe Decker Hofmeyr, 2018)
- Vardocube Mining – Geohydrological impact assessment, including numerical modelling (ABS Africa, 2018)
- Assmang Manganese Cato Ridge – Numerical groundwater flow and contaminant transport model (Assmang Manganese, 2018)
- eMakazeni Mining Project - Numerical groundwater flow and contaminant transport model (Kongiwe, 2018)
- Leslie 1 Project – Numerical groundwater flow and contaminant transport model (Kongiwe, 2018)
- City of Cape Town Kalbaskraal Waste Disposal Project – Numerical modelling (Cliffe Decker Hofmeyr, 2018)
- Dwarsrivier Mine –Numerical groundwater flow and contaminant transport model (Envirogistics, 2018)
- Assmang Chrome Machadodorp Works - Numerical groundwater flow and contaminant transport mod (Assmang, 2018)
- Assore – Numerical groundwater flow and contaminant transport model – RMDC and ZCM operations (Assore, 2019)
- Kranspan Colliery – Numerical groundwater flow and contaminant transport model (ABS Africa, 2019)
- DRD Gold – Numerical groundwater flow and contaminant transport modeling: Soweto Cluster and Marievale Projects (Kongiwe, 2019)
- South32 – Wolvekrans Mega Project – Geohydrological specialist study (NTC Group, 2019-2021)
- AEMFC – Vlakfontein Mine North Block Geohydrological Risk Assessment (EIMS, 2019)
- Envirogistics – Groundwater impact assessment – Wonderstone operations (Assore, 2020)
- Dwarsrivier Chrome Mine – Groundwater impact assessment – Historical TSF removal project (Dwarsrivier Chrome Mine, 2020)
- Prieska Copper and Zinc Mine – Groundwater impact assessment – Brine management scenarios (ABS Africa, 2020)
- Universal Coal Ubuntu Colliery – Numerical groundwater flow and contaminant transport modelling (Groundwater Abstract, 2020)
- Assore – Numerical groundwater flow and contaminant transport model updates: RMDS and ZCM operations (Assore, 2021)
- Dwarsrivier Chrome Mine – Annual numerical groundwater model update (Dwarsrivier Chrome Mine 2020 – 2023)
- ARM Machadodorp Works - Numerical groundwater flow and contaminant transport model update (ARM, 2021)
- eMakazeni Mining Project – Update of numerical groundwater modelling (Groundwater Abstract, 2021)
- Dwarsrivier Chrome mine – Khulu Tailings Storage Facility Project (Envirogistics, 2021 - 2022)
- DRD Reclamation of several TSF – Geohydrological impact assessment (Groundwater Abstract, 2022)
- Dwarsrivier Chrome Mine – Scavenger Borehole Implementation Strategy (Dwarsrivier Chrome Mine, 2022)
- Orion Limited – Okiep Flat Mines Project Geohydrological Impact Assessment (ABS Africa, 2022)
- Hlagisa Wildfontein Mine Closure Application – Geohydrological Specialist Study (ABS Africa, 2022)

Integrated Water and Waste Management:

- Sebilo Resources – Perth Manganese water use license application (Sebilo, 2014)
- Vantage Goldfields – Water Balance: Lily and Barboork Mines (Vantage Gold, 2015)
- Dwarsrivier Mine – Integrated Water Monitoring Programme (Assmang Chrome, 2015)
- RK Boerdery – Water balance for piggery (Batho Environmental, 2015)
- Sakura JV Indonesia – Groundwater study (Assmang Ltd, 2015)
- PMG Mining – Water balance of manganese mine (Globesight, 2016)
- Sebilo – Perth Manganese Mine – Water Use License Application (Sebilo, 2016)
- Transnet – Confidential technical report review (DMT Kai Batla, 2016)
- Tswane Metropolitan Municipality – Tswane Agri-Hub Baseline Hydrogeological Study (DMT Kai Batla, 2016)
- Afrisam South Africa – Ulco Cement Factory Hydrogeological Investigation (MojaTerre, 2016)
- City of Cape Town – Kalbaskraal Waste Disposal Facility Geohydrological Modelling (Cliffe Decker Hofmeyer, 2017)
- Sebilo Resources – Perth Mine Waste Classification (Sebilo Resources, 2017)
- Zeerust Chrome Mine – Tailings Waste Classification Study (AMTIT, 2017)
- Lephalale Coal and Power Project – Numerical groundwater flow and contaminant transport model (ASST, 2017)
- Beeshoek Iron Ore Mine – Water and Salt Balance (Envirogistics, 2017)
- Beeshoek Iron Ore Mine – Water Conservation and Demand Management Plan (Envirogistics, 2017)
- Machadorp Smelter – Water and Salt Balance (Assmang Ltd, 2017)
- Dwarsrivier Chrome Mine – Water Conservation and Demand Management Plan (Envirogistics, 2017)
- Dwarsivier Chrome Mine – Waste Classificaiton Study (DCM, 2017)
- New Kleinfontein Mine – Water and Salt Balance (NTC Group, 2017)
- Zeerust Chrome Mines – Basic Assessment Report -Groundwater (Envirogistics, 2018)
- Rustenburg Minerals Development Corporation – Basic Assessment Report – Groundwater (Envirogistics, 2018)
- Dwarsrivier Chrome Mine – Water Balance Study (Envirogistics, 2018)
- Beeshoek Mine -Water Balance Study (Envirogistics, 2018)
- Gold One New Kleinfontein Mine – Water Balance Study (NTC, 2018)
- Beeshoek Mine – Water and Salt Balance and Water Conservation and Demand Management Plan (Envirogistics, 2019)
- Dwarsrivier Mine – Water Conservation and Demand Management Plant (Envirogistics, 2019)
- ARM Alloys – Machadodorp Works Water and Salt Balance (ARM Alloys, 2019)
- ESKOM Ash Facility – Review of validity of closure liability calculation (Markus Reichardt, 2020)
- Wonderstone Mine – Water and Salt Balance (Envirogistics, 2020)
- Beeshoek Iron Ore Mine – Water and Salt Balance (Envirogistics, 2020)
- ARM Machadorp Smelter – Water and Salt Balance (Envirogistics, 2020)
- RMIPPPP 50 MW Gas Power Project Basic Assessment Report (ABS Africa, 2020)
- Beeshoek Mine – Water and Salt Balance and Water Conservation and Demand Management Plan (Envirogistics, 2020 and 2021)
- Upper Jukskei River Catchment Management Plan for the City of Johannesburg – Geohydrology component (Fourth Element, 2021)
- The Mineral Corporation – Geohydrological Opinion, Phase 2 Technical Due Diligence – Waterberg Project (TMC, 2021)
- Eskom Majuba Power Station – Geohydrological Basic Assessment (EIMS, 2022)
- Lubambe Copper Mine Zambia Geohydrological and Water Management Assessment (The Mineral Corporation, 2022)
- Karo Platinum Project Zimbabwe high-level geohydrological assessment (The Mineral Corporation, 2022)

Environmental Management:

- Management of the construction of a river diversion (Pamodzi Gold, 2006)
- Minxcon Competent Person's Report (Bema Gold, 2006)
- Management of the construction and commissioning of a 10 ML/d mine water treatment plant (Pamodzi Gold, 2008/2009)
- Standard Bank Due Diligence (Pamodzi Gold, 2009)
- Environmental Baseline Assessment: Perth Manganese Prospect (Sebilo Resources, 2010)
- Prospecting Right EMP: Aquarius Chieftans and Valhallah Prospect (SRK Consulting, 2011)
- NI43-101 Technical Report - Hydrogeology: Homeland Energy (SRK Consulting, 2011)
- Zeerust Chrome Mine EMP Amendment (Assore, 2011)
- Northam Platinum Due Diligence – Hydrogeology (SRK, 2011)
- Mogale Gold Technical Assessment – Water-related issues (MSA Geoservices, 2011)
- Rustenburg Mineral Corporation EMP Amendment (Assore, 2011)
- Mogale Gold – Lancaster Dam Baseline Assessment (Mintails SA Ltd, 2011)
- Sebilo Resources – Perth Mining Right Application EMP (2012)
- Lebalelo Water Users Association – Olifants River Project (Anglo Platinum, 2012)
- Umlabu Colliery – Due Diligence (SRK, 2012)
- Assore – PA Audits for RMDC, ZCM and Wonderstone Operations (Assore, 2013)
- Keegan Resources - Esaase Gold Project, Ghana – Gap Analysis and ESIA (Epoch Resources, 2013)
- Sebilo Resources – Quantum for Rehabilitation (Sebilo, 2014)
- Pembani Group – Evaluation of the Carolina Operations water related liabilities (Pembani, 2014)
- Obarex – Van Roois Vley Environmental Management Programme (Rock & Stock, 2014)
- Glencore & Royal Bafokeng Holdings – Boschfontein Slag Dump Groundwater Risk Assessment (EIMS, 2014)
- RK Boerdery – Baseline geohydrological study for piggery (Batho Environmental, 2015)
- Sungu Sungu Gas – Geohydrological study (EIMS, 2015)
- Gold mining industry – Groundwater component of a confidential Due Diligence (EBS, 2015)
- Sungu Sungu Gas – Groundwater specialist input – Scoping and EIA (EIMS, 2016)
- Kao Diamond Mine Lesotho – Groundwater specialist input – Scoping and EIA (EIMS, 2016)
- The Mineral Corporation – Mukulu Project Competent Persons Report Technical Review (TMC, 2016)
- HC Van Wyk Diamponds – Groundwater input to diamond prospecting (MojaTerre, 2016)
- Black Mountain Mine – Groundwater Basic Assessment Report (The MSA Group, 2016)
- Tetra4 – Virginia Gas Project Baseline Hydrogeological Study (Tetra4, 2016)
- DRD Gold – Tailings reprocessing offset evaluation (DRD Gold, 2016)
- Dwarsrivier Chrome Mine – Assessment of Quantum for Rehabilitation (Assore, 2016)
- Hlagisa – Wildfontein Section 102 application (ESS, 2017)
- African Mining Trust – Zeerust, Wonderstone and RMDC Quantum for Rehabilitation (2013 – 2017)
- Dwarsrivier Chrome Mine – Assessment of Quantum for Rehabilitation (Assore, 2018)
- AMT – Updated of Quantum for Rehabilitation for three operations (AMT, 2018)
- African Mining Trust – Wonderstone Quantum for Rehabilitation evaluation (Assore, 2020)

Appendix C:
Public Participation Report

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRE reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Public Participation Process Report: (Appendix C)

January 2025

Report Information

Project:	Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province
Report Title:	Public Participation Report
DMRE Reference No:	GP30/5/1/1/2/000073 BP/BAR
DWS Reference No:	WU37611
Client:	Far West Gold Recoveries (Pty) Limited (FWGR)
Project No:	DRDG#037
Compilation Date:	January 2025
Status of Report:	**PP Report for Draft EIR/EMP Report**

Verification	Capacity	Name	Signature	Date
By Author	Stakeholder Consultant	Vanessa Viljoen		5 December 2024
Reviewed by:	Technical Director / EAP	Gerlinde Wilreker		5 December 2024
Reviewed by:	Legal Review	Michael Hennessy		5 December 2024
Reviewed by:	CEO	Bradly Thornton		6 January 2025

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Abbreviations

BID	Background Information Document
CA	Competent Authority
CRR	Comments and Response Report
DALRRD	Department of Agriculture, Land Reform and Rural Development
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
I&AP	Interested and Affected Party
GDARD	Gauteng Department of Agriculture and Rural Development
DoH	National Department of Health
SAHRA	South African Heritage Resources Agency
DPWI	Department of Public Works and Infrastructure
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NNR	National Nuclear Regulator
PAIA	Promotion of Access to Information Act, 2000 (Act No. 2 of 2000)
POPIA	Protection of Personal Protection Act, 2013 (Act No. 4 of 2013)
PPP	Public Participation Process
NGO's	Non-Governmental Organisations
SMS	Short Message Services

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1 INTRODUCTION

The following report outlines the Public Participation activities conducted as part of the Environmental regulatory processes for Far West Gold Recoveries (Pty) Ltd (FWGR) which intends to reclaim and reprocess the gold residues of the Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and alternatively in the future other existing gold plants. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. Required infrastructure will include: Pumpstation, Process water from Kloof Shaft 10#, Pollution paddock, Access Road, Laydown area and Powerlines.

The TSF is situated approximately 2 km west of Westonaria, in the Rand West City Local Municipality. The N12 runs 2km to the South of the TSF. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine. The extent of the TSF is approximately 170 Ha.

Public involvement is a fundamental principle of the Environmental Impact Assessment. The inclusion of the views of the Interested and Affected Parties (I&APs) helps to ensure the decision-making process is equitable and fair and leads to more informed choice and better environmental outcomes.

2 PUBLIC PARTICIPATION PROCESS

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 Libanon project.

2.1 Applicable Legislation

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

- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The Environmental Impact Assessment 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 59 of 2008 (NEM:WA): List of Waste Management Activities;
- The Constitution of the Republic of South Africa, 1996;
- 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); and
- International good-practice guidelines for public participation and the Core Values of the International Association for Public Participation.

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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.

2.2 Objectives of the Public Participation Process

The PPP objectives for this project are to:

- Ensure that stakeholders are informed about the proposed Libanon 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 will be 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 ***(Process complete)***	❖ Stakeholder identification (WinDeed searches, compilation of stakeholder database); ❖ Landowner/ occupier consultation meetings; ❖ Consultation with the relevant Authorities (including ward councillors/ward committees) (Microsoft teams/One-on-one consultation meetings); ❖ Compilation of announcement documents (BID, Registration Sheet, Advert, site notice and Draft Scoping Report (DSR) notification letter) and providing project information to stakeholders; ❖ Obtaining initial comments, suggestions from stakeholders; and ❖ Land Claims enquiry.
Scoping Phase ***(Process complete)***	❖ Consultations with Directly Affected Landowners (Microsoft teams / One-on-one consultation meetings); ❖ Distribution and placement of project announcement materials (site notices, newspaper advertisements); ❖ Updating of the stakeholder database; ❖ Making available the Scoping Report for public review and comment; ❖ Providing stakeholders with further details of the proposed project and associated specialist studies; ❖ Consultations with stakeholders (virtual meetings and in-person meetings);

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Project Phase	Activities to be Undertaken
	❖ Obtaining further comments or suggestions from stakeholders; and ❖ Informing specialists and the applicant about comments received from stakeholders. ❖ Submit Final Scoping Report to relevant competent authorities.
EIA Phase	❖ Provide feedback about the specialist studies conducted and mitigation measures proposed by means of consultation with stakeholders; ❖ Provide opportunity for I&APs to comment on specialist findings, impacts assessments and recommendations; ❖ Make the relevant environmental reports available for public review and comment; ❖ Consultations with stakeholders (virtual meetings and face to face meetings); ❖ Verify that comments raised by I&APs have been accurately recorded; and ❖ Inform specialists and the proponent of stakeholders' comments. ❖ Submit Final Environmental Reports to relevant competent authorities.
Decision Making Phase	❖ Once the competent authorities have come to a decision regarding the authorisation of the project, all registered stakeholders will be notified of the decision made and the appeal process will be explained.

2.3 Summary of Issues raised by Stakeholders

Comments raised by stakeholders during the scoping phase are included in the Comments and Responses Report (CRR) **(Appendix C9)** of the Final Scoping Report.

2.4 Public Participation Approach

2.4.1 Landowner Consent

As part of the IWULA procedure, an applicant is required to attain consent from the property owners whose property will be affected by the proposed water uses. Sibanye Gold Limited (Sibanye) is the landowner for the property on which the TSF and proposed infrastructure will be located. There is a Use and Access Agreement in place between Sibanye and DRDGOLD Limited for operations that FWGR will be undertaking on Sibanye property.

2.4.2 Submission of the Environmental Authorisation Application Form

An application for an Environmental Authorisation for the proposed reclamation of the Libanon Project was submitted to the Department of Mineral Resources and Energy (DMRE) **on Monday, 8 July 2024.**

An IWULA will be submitted via the electronic - Water Use Licence Application and Authorisation System (e-WULAAS) once complete. The project has been registered (WU37611) on e-WULAAS and the e-WULAAS process has commenced and is ongoing. The Proposed Project is currently on Phase 1 of the e-WULAAS.

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2.4.3 Pre-application Meeting with the Department of Water and Sanitation

A pre-application meeting was arranged and attended with Department of Water and Sanitation (DWS) officials on **Monday, 19 August 2024**.

The purpose of the Meeting was to:

- Present and discuss the proposed reclamation of the Libanon Project;
- Provide an overview of the Integrated Water Use License Application (IWULA) process;
- Provide the DWS officials with an opportunity to raise comments/seek clarity and provide input for the Project; and
- Record comments raised and then include them in the Comments and Responses Report (CRR) which will be integrated into the IWULA Technical Report.

The following stakeholders attended the online pre-application meeting:

Table 2-2: DWS Pre-application attendees

Organisation	Name of attendee	Designation
Department of Water and Sanitation	Ms Basini Lerato Nkuna	Environmental Officer/Assessor
Department of Water and Sanitation	Ms Xolelwa Gloria Bhele	Environmental Officer
Department of Water and Sanitation	Ms Josephine Dineo Magolego	Environmental Officer
Department of Water and Sanitation	Ms Thabelo Tshipate	Environmental Officer
Far West Gold Recoveries (Pty) Ltd	Mr Greg Ovens	Project Manager
Far West Gold Recoveries (Pty) Ltd	Ms Anja Esterhuizen	Environmental Officer
Kongiwe Environmental (Pty) Ltd	Ms Phumla Mngwengwe	WULA Consultant
Kongiwe Environmental (Pty) Ltd	Mr Bradly Thornton	Project Director
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement Consultant
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevele	Environmental Consultant
No apologies		
N/A		

2.4.4 Site Visit with the Department of Water and Sanitation

A site visit was arranged and attended with Department of Water and Sanitation (DWS) officials on **Thursday, 12 September 2024, the team met at the Libanon TSF Site, Cnr Bridges Avenue and Cedar Lane, Westonaria**.

The purpose of the site visit was to:

- Show the overall project site, as well as the proposed location of the infrastructure and water uses to the DWS;
- Provide the DWS officials with an opportunity to raise comments/seek clarity and provide input.
- Record comments raised and then include them in the CRR.

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Information at the site visit was presented by means of a locality map which showed the affected properties. Minutes of the site visit has been compiled and distributed to the relevant DWS officers. **(Appendix C8)**.

The following stakeholders attended the Site Visit:

Table 2-3: DWS Site visit attendees

Organisation	Name of attendee	Designation
Department of Water and Sanitation (DWS)	Ms Basani Nkuna	Environmental Officer (Case Officer)
DWS	Ms Portia Chawane	Environmental Officer
DWS	Ms Zanele Nyamande	Specialised Production: Section 21(c) & (i)
Far West Gold Recoveries (Pty) Ltd	Ms Anja Esterhuizen	Applicant
Kongiwe Environmental (Pty) Ltd	Ms Phumla Mngwengwe	Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement Consultant
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevele	Junior Environmental Consultant

2.4.5 Stakeholder Identification and Analysis

Project stakeholders are defined as individuals/ groups/ entities who:

- Are impacted or likely to be impacted directly or indirectly (positively / negatively) by the proposed project; and
- May have an interest in the proposed Project; these include individuals / groups / entities whose interest may be affected by the proposed project and who have the potential to influence the project outcomes.

To ensure a proper representation of all stakeholders, the following identification methods were used as part of the stakeholder identification and analysis process:

- WinDeed searches for the directly affected and adjacent farms;
- Desktop and online research;
- Identifying the relevant ward councillors for the affected wards;
  - Cllr Zodwa Nkosi, Ward Councillor 24 (indirectly);
  - Cllr Anele Saba, Ward Councillor 25 (directly); and
  - Cllr Amanda Setjyebi, Ward Councillor 26 (indirectly);
- Identifying and consulting relevant community ward committee members;
- Identifying and consulting key community leaders;
- Consulting landowners and land occupiers;
- Consulting with the Gauteng Department of Agriculture, Land Reform and Rural Development, Office of the Regional Land Claims Commissioner: Gauteng Province;
- Consulting government departments on a National, Provincial and Local level relevant to the project;

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- Stakeholders who respond to the publication of newspaper advertisements;
- Stakeholders who respond to the distribution of project documentation;
- Updating the stakeholder database from attendance registers from a broad range of stakeholder meetings that will be held throughout the process; and
- Site visits will be conducted to familiarise Kongiwe of what is in the area and assist in the effort to identify any additional stakeholders.

Identified stakeholders who are affected by or interested in the proposed project area are grouped into the following broad categories:

- **Government:** National, Provincial, and Local Authorities (including ward councillors and ward committee members);
- **Parastatals:** Various semi-Government entities, Organs of State;
- **Landowners and Occupiers:** Directly and indirectly affected;
  - **Directly Affected:** these are landowners / occupiers that reside within an application boundary area or who reside on a property(s) that will contain proposed project infrastructure;
  - **Adjacent (Indirectly Affected):** these landowners / occupiers are directly adjacent to an application boundary or property(s) that contains infrastructure; and
  - **Other Affected:** these landowners / occupiers who have registered formally as an I&AP.
- **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;
- **Business and industry:** Small, Medium and Micro Enterprises (SMMEs), mines, industrial and large business organisations; and

A stakeholder database has been compiled and will be updated throughout the environmental regulatory process **(Appendix C1)**.

2.4.6 Land Claims Enquiry

A formal Letter of enquiry was compiled and sent to the Land Claims Commission, Mr Solomon Maruma from the Office of the Regional Land Claims Commissioner: Gauteng Province, Department of Agriculture, Land Reform and Rural Development (DALRRD), on **Thursday, 4 July 2024**. The letter contained a list of all the directly affected properties for the project.

Feedback was received from DALRRD by means of letters dated **Monday, 8 July 2024 (Appendix C2)** indicating that there are no pending land claims on the Directly Affected Properties.

2.4.7 Communication and Engagement

2.4.7.1 Public Participation Materials

Considering the legislative requirements and good practice, the following documents were developed and distributed to stakeholders. The various PPP information materials will be used as part of the Scoping and Environmental Impact Assessment (EIA) and IWULA process**.**

Background Information Document (BID): The BID **(Appendix C3)** provided important information regarding the following:

- A project description of the proposed Libanon project.
- The Scoping, EIA and PPP which will be undertaken in support of the relevant environmental authorisations/permits and the contact details of the Environmental Assessment Practitioner (EAP) and the stakeholder engagement consultants.
- Details about how stakeholders could register as an I&AP and be kept informed about the project developments.
- The public review and comment period for environmental reports; and
- Invitation to attend an open day.

The BIDs were emailed on **Thursday, 04 July 2024**, to the stakeholder database **(Appendix C6)**.
The BID was available on the following website:

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

Registration and Comment Form: An I&AP registration form was sent out to stakeholders to register formally and/or to submit comments **(Appendix C3).**

Newspaper advertisements: A newspaper advert **(Appendix C4)** was placed in ***the Randfontein Herald, on Tuesday, 09 July 2024***. The advert included the following details:

- Brief project description.
- Legal framework, the competent authorities.
- How stakeholders could access the Draft Scoping report for public review and comment.
- The details of the open day.
- Registration as stakeholders.
- The contact details of the EAP and the stakeholder engagement consultants.

Site notice: The site notice provided an overview of the project and highlights the applicable legislation, environmental authorisation/permits applicable to the project. It also outlined the stakeholder engagement process to be followed and where relevant information could be obtained from. A locality map of the project site was included in the site notice. Details of the open day and how stakeholders could register as I&APs were included in the Site Notice. Pictures and co-ordinates of where the site notices were placed will be recorded in the site notice report and a site notice map was developed **(Appendix C5).**

Notification Letter with a Comment and Registration Form: An email was sent to stakeholders to inform them about the proposed Libanon project. The email also shared details of the open day and invited the broader public to formally register as I&APs. A Registration and Comment Form was provided for stakeholders to use for formal registration and to submit their comments **(Appendix C3)**.

A reminder notification was emailed on **Friday, 19 July 2024** to remind all stakeholders of the availability of the DSR for public review and comment. The reminder email also served the purpose of reminding stakeholders to attend the open day at Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780 on **Saturday, 27 July 2024** from **09H00 - 11H00 (Appendix C6).** An electronic copy of the non-technical summary was also distributed to all stakeholders on the database.

Telephonic discussions: Stakeholders were consulted by means of telephonic discussions. These discussions facilitate the process of inviting stakeholders to stakeholder meetings and provide stakeholders with a platform to raise issues and suggestions regarding the proposed Libanon Project. Comments raised during telephonic discussions will be recorded and addressed by the project team (EAP and the relevant specialists).

2.4.7.2 Scoping Phase Consultation

Pre-application meeting: Consultation during the pre-application phase was aimed at providing key stakeholders with an overview of the proposed project to obtain initial comments which informed the specialist studies and project planning. Various stakeholder meetings were held to facilitate dialogue between stakeholders and the project team members who presented an overview of the Proposed Project, locality, infrastructure and land tenure maps were distributed as part of the meetings.

Authority Meetings: Authority meetings were held with various Organs of State, the purpose of which was to discuss the Libanon project and obtain initial comments which informed specialist studies and project planning. The project team presented an overview of the proposed Libanon project and locality, infrastructure and land tenure maps were distributed as part of the meeting.

Landowner Consultation Meetings: Consultation meetings were held with directly affected landowners on a one-on-one basis. An overview of the Proposed Project, land tenure and locality plans were presented. Landowners were provided with an opportunity to raise comments/suggestions regarding the Proposed Project.

Site Visits: Additionally, site visits will be held with key stakeholder where needed. The purpose of the site visits will be to show stakeholders the Libanon project site and obtain initial comments which will inform specialist studies and project planning.

Stakeholder engagement meetings: Consultation during the scoping phase was aimed at providing 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 virtual meetings and in-person meetings. One-on-one consultation meetings were held via on-line forums such as Microsoft

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Teams, or telephonically. Formal consolation meeting was held on-line via Microsoft Teams during the public review period for all stakeholders on the database.

Mobilisation of stakeholders was done for Authorities (including ward councillors /ward committees), NGOs, landowners / land occupiers and community members to promote attendance, by means of telephonic consultation and distribution of emails and SMS.

Minutes of these meetings and the presentations / maps have been compiled and were distributed to all stakeholders who attended **(Appendix C8).** Refer to **Appendix C8** for a list of meetings and consultations that were undertaken. The stakeholder database was updated with all stakeholders who attended the meetings.

All comments raised by stakeholders during these meetings were captured into the Comment and Response Report (CRR). Responses to comments were provided in line with the overall project scope and available information **(Appendix C9).** Table 2-2 lists the stakeholders' meeting schedule.

Table 2-4: Stakeholder Meetings

Dates	Time slots	Meetings held
Virtual Meetings: Microsoft Teams Online Meeting		
Thursday, 18 July 2024	10H00 – 10H30	Department of Public Works and Infrastructure
Monday, 22 July 2024	12H00 – 13H00	Sibanye-Stillwater Limited
Tuesday, 23 July 2024	10H00 – 10H30	Rand West City Local Municipality
Wednesday, 24 July 2024	10H00 - 11H00	Broader Stakeholders on the Database
Thursday, 1 August 2024	10H00 – 11H00	Federation for a Sustainable Environment
Tuesday, 3 September 2024	10H00 – 13H00	Wonderfonteinspruit Catchment Forum
In-person Meeting: Open Day		
Saturday, 27 July 2024	09H00 - 11H00	Open Day at Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780

Focused efforts were made to engage with directly impacted stakeholders (those residents in the Proposed 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 also given the option to raise issues in the language of their choice and where translation was required, it was provided.

Open Day: An open day was held at Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780 on Saturday, 27 July 2024 from 09H00-11H00. The purpose of the open day was to discuss the proposed Project, discuss the contents of the DSR, provide I&APs with an opportunity to raise their comments and interact with the project team. Posters with information regarding the proposed project description, locality, infrastructure, and land tenure maps were displayed. Copies of the non-technical summary were also distributed to stakeholders who attended. The non-technical summaries were available in English **(Appendix C3)**. Stakeholders were also given the option to raise issues in the language of their choice, and where translation was required, it was provided.

Mobilisation of stakeholders was done for Authorities, NGOs, landowners / land occupiers and community members to promote attendance, by means of telephonic consultation and distribution of emails and SMS.



Figure 2.2: Open Day held on Saturday, 27 July 2024 from 09H00-11H00

2.4.7.3 Availability of Reports for Public Review and Comment

Copies of the Draft Scoping Report (DSR) were available for public review and comment for a period of 30 days from **Thursday, 11 July 2024 until Monday, 12 August 2024**.

The DSR was available as follows:

- Copies of the non-executive summary of the DSR were distributed to all stakeholders on the database.
- Copies of the DSR were made available for public review and comment on the following website: Kongiwe's website: https://kongiwe.com/projects/
- A hard copy of the Draft Scoping Report (DSR) was made available at the following public place:
  - Location: **Westonaria Public Library**
  - Contact Person: Mr Thozama Ndabeni, Westonaria Librarian
  - Telephone No: Supervisor, (010) 345 4388/4389
  - Physical Address: Corner Neptunus & Saturnus streets, Westonaria, Gauteng, 1780



Figure 2.3: Westonaria Public Library

The DSR and appendices was delivered to the **DMRE** on **Thursday, 11 July 2024**, which is the CA for the EA application. Key Commenting Authorities received an email with a website link to where they could download the DSR **(Appendix C6).**

A non-technical summary of the DSR report was compiled and distributed to stakeholders with no access to the internet. Hard copies of the non-technical summary were distributed through the relevant community representatives and at the open day that was held.

Copies of the Draft IWWMP will be made available for review once the required phase of the e-WULAAS process has been reached. The report will be made available for a period of 60 days. This is an ongoing process that is occurring simultaneously with the Environmental Authorisation process.

Table 2-5 below provides a summary of the stakeholder engagement activities that formed part of the Draft Scoping Phase.

Table 2-5: Summary of activities undertaken as part of the Scoping Phase

Activity	Details	Reference in Draft Scoping Report
Stakeholder identification and analysis	Stakeholders were identified by means of WinDeed searches, stakeholder networking and research for the compilation of a stakeholder database. The database was updated with new I&APs who formally registered and attended stakeholder meetings or submitted comments.	**Appendix C1** Stakeholder database
Identification of land claims	A formal Letter of enquiry was compiled and sent to the Land Claims Commission, Mr Solomon Maruma from the Office of the Regional Land Claims Commissioner: Gauteng Province, Department of Agriculture, Land Reform and Rural Development (DALRRD), on Thursday, 4 July 2024.	**Appendix C2** Land claims enquiry letter and correspondence from the DALRRD.

Activity	Details	Reference in Draft Scoping Report
	The letter contained a list of all the directly affected properties for the project. Feedback was received from DALRRD by means of letters dated 8 July 2024 (Appendix C2) indicating that there are no pending land claims on the Directly Affected Properties.	
Development of the Background Information Document	The BIDs were developed and distributed to all stakeholders on the database. The BID was available on the following website: ❖ Kongiwe's website: https://kongiwe.com/projects/	**Appendix C3** BIDs
Placement of newspaper advertisements	A newspaper advert was placed in the Randfontein Herald, on **Tuesday, 9 July 2024.**	**Appendix C4** Newspaper advertisements
Placement of site notices	Site notices were placed at publicly accessible places within proximity of the project area **on Thursday, 11 July 2024.** Copies of the Site Notices were placed at the following public places: ❖ **Westonaria Public Library** Pictures and co-ordinates of where the site notices were placed were recorded in the site notice report and a site notice map was developed.	**Appendix C5** Site notice report and placement map
Announcement of the project and the availability of the Draft Scoping Report	The announcement letter was distributed to stakeholders on **Thursday, 4 July 2024** to: ❖ Announce availability of the Draft Scoping Report; ❖ Invite stakeholders to the open day; and ❖ Indicate where the Scoping Report will be available for public review and comment. The DSR was available on the following website: ❖ Kongiwe's website: https://kongiwe.com/projects/ A copy of the DSR and non-technical summaries were placed in the following public place: ❖ **Westonaria Public Library**	**Appendix C6** Announcement Correspondence **Appendix C3** BID
Stakeholder meetings: Pre-Application	Stakeholders were invited to participate through virtual and live engagements. One-on-one meetings and focus group meetings were held with Authorities and Directly Affected landowners. Subsequent to these meetings, minutes were developed, and the stakeholder database was updated with additional	**Appendix C8** List of meetings & Meeting Minutes **Appendix C9** Comment and Response Report

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Activity	Details	Reference in Draft Scoping Report
	stakeholder information. Refer to (Appendix C8) for a list of meetings and consultations that were undertaken to date. A high-level overview of the proposed project, locality, infrastructure and land tenure maps were distributed as part of the meetings. All comments raised by stakeholders during these meetings were captured into the CRR.	
Stakeholder Meetings: Scoping Phase	Stakeholders were invited to participate through virtual 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. The following meetings were held: **Virtual Meeting:** **Wednesday, 24 July 2024** from 10H00 - 11H00 on Microsoft teams/scheduled Telephonic discussions. **In-Person Meeting:** An open day was held at the **Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780, Saturday, 27 July 2024** from **09H00 – 11H00**. Minutes of these meetings were compiled and distributed to everyone who attended these meetings. Comments raised from the meeting will be included into the CRR.	**Appendix C8** List of meetings & Meeting Minutes **Appendix C9** Comment and Response Report

2.4.7.4 Consultation Undertaken as part of the Final Scoping Phase

The aim of consultation during the Final Scoping Phase was to focus on the formal EIA process, specialist impact studies, Terms of Reference and addressing comments from stakeholders.

The Final Scoping Report was submitted to the DMRE **on Thursday, 22 August 2024**.

Stakeholders were notified of the availability of the Final Scoping Report for review on **Monday, 26 August 2024**. Stakeholders were provided with an 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 Final Scoping Report were incorporated into the CRR.

Table 2-6: PPP activities 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 Reports	The Final Scoping Report has been made available following websites: ❖ Kongiwe's website: https://kongiwe.com/projects/
Announcement of the Final Scoping Report	Notification letter notifying stakeholders about the availability of the Final Scoping Report for comment was emailed to the full stakeholder database. An SMS was sent to stakeholders who have no access to the internet, arrangements will be made to ensure that all stakeholders have full access to the reports - arrangements and requests will be accessed on a case-by case basis.

2.4.7.5 Consultation with Stakeholders during 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 will be included as part of the Environmental Impact Assessment Report and the Environmental Management Programme Report (EIA/EMPr). Stakeholder meetings will also be held to present the findings of the specialist studies and to get comments from stakeholders. The format of stakeholder meetings will be similar to the Scoping phase, these will be determined on a case-by-case depending on stakeholders' preference.

2.4.7.6 Public Participation Materials: EIA phase

Notification Letter: A letter **(Appendix C6)** which provides details about the availability of the DEIR/EMPr and the IWWMP for public review and comment and an invitation to virtual and non-virtual engagements was sent by email to the full stakeholder database on **Thursday, 9 January 2025**.

Newspaper advertisements: A newspaper advert (**Appendix C4**) was placed in ***the Randfontein Herald, on Thursday, 9 January 2025***. The advertisement provided details about the public review period for the Draft EIR/EMPr and the Draft IWWMP and how the public can access the draft reports for their review and comment. The advert provided information about the virtual and non-virtual engagements.

Telephonic discussions: Stakeholders will be consulted by means of telephonic discussions. These discussions facilitate the process of inviting stakeholders to virtual and non-virtual engagements and provide stakeholders with a platform to raise issues of concern and suggestions regarding the draft reports. Comments and/or concerns raised through telephonic discussions will be recorded and addressed by the project team (EAP and the relevant specialists).

Maps: Various maps which are part of the Draft EIR/EMPr and the Draft IWWMP will be on display during virtual and non-virtual engagements.

Posters: Posters will be developed and used at the virtual and non-virtual engagements. The following aspects will be covered in the poster presentation below:

- Project Overview;
- EIA process and legislative timeframes;
- Specialist findings, impacts and proposed mitigation measures; and
- PPP undertaken to date and next steps.

2.4.7.7 Availability of the Draft Environmental Impact Assessment Report / Environmental Management Programme and the Draft IWWMP for public review and comment

The Draft EIA/EMPr report has been compiled and will be made available for a 30-day public review and comment period from **Friday, 10 January 2025 until Monday, 10 February 2025**.

The Draft Integrated Water and Waste Management Plan (IWWMP) report will be made available for a 60-day public review and comment period from **Friday, 10 January 2025 until Tuesday 11 March 2025**.

The Draft EIA/EMPr and the Draft IWWMP will be made available as follows:

- Copies of the non-executive summary of the DEIR/EMPR will be distributed to all stakeholders on the database.
- Copies of the DEIA/EMPR and Draft IWWMP will be made available for public review and comment on the following website: Kongiwe's website: https://kongiwe.com/projects/
- A hard copy of the reports will be made available at the following public place:

Location	Physical Adress	Contact Person
Westonaria Public Library	Corner Neptunus & Saturnus streets, Westonaria, Gauteng, 1780	Mr Thozama Ndabeni, Westonaria Librarian – Supervisor (010) 345 4388/4389

The Draft EIA/EMPr and appendices were delivered to the DMRE which is the Competent Authority on Friday, 10 January 2025.

Key Commenting Authorities will receive an email with a website link to where they can download the Draft EIA/EMPr **(Appendix C6).**

2.4.7.8 EIA Phase Consultation

Stakeholder engagement meetings

Stakeholders are invited to participate through online and face to face engagements. Consultation meetings will be held using platforms like Microsoft Teams, telephonic discussions, and an Open Day.

The purpose of these Stakeholder Meetings is to discuss the Draft EIA/EMPr and the Draft IWWMP, present findings from the specialist studies, provide stakeholders with a platform to raise

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comments/concerns on the Draft EIA/EMPr and the Draft IWWMP reports and interact with the project team. Posters with information regarding the proposed project description, findings from the specialist studies, impacts and proposed mitigation measures will be displayed, these posters will include various maps of the affected areas. Copies of the non-technical summary will be distributed to stakeholders who attended. The non-technical summaries will be available in English. Minutes of the open day and the presentation as well as the posters will be compiled and distributed to all stakeholders who attended.

All comments raised by stakeholders during these meetings will be captured into the CRR. Responses to comments are provided in line with the overall project scope and available information.

Table 2-7: Details of the Stakeholder Meetings

Proposed dates	Available time slot	Method of Engagement
Online meeting		
Wednesday, 22 January 2025	10H00 – 11H00	Online / Microsoft teams
Face to face meeting (Open Day)		
Saturday, 25 January 2024	09H00 - 11H00	Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780

Focused efforts will be made to engage with directly impacted stakeholders, including vulnerable groups at local level. These individuals will be consulted directly and via their representatives, and other influential people within communities. Meetings will be held in a culturally appropriate manner, allowing stakeholders to voice their opinions and/or concerns openly. Stakeholders will also be given the option to raise issues in the language of their choice, and where translation is required, it will be provided.

Extensive mobilisation of stakeholders will be done for National, Provincial, and Local Authorities, Environmental Groups, Landowners / Land occupiers and Community members to promote attendance. Mobilisation of stakeholders was done by means of telephonic consultation, distribution of emails and Short Message Services (SMS/WhatsApp).

Table 2-8 below provides a summary of the stakeholder engagement activities that formed part of the Draft Environmental Impact Assessment Phase.

Table 2-8: Summary of PPP activities - Draft Environmental Impact Assessment Phase

Impact Assessment Phase		
Activity	**Details**	**Reference in DEIR/EMPr**
Announcement of the availability of the Draft EIA/EMPr/IWWMP Reports	A Notification letter which provides details about the availability of the Draft EIR/EMPr and the Draft IWWMP for public review and comment and an invitation to online and face-to-face engagements was emailed to the full stakeholder database.	Appendix C6 Announcement Letter
Placement of media advertisement for the EIA Phase	Newspaper advert was placed in **the Randfontein Herald, on Thursday, 9 January 2025**. The advertisement provided details about the public review period for the Draft EIR/EMPr and the Draft IWWMP and	Appendix C4 Advertisements

Impact Assessment Phase		
Activity	**Details**	**Reference in DEIR/EMPr**
	how the public can access the draft reports for their review and comment. The advert also provided information about virtual and non-virtual engagements.	
Placement of Draft EIA/EMPr/IWWMP Reports for public review and comment	The Draft EIA/EMPr reports have been compiled and will be made available for a 30-day public review and comment period and the Draft IWWMP report will be made available for a 60-day public review and comment period from. Copies of the abovementioned reports will be available on the following websites: ❖ Kongiwe's website: https://kongiwe.com/projects/ A hard copy of the reports and copies of the non-technical summary in English will be made available for public review and comment at the following public place: ❖ Westonaria Public Library, Corner Neptunus & Saturnus streets, Westonaria, Gauteng, 1780 A copy of the Draft EIR/EMPr and the Draft IWWMP will also be made available at the Stakeholder Meetings. Copies of the Draft EIR/EMPr and the Draft IWWMP will be sent to the DMRE and DWS and various Commenting Authorities for review and comment.	-
Open Day	Stakeholders are invited to participate through online and face-to-face engagements. One-on-one consultation meetings will be held via on-line forums such as Microsoft Teams, or telephonically. On-line engagement activities will be available during the public review period. Additionally, an Open Day will be held. The purpose of these Stakeholder Meetings is to discuss the Draft EIA/EMPr and the Draft IWWMP, present findings from the specialist studies, provide stakeholders with a platform to raise comments/concerns on the Draft EIA/EMPr and the Draft IWWMP reports and also interact with the project team. All comments raised by stakeholders during these meetings will be captured into the (CRR). Responses to comments are provided in line with the overall project scope and available information.	Appendix C9 Comment and Response Report

2.4.7.9 Availability of the Final Environmental Impact Assessment Report / Final Environmental Management Programme (Final EIR/EMPr) and the Draft IWWMP.

Stakeholders will be notified of the availability of the Final EIR / EMPr and the Final IWWMP reports for review by the CA's.

Table 2-9: Summary of the PPP activities - Final EIA phase

Activity	Details
Announcement of the Final EIR/EMPr /IWWMP	Notification letter notifying stakeholders about the availability of the of the Final EIR/ EMPr and the Final IWWMP for comment will be emailed to the full stakeholder database. Stakeholders who have no access to the internet, arrangements will be made to ensure that all stakeholders have full access to the reports - arrangements and requests will be accessed on a case-by case basis.
Placement of of the Final EIR / EMPr /IWWMP	The Final EIR / EMPr and the Final IWWMP will be available as follows: ❖ Copies of the Final EIR / EMPr and the Final IWWMP will be available on the following website: o Kongiwe's website: https://kongiwe.com/projects/
Submission to the Authorities	The Final EIR/EMPr will be submitted to the DMRE and key Commenting Authorities.
Submission to the Authorities	The Final IWWMP will be submitted to the DWS.

2.4.7.10 Consultation during the Decision-Making Phase

Once the competent authority has come to a decision regarding the authorisation of the project, all registered 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.

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Appendix C1: Stakeholder Database

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

Stakeholder Database

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Agricultural Union	AFGRI SA	Mr	Ernest	Botha	Afgri-Attorney	Gauteng
Agricultural Union	AFGRI SA	Mr	Johan	Smuts	Legal Representative (Afgri)	Gauteng
Agricultural Union	AFGRI SA	Ms	Nadia	Hetzel	Legal Representative (Afgri)	Gauteng
Agricultural Union	AFGRI SA (Gauteng)	Mrs	Lynette	Du Plessis	TAU SA Central Region	Gauteng
Agricultural Union	TAU SA (National)	Mr	Janse	Rabie	Head of Natural Resources	Gauteng
Agricultural Union	TAU SA Limpopo Region	Ms	Wilma	Prinsloo	Regional Secretary	Gauteng
Agricultural Union	Transvaal Agricultural Union of South Africa (TAUSA)	Mr	Henry	Geldenhuys	President	Gauteng
Business & Commerce	Eskom	Mr	Jason	Kasper	Land and Rights Manager	Gauteng
Business & Commerce	Eskom	Mr	Luvuyo	Diniso	W/L Allocations	Gauteng
Business & Commerce	Eskom	Mr	Moitheri	Khuphane	Ekurhuleni Environmental	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Business & Commerce	Eskom	Mr	Sbu	Nkalanga	Ekurhuleni Representative	Gauteng
Business & Commerce	Eskom	Ms	Charmaine	Mare	Eskom Enviro. Manager	Gauteng
Business & Commerce	Eskom	Ms	Nkateko	Msimango	Ekurhuleni Environmental	Gauteng
Business & Commerce	Eskom (National): National Transmission Company South Africa SOC Ltd (NTCSA)	Mr	John	Geeringh	Senior Consultant Environmental Management Grid Planning: Land and Rights	Gauteng
Business & Commerce	Johannesburg Chamber of Commerce & Industry	Ms	Bernadette	Zerler	Chief Executive	Gauteng
Business & Commerce	Minerals Council South Africa	Ms	Mpho	Thobye	Health	Gauteng
Business & Commerce	Passenger Rail Agency of South Africa (PRASA)	Ms	Nosizwe Nokwe	Macamo	Chairperson: Gauteng Rep	Gauteng
Business & Commerce	South African National Roads Agency Limited (SANRAL)	Ms	Ria	Barkhuizen	Environmentalist (NR)	Gauteng
Business & Commerce	South African National Roads Agency Limited (SANRAL)	Ms	Victoria	Bota	Environmentalist (Gauteng Region)	Gauteng
Business & Commerce	South African Road Agency (SANRAL)	Ms	SANRAL	SANRAL	Central email	Gauteng
Business & Commerce	Transnet	Ms	Carol	Gore	Property Technician, JHB	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Business & Commerce	Transnet Freight Rail	Mr	Xolisa	Kilani	Technical Engineer	Gauteng
Business & Commerce	Transnet Freight Rail Ltd (JHB)	Ms	Banzi	Mlungu		Gauteng
Business & Commerce	Transnet Ltd Gauteng	Ms	Suzan	Aidelomo	Gauteng Environmental Specialist	Gauteng
Business & Commerce	Transnet Freight Rail Ltd (JHB)	Mr	Thembinkosi	Memela	Property Technician	Gauteng
Business & Commerce	Transnet Ltd Freight Rail Gauteng	Ms	Annalize	Harmse	Chief Admin Official	Gauteng
Catchment Forum	BBM	Mr		Maponya	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum	BBM	Mr	AR	Zwart	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum	BBM	Mr	J	Masoba	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum	BBM	Mr	Mandy	Vilakazi	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum	BBM	Mr	N	Mogopodi	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum	BBM	Mr	P	Leburu	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum	BBM	Mr	Stephan	Veldsman	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Catchment Forum	BBM	Mr	WZ	De Lange	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
Catchment Forum, National Government	Department of Water and Sanitation (DWS)	Mr	Mogale	Matseba	Control Environmental Officer, Wonderfontein Catchment Forum Chair	Gauteng
Community-Based Organisation	WRIRA Community Engagement Forum	Mr	Lazarus	Molebatsi	Convener Community Engagement Forum: Ward 26	Gauteng
Community-Based Organisation	WRIRA Community Engagement Forum	Mr	Ramadibeng Father	Ratsoeu	Admin: Ward 32	Gauteng
Community Member	Community Member	Mr	Solly	Modise	Community Member	Gauteng
Community Member	Community Member	Ms	Lisakhanya	Majuqu	Community Member: Ward 25	Gauteng
Community Member	WRIRA Community Engagement Forum	Mr	Albert	Soxokashe	Community Member	Gauteng
Directly Affected Landowner	Sibanye Stillwater	Mr	Bashan	Govender	Environmental Compliance SA Region	Gauteng
Directly Affected Landowner	Sibanye Stillwater	Mr	Kahmani	Gounden	Supervisor Surface and Mineral Rights	Gauteng
Directly Affected Landowner	Sibanye Stillwater	Mr	Stephan	Botes	Unit Manager - Mineral Title and Legal Services	Gauteng
Directly Affected Landowner	Sibanye Stillwater	Ms	Evelyn	Mekgwe	Superintendent - Environmental Compliance	Gauteng
Directly Affected Landowner	Sibanye Stillwater	Ms	Grace	Langa	Superintendent Environmental Compliance Coordinator	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Directly Affected Landowner, Indirectly Affected Landowner	Rand West City Local Municipality	Mr	Thabiso	Makhele	Property Evaluation	Gauteng
Directly Affected Landowner, Indirectly Affected Landowner	Sibanye Stillwater; G F I Mining South Africa Pty Ltd	Mr	Sylvester	Nkwe	Acting Unit Manager Environmental Compliance	Gauteng
Directly Affected Landowner, Indirectly Affected Landowner, National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Jacob	Mahloko	Construction Project Manag ement	Gauteng
Directly Affected Landowner, Indirectly Affected Landowner, National Government	Department of Public Works and Infrastructure (DPWI)	Ms	Friedah	Khoza	Property Manager	Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Mr	Moses	Mokwana		Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Mr	Vuyani	Bekwa	Executive Manager: Economic Development and Planning	Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Ms	Anele	Songelwa		Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Ms	Cassie	Pelser	Senior Town Planner	Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Ms	Diteboho	Moabi		Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Ms	Gladys	Ngwana	Environmental Officer	Gauteng
Directly Affected Landowner, Local Municipality	Rand West City Local Municipality	Ms	Sewela	Malehopa	Town Planner	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
District Municipality	West Rand District Municipality (WRDM)	Mr	Elias	Koloi	Municipal Manager	Gauteng
District Municipality	West Rand District Municipality (WRDM)	Mr	HB	Munyai	Speaker	Gauteng
District Municipality	West Rand District Municipality (WRDM)	Mr	Tebogo	Patane	PA to Infrastructure	Gauteng
District Municipality	West Rand District Municipality (WRDM)	Mr	Zeblon	Mphaphuli	Regional Development Planning and Environmental Management	Gauteng
District Municipality	West Rand District Municipality (WRDM)	Ms	Amanda	Segopolo	PA to Municipal Manager	Gauteng
District Municipality	West Rand District Municipality (WRDM)	Ms	Portia	Sikiti		Gauteng
District Municipality	West Rand District Municipality (WRDM)	Ms	Robbie	Hendrikse	Town Planner	Gauteng
District Municipality	West Rand District Municipality (WRDM)	Ms	Susan	Stoffberg	Environmental Manager	Gauteng
Environmental NGO's	African Wattle Crane Programme (ICF/EWT)	Ms	Kerryn	Morrison	Senior Manager: Africa	Gauteng
Environmental NGO's	Benchmarks Foundation (BMF)	Mr	David	van Wyk	Lead Researcher	Gauteng
Environmental NGO's	Benchmarks Foundation (BMF)	Mr	Moses	Cloete	Director	Gauteng
Environmental NGO's	Benchmarks Foundation (BMF)	Mr	Simo	Gumede	Logistics and Administration Lead	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Environmental NGO's	Benchmarks Foundation (BMF)	Ms	Busi	Thabane	General Manager	Gauteng
Environmental NGO's	Birdlife South Africa (BLSA)	Dr	Kirsten	Day	Policy & Advocacy Manager	Gauteng
Environmental NGO's	Centre for Environmental Rights (CER)	Mr	Brandon	Abdinor	Programme Head: Pollution & Climate Change	Gauteng
Environmental NGO's	Council of Geosciences	Mr	Henk	Coetzee	Environmental Manager	Gauteng
Environmental NGO's	Earthlife Africa Johannesburg	Ms	Makoma	Lekalakala	Director	Gauteng
Environmental NGO's	Endangered Wildlife Trust (EWT)	Dr	Ian	Little	Head of Conservation and Science	Gauteng
Environmental NGO's	Endangered Wildlife Trust (EWT)	Dr	Oliver	Cowan	Conservation Science Officer	Gauteng
Environmental NGO's	Federation for Sustainable Environment (FSE)	Ms	Mariette	Liefferink	Chief Executive Officer	Gauteng
Environmental NGO's	Federation of Sustainable Environment (FSE)	Mr	Koos	Pretorius	Representative	Gauteng
Environmental NGO's	Gauteng Wetland Forum	Mr	Bismark	Mashau	Chairperson	Gauteng
Environmental NGO's	Gauteng Wetland Forum	Ms	Keitumetse	Mekgoe	DEA Provincial Coordinator	Gauteng
Environmental NGO's	Groundwork	Mr	Bobby	Peek	Director	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Environmental NGO's	Johannesburg Heritage Foundation	Mr	Mark	Schaerer	Member of the Joint Plans Committee West	Gauteng
Environmental NGO's	Johannesburg Heritage Foundation	Mr	Wynand	Dreyer	Secretory of the Joint Plans Committee	Gauteng
Environmental NGO's	Klipwas	Mr	Dennis	Jane	Operations	Gauteng
Environmental NGO's	Minerals Council South Africa	Mr	Babalwa	Matiwane	Environment Department	Gauteng
Environmental NGO's	South African Human Rights Commission	Mr	Wisani	Baloyi	Communications Co-ordinator	Gauteng
Environmental NGO's	South African Human Rights Commission	Ms	Chantal	Kisoon	CEO PA	Gauteng
Environmental NGO's	South African National Biodiversity Institute (SANBI)	Ms	Zama	Nzeru		Gauteng
Environmental NGO's	University of Witwatersrand (Gauteng Observatory)	Ms	Kerry	Bobbins		Gauteng
Environmental NGO's	WESSA (Wildlife & Environmental Society of South Africa) Springs & Nigel branch	Mr	Peter	Law		Gauteng
Environmental NGO's	Wildlife and Environment Society of South Africa (WESSA)	Mr	Hanno	Moller	Wessa West Rand Branch (Acting Branch manager	Gauteng
Environmental NGO's	Wildlife and Environment Society of South Africa (WESSA)	Ms	Kgomotso	Kotlai		Gauteng
Environmental NGO's	Wildlife and Environmental Society of South Africa (WESSA)	Mr	John	Wesson	Manager: Conservation Specialist	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Environmental NGO's	Wildlife and Environmental Society of South Africa (WESSA)	Mr	Sabelo	Sithole	Admin	Gauteng
Environmental NGO's	Wildlife and Environmental Society of South Africa (WESSA)	Ms	Tevya	Lotriet	Senior Sustainability Programme Manager	Gauteng
Indirectly Affected Landowner	Baxter Consulting - Far West Rand Dolomitic Water Association	Mr	Wimpie	M		Gauteng
Indirectly Affected Landowner	Far West Rand Dolomitic Water Association	Mr	Henk	Jooste	Far West Rand Dolomitic Water Assoc	Gauteng
Interested & Affected Party	Interested and Affected party	Ms	Mokondeleli	Makoya		Gauteng
Interested & Affected Party	Interested and Affected Party	Mr	Samuel	Maponya	Diesel Mechanic	Gauteng
Interested & Affected Party	Interested and Affected Party	Ms	Bongumusa	Mbatha		Gauteng
Interested & Affected Party	Interested and Affected Party	Ms	Mukondeleli	Makoya		Gauteng
Interested & Affected Party	Merafong Dolomite Risks CS Group	Mr	Jeremiah	Matsobane	Coordinator	Gauteng
Interested & Affected Party	NWU Potch Campus	Ms	Eric	Stoch		Gauteng
Interested & Affected Party	Unisa	Mr	Eric	Nealer	Professor	Gauteng
Labour Union	Congress of South Africa Trade Union (COSATU)	Mr	Nomthunzi	Unknown	Gauteng Spokesman	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Labour Union	National Union of Metal Workers of South Africa (NUMSA)	Mr	Gift	Nkabinde	RLO - Legal Representative	Gauteng
Labour Union	National Union of Metal Workers of South Africa (NUMSA)	Ms	Zwiitwaho	Raidane	RLA - Legal Representative	Gauteng
Local Government	Department of Health: West Rand District	Dr	Mary	Daka	Executive Director	Gauteng
Local Municipality	Department of Water and Sanitation (DWS)	Ms	Nthata	Thandile		Gauteng
Local Municipality	Merafong City Local Municipality	Mr	I	Mavhutha	Chief Environmental Management	Gauteng
Local Municipality	Merafong City Local Municipality	Mr	I	Mashamba	Environmental Officer	Gauteng
Local Municipality	Merafong City Local Municipality	Mr	Siyethemba	Mdletshe	Municipal Manager	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Atang	Modise	PA/Executive Secretary: Infrastructure	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Bongani Eugene	Nkambule	Executive Manager: Infrastructure	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Edward	Nkoana	Credit Controller	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Jokazi	Mkhuseli	Council Whip	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Lulama	Manganyi	Westonaria Librarian - Assistant	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Local Municipality	Rand West City Local Municipality	Mr	Mzubanzi	Silinga	Executive Director: Community Services	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Samuel	Monkwe	Unit Manager Infrastructure Planning and Programme Management	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Thabo	Ndlovu	Municipal Manager	Gauteng
Local Municipality	Rand West City Local Municipality	Mr	Thozama	Ndabeni	Westonaria Librarian - Supervisor	Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Gladys	Mahlangu	Assistant Manager: Environment Management	Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Isabel	Olivier	Town Planner	Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Kgomotso	Sekgobela		Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Leanne	Scheepers		Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Maliba	Ramatlhape	Manager: Environmental Management	Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Marjorie	Faber	Randfontein Librarian - Supervisor	Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Selina	Moumakwe	Speaker	Gauteng
Local Municipality	Rand West City Local Municipality	Ms	Thandeka	Lekgae	Rand West City Library - Assistant	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Local Municipality	Rand West City Local Municipality	Ms	Thandokazi	Stefane	PR Councillor	Gauteng
Local Municipality, Ward Councillor	Rand West City Local Municipality	Cllr	Anele	Saba	Ward Councillor: Ward 25	Gauteng
Local Municipality, Ward Councillor	Rand West City Local Municipality	Cllr	Zodwa	Nkosi	Ward Councillor: Ward 24 (indirectly)	Gauteng
Local Municipality, Ward Councillor	Rand West City Local Municipality	Ms	Amanda	Setyebi	Ward Councillor: Ward 26 (indirectly)	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development	Ms	Mashudu	Marubini	Deputy Director	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development (DALRRD)	Mr	Solomon	Maruma	Land Claims Gauteng Regional Officer	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development (DALRRD)	Ms	Amukelani	Shiburi	Land Claim Officer	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development (DALRRD)	Ms	Desiree	Kgole	Commission on Restitution of Land Rights- Gauteng Regional Officer	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development (DALRRD)	Ms	Fundiswa	Ndaba	Commission on Restitution of Land Rights- Gauteng Regional Officer	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development (DALRRD)	Ms	Phyllystas	Mmakola	Resource Auditor	Gauteng
National Government	Department of Agriculture, Land Reform and Rural Development (DALRRD)	Ms	Vuyiswa	Qobo	Environmental Officer	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Dr	Mpho	Tshitangoni	Chief Director: Land Remediation	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Andrew	Ngubeni		Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Lucas	Mahlangu	Control Environmental Officer: Waste Licensing	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Mulalo	Sundani	National Office: Directorate: Forestry Regulation and Oversight: Environmental	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Obed	Baloyi	Environmental Impact Evaluation	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Shumani	Dzivhani	Deputy Director: Forestry Regulation	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Mr	Themba	Dlamini	Gauteng Regional Office	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Boikanyo	Matsha	Senior Forestry Regulation Officer	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Lydia	Bosoga	Deputy Director: Sustainable Land Management	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Mashudu	Mudau	Protected Areas Planning and Management Effectiveness	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Mashudu	Mukwevho	Resource Auditor	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Mpho Patience	Thenga		Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Pumeza	Nodada	Chief Director: Forestry Management	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Santie	Janse van Rensburg	Legal	Gauteng
National Government	Department of Forestry, Fisheries and the Environment (DFFE)	Ms	Tabisa	Fiko	Chief Directorat Environmental Programmes : Gauteng	Gauteng
National Government	Department of Mineral Resources (DMRE)	Adv	Mmadikeledi	Malebe	DDG: Mineral Regulation	Gauteng
National Government	Department of Mineral Resources (DMRE)	Mr	Tseliso	Maqubela	Minerals and Petroleum Regulation	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Mr	David	Msiza	Mine Health and Safety Inspectorate	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Mr	Jacob	Mbele	Director General PA: Ms Mamabefu Modipa	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Mr	Nkosinathi	Mahlaba	Environmental Officer	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Mr	Rudzani	Mabogo	Head of Environment: Assistant Director	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Mr	Siyabonga	Vezi	Acting Gauteng Regional Director	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Ms	Buyisiwe Ntokozo	Ngcwabe	DDG- Mineral Policy & Promotions	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Ms	Carol	Khanyile	Gauteng Regional: Secretary	Gauteng
National Government	Department of Mineral Resources and Energy (DMRE)	Ms	Thobile	Mbatha	Chief Director	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Lutendo	Neduvhuledza	Town Planning Services (HO)	Gauteng
National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Malusi	Ganiso	Town Planning Services (HO)	Gauteng
National Government	Department of Public Works and Infrastructure (DPWI)	Mr	Thapelo	Duma	PA to Regional Manager	Gauteng
National Government	Department of Public Works and Infrastructure (DPWI)	Ms	Desire	Msimango		Gauteng
National Government	Department of Public Works and Infrastructure (DPWI)	Ms	Jabulile	Mabaso	Acting Regional Manager	Gauteng
National Government	Department of Public Works and Infrastructure (DPWI)	Ms	Lerato	Mbatha		Gauteng
National Government	Department of Rural Development and Land Reform (DRDLR)	Mr	Harry	Maphutha	Regional Land Claims Commissioner	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Adriaan	Claassen	Chief Engineer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Andrew	Mbedzi	Instream	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Ayanda	Mtetwa	National	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Desmond	Mutshaine	Geochemistry	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Dikeledi	Baloyi	Environmental Officer	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Water and Sanitation (DWS)	Mr	K	Nkumanda	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Kama	Meso	Environmental Officer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Khathutshelo	Mudau	Specialised Production	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	KP	Makgoba	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Londolani	Mutshekwa	Mine Water Quality Management	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Lumka	Kuse	Gauteng Wetland Forum (Downstream)	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Nemataheni	Thivhafuni	Scientist Manager: Water Use Efficiency in the IMP Sector	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Noe	Malise	Resource Protection & Waste	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	TG	Makhari	Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
National Government	Department of Water and Sanitation (DWS)	Mr	Victor	Nkuna	Environmental Officer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Candace	Enoch	Environmental Officer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Faith Fulufhelo	Khosa	Gauteng Regional Representative	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Water and Sanitation (DWS)	Ms	Florah	Mamabolo	Gauteng Provincial Operations	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Jeanette Ledile	Nyama		Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Josephine Dineo	Magolego	Environmental Officer: Case Officer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Mathedimosa Hellen	Makgwale	GAU	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Mogadi	Machaba	Environmental Officer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Mulalo	Sidogi	Environmental Officer	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Nosie	Mazwi	Director: Mining and Industry Water Quality Regulation	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Portia C	Chawane	Control Environmental Officer Grade A	Gauteng
National Government	Department of Water and Sanitation (DWS)	Ms	Thabelo	Tshipate	Case Officer	Gauteng
National Government	National Department of Health (DOH)	Ms	Belinda	Makhafola	Directorate: Environmental Health Services	Gauteng
National Government	National Nuclear Regulator (NNR)	Mr	Patle	Mohajane	Programme Manager: NORM	Gauteng
National Government	South African Heritage Resources Agency	Ms	Nokusho	Ngobeni	Heritage Officer	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
National Government	Department of Water and Sanitation (DWS)	Ms	Gloria	Bhele	Chairperson: Wonderfontein & Loopspruit Forum: Kromdraai Catchment	Gauteng
National Government,	Department of Mineral Resources and Energy (DMRE)	Mr	Musa	Mangobe	Gauteng Environment	Gauteng
National Government,	Department of Water and Sanitation (DWS)	Mr	Mabona (Rodney)	Lesiba	Control Environmental Officer, Klip River and Natalspruit Catchment Forum Assis	Gauteng
National Government,	Department of Water and Sanitation (DWS)	Mr	Phillimon	Khwinana	Control Environmental Officer, Blesbokspruit and Rietspruit Catchment Forum Ch	Gauteng
Provincial Government	Department of Health Johannesburg District	Ms	Crystal	Rosenburg	Environmental Health Officer	Gauteng
Provincial Government	Department of Health Johannesburg District	Ms	Kgomotso	Leola	Environmental Health Practitioner	Gauteng
Provincial Government	Department of Health Johannesburg District	Ms	Thabiso	Motlhamme	African Director: Environment Department	Gauteng
Provincial Government	Department of Health Westonaria District: West Rand District Health Services	Ms	Cynthia	Mokhali		Gauteng
Provincial Government	Department of Health Westonaria District: West Rand District Health Services	Ms	Sentle	Mofokeng	Chief Environmental Health Practitioner	Gauteng
Provincial Government	Department of Health: Gauteng Province	Ms	Londiwe	Mkhize	Environmental Health Practitioner- Ekurhuleni District	Gauteng
Provincial Government	Department of Water and Sanitation	Ms	Basani	Nkuna	Environmental Officer	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Provincial Government	Department of Water and Sanitation (DWS)	Ms	Betty	Nakene	Gauteng: Nigel / Springs	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Dan	Motaung	Deputy Director: EIA	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Eric	Mulibana	Air Quality	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Erick	Moletsane	Environmental Officer	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Joshua	Quinton	PSG B	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Loyiso	Mkwana	Chief Director	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Marc	Leroy	Environmental Information Manager	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Mokutu	Nketu		Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Nhlanhla	Makhathini	Assistant Director	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Steven	Mukhola	Director	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Tendani	Rambuda	Control Environmental Officer Grade B	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Mr	Tjatja	Mosia	Environmental Officer	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Ms	Albertina	Setsiba	PS	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Ms	Anga	Yaphi	PS - Biodiversity	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Ms	Lydia	Muditambi	Air Quality	Gauteng
Provincial Government	Gauteng Department of Agriculture and Rural Development (GDARD)	Ms	Mathabo	Phoka	Environmental Officer: Specialised Production	Gauteng
Provincial Government	Gauteng Department of Health: West Rand District Municipality	Ms	C.D	Mokhali	Environmental Health & Safety	Gauteng
Provincial Government	Gauteng Department of Health: West Rand District Municipality	Ms	Onica	Papiso	AD: Health and Safety	Gauteng
Provincial Government	Gauteng Department of Health: West Rand District Municipality	Ms	Thembokuhle	Karigani	Chief Director: West Rand District Municipality	Gauteng
Provincial Government	Gauteng Wetland Forum (GDARD)	Mr	Happy	Khumalo		Gauteng
Provincial Government	Gauteng Wetland Forum (GDARD)	Mr	Mashau	Mpfareleni		Gauteng
Provincial Government	Gauteng Wetland Forum (GDARD)	Mr	Tebogo	Nkadimeng		Gauteng
Provincial Government	Gauteng: Department of Economic Development	Mr	Blake	Mosley-Lefatola		Gauteng
Provincial Government	West Rand Health	Mr	Nicholas	Mwangi	General Manager	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Ward Committee Member	Rand West City Local Municipality	Mr	David	Mayaba	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Mr	Maxwell	Ndebele	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Mr	Onesimo	Dotyeni	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Mr	Sinethemba	Ngwiqi	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Akhona	Ndonpeni	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Joyce	Mulenje	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Ncebano	Dikida	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Nokukhanya	Damane	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Nokuthula	Fulela	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Precious	Tebe	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Princess	Sebanda	Ward Committee: Ward 25	Gauteng
Ward Committee Member	Rand West City Local Municipality	Ms	Sindiswa	Kondile	Ward Committee: Ward 25	Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Water Bodies -Institution	Johannesburg Water (Pty) Ltd	Mr	Edward	Nduvheni	Environmental Manager	Gauteng
Water Bodies -Institution	Johannesburg Water (Pty) Ltd	Mr	Thendo Stanely	Makuya	Environmental Specialist	Gauteng
Water Bodies -Institution	Johannesburg Water (Pty) Ltd	Ms	Mpho	Mosia	Environmental Officer	Gauteng
Water Bodies -Institution	Rand Water	Mr	Jimmy	Maluleke	Environmental Co-ordinator	Gauteng
Water Bodies -Institution	Rand Water	Mr	Lesley	Hoy	Manager Environmental Assessments & Compliance	Gauteng
Water Bodies -Institution	Rand Water	Mr	Marc	de Fontein	Senior Water Quality Advisor & Blesbokspruit to Forum Member	Gauteng
Water Bodies -Institution	Rand Water	Mr	Noel	Dzhivhuho	Civil Engineering Assistant - HO	Gauteng
Water Bodies -Institution	Rand Water	Mr	Thokozani	Masilela	Environmental Assessor	Gauteng
Water Bodies -Institution	Rand Water	Ms	Natalie	Koneight	Secretary - Nursery-CD	Gauteng
Water Bodies -Institution	Rand Water	Ms	Nomkhosi	Mohlahlo		Gauteng
Water Bodies -Institution	Rand Water	Ms	Zesha	Ramrathan	Civil Engineering Technologist	Gauteng
Water Bodies -Institution	Water Research Commission	Dr	Shafick	Adams		Gauteng

I&AP Sector	Organisation	Mr/Ms	First Name	Last Name	Position	Province
Water Bodies -Institution	Water Research Commission	Mr	Bennie	Mokgonyana	Coordinator	Gauteng
Water Bodies -Institution	Water Research Commission	Mr	Jay	Bhagwan	Executive Manager: Water Use and Waste Management	Gauteng
Water Bodies -Institution	Water Research Commission	Ms	Charmaine	Khanyile	Water Use & Waste Management	Gauteng
Water Bodies -Institution	Water Research Commission	Ms	Penny	Jaca	Water Resource Management	Gauteng
Water Bodies -Institution	Water Research Commission	Ms	Sherly	Machelisi	Water Use & Waste Management	Gauteng
Water Bodies -Institution	Water Research Commission	Ms	Shirley	Machelesi		Gauteng

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

Directly and Indirectly Affected Landowners (Draft EIR Report)

Directly Affected Farm Portion			
MAP ID	**Parent Farm**	**Farm Portion**	**Landowner**
1	Libanon or Witkleigat 283 IQ	RE/283	Sibanye Gold Limited
Indirectly Affected Farm Portion			
MAP ID	**Parent Farm**	**Farm Portion**	**Landowner**
1	Gemspost 288 IQ	RE/288	Sibanye Gold Limited
1	Venterspost 284 IQ	92/284	Sibanye Gold Limited
1	Libanon or Witkleigat 283 IQ	13/283	Sibanye Gold Limited
2	Libanon or Witkleigat 283 IQ	4/283	Far West Rand Dolomitic Water Assoc
2	Venterspost 284 IQ	2/284	Far West Rand Dolomitic Water Assoc
3	Gemspost 288 IQ	11/283	National Government of The Republic of South Africa
4	Gemspost 288 IQ	41/288	Westonaria Local Municipality
4	Libanon Or Witkleigat 283 IQ	3/283	Westonaria Local Municipality
4	Libanon Or Witkleigat 283 IQ	6/283	Westonaria Local Municipality
4	Libanon Or Witkleigat 283 IQ	8/283	Westonaria Local Municipality
4	Gemspost 288 IQ	39/288	Westonaria Local Municipality
4	Libanon Or Witkleigat 283 IQ	12/283	Westonaria Local Municipality
5	Gemspost 288 IQ	RE/31/284	Unregistered

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Appendix C2: Land Claims

Thursday, 4 July 2024

Attention: Mr Solomon Maruma
Gauteng Department of Agriculture, Land Reform and Rural Development (DALRRD)
Office of the Regional Land Claims Commissioner: Gauteng Province
Email: Solomon.Maruma@dalrrd.gov.za

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

LAND CLAIMS ENQUIRY

Kongiwe has been appointed by Far West Gold Recoveries (Pty) Limited (FWGR), a subsidiary of DRDGOLD Limited, 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).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. The TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality.

The project area is made up of 5 farm portions all falling within the Rand West City Local Municipality. The affected farms are listed in **Table 1** below.

Table 1: Directly Affected property details.

Farm Name & Number	Farm Number	Farm ID	Farm Portion	Farm owner
Gemspost	288	IQ	11	Department of Public Works and Infrastructure (DPWI)
Gemspost	288	IQ	41	Rand West City Local Municipality
Venterspost	284	IQ	31 (RE)	GFI Mining South Africa Pty Ltd
Gemspost	288	IQ	0 (RE)	Sibanye Gold Limited
Libanon or Witkleigat	283	IQ	0 (RE)	Sibanye Gold Limited

Kongiwe Environmental (Pty) Ltd.
Reg No 2016 / 135562 / 07
Directors: GE Cornish-Bowden, MJ Hennessy, BJ Thornton (CEO), GI Wilreker
Tel: +27 (10) 140 6508 | Fax: +27 (86) 476 6438 Email: info@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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Kongiwe would like 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.

Kind regards,



Vanessa Viljoen
Stakeholder Engagement Consultant

Vanessa Viljoen

From: Vanessa Viljoen
Sent: Thursday, 04 July 2024 09:42
To: Solomon Maruma
Subject: EMPr and WUL Applications for the Reclamation of the Libanon TSF: Land Claims Enquiry
Attachments: 1July24_LClaims.pdf

Importance: High

Dear Mr Solomon Maruma

Kongiwe has been appointed by Far West Gold Recoveries (Pty) Limited (FWGR), a subsidiary of DRDGOLD Limited, 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).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. The TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality.

We would appreciate it if you could assist us with the attached Land Claims enquire.

Kind Regards,

Vanessa Viljoen | Senior 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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COMMISSION ON RESTITUTION OF LAND RIGHTS

OFFICE OF THE REGIONAL LAND CLAIMS COMMISSIONER: GAUTENG
No. 9 Bailey Lane, Arcadia, 0007 | Private Bag X 03, Arcadia, 0007
Tel: (012) 310 6500 | Fax: (012) 323 0312

Enquiries: **Desiree Tsholofelo Kgole**
Telephone: **(012) 310 6578**

Dear Ms Vanessa Viljoen

LAND CLAIMS ENQUIRY – PORTION 0 OF THE FARM WITKLEIGAT 283, REG DIV IQ, GAUTENG

We refer to your land claim enquiry dated **4th July 2024.**

We confirm that as at the date of this letter no land claims appear on our database in respect of the Properties listed. 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.

In conclusion, please note that **enquiries should be forwarded to Desiree Tsholofelo Kgole** who could be reached at the following contact details: Tel: (012) 310-6578 or via e-mail at desiree.kgole@dalrrd.gov.za

Yours faithfully

MS. C. BENYANE
CHIEF DIRECTOR
OFFICE OF THE REGIONAL LAND CLAIMS COMMISSION
GAUTENG PROVINCE
DATE: 6/7/2024

COMMISSION ON RESTITUTION OF LAND RIGHTS

OFFICE OF THE REGIONAL LAND CLAIMS COMMISSIONER: GAUTENG
No. 9 Bailey Lane, Arcadia, 0007 | Private Bag X 03, Arcadia, 0007
Tel: (012) 310 6500 | Fax: (012) 323 0312

Enquiries: **Desiree Tsholofelo Kgole**
Telephone: **(012) 310 6578**

Dear Ms Vanessa Viljoen

LAND CLAIMS ENQUIRY – PORTION 0, 11 & 41 OF THE FARM GEMSPOST 288, REG DIV IQ, GAUTENG

We refer to your land claim enquiry dated **4th July 2024.**

We confirm that as at the date of this letter no land claims appear on our database in respect of the Properties listed. 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:

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In conclusion, please note that **enquiries should be forwarded to Desiree Tsholofelo Kgole** who could be reached at the following contact details: Tel: (012) 310-6578 or via e-mail at desiree.kgole@dalrrd.gov.za

Yours faithfully

MS. C. BENYANE
CHIEF DIRECTOR
OFFICE OF THE REGIONAL LAND CLAIMS COMMISSION
GAUTENG PROVINCE
DATE: 6/7/2024

COMMISSION ON RESTITUTION OF LAND RIGHTS

OFFICE OF THE REGIONAL LAND CLAIMS COMMISSIONER: GAUTENG
No. 9 Bailey Lane, Arcadia, 0007 | Private Bag X 03, Arcadia, 0007
Tel: (012) 310 6500 | Fax: (012) 323 0312

Enquiries: **Desiree Tsholofelo Kgole**
Telephone: **(012) 310 6578**

Dear Ms Vanessa Viljoen

LAND CLAIMS ENQUIRY – RE OF PORTION 31 OF THE FARM VENTERSPOST 284, REG DIV IQ, GAUTENG

We refer to your land claim enquiry dated **4th July 2024.**

We confirm that as at the date of this letter no land claims appear on our database in respect of the Properties listed. 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.

In conclusion, please note that **enquiries should be forwarded to Desiree Tsholofelo Kgole** who could be reached at the following contact details: Tel: (012) 310-6578 or via e-mail at desiree.kgole@dalrrd.gov.za

Yours faithfully

MS. C. BENYANE
CHIEF DIRECTOR
OFFICE OF THE REGIONAL LAND CLAIMS COMMISSION
GAUTENG PROVINCE
DATE: 9/7/2024

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Appendix C3: Consultation Materials

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Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

Background Information Document

DMRE reference number: To be confirmed
DWS reference number: To be confirmed

July 2024

1. Purpose of the Document

This Background Information Document aims to provide you with important information regarding:

- Far West Gold Recoveries (Pty) Ltd intention is to reclaim the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province;
- The Environmental Impact Assessment and the Public Participation Process (PPP) to be undertaken in support of the proposed project;
- An Integrated Water Use Licence Application process;
- How you can register as an Interested and Affected Party (I&AP) and be kept informed about the project developments;
- The public review and comment period for the Draft Scoping Report and Integrated Water Management Plan (IWWMP).

2. Project Background

In 2017, Sibanye Gold Limited (Sibanye), a subsidiary of Sibanye-Stillwater Limited, was granted the necessary approvals to execute a project known as the West Rand Tailings Retreatment Project (WRTRP) (Licence No. 10/C22B/ACFGI/4976). Broadly, this project entails the reclamation of several historic TSFs in the West Rand of Gauteng. Tailings were to be treated with residue material being disposed onto the Regional TSF (RTSF). The gold-bearing TSFs and related infrastructure to execute this project are spread across several Mining Right Areas owned by Sibanye, namely: Driefontein, Kloof, Cooke and Ezulwini.

A commercial agreement was reached between DRDGOLD Limited and Sibanye resulting in the formation of Far West Gold Recoveries (FWGR) in 2018, which acquired certain assets of the WRTRP. This is specifically associated with the surface plant assets and tailings dam assets of Driefontein and Kloof with the possibility of acquiring the additional assets associated with the Cooke operations in the future.

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It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and alternatively in the future other existing gold plants. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised.

The proposed reclamation activity will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses, the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008), Category B Activities. 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).

2.1 Locality

In terms of regional locality, the TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality.

The N12 runs 2km to the South of the TSF. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine. The extent of the TSF is approximately 170 Ha. **(See Figure 1) below for the project locality map.**

2.2 Access

The main access route is off Bridges Avenue which runs parallel to the south of the TSF. As far as possible, existing access roads will be utilised, and where this is not possible, these will be constructed. Where access roads are to be constructed, these will be 4m wide gravel roads with mitre drains to protect the road structure from flood damage. Intersections will be properly designed to provide safe entry and exit in and out of the reclamation area. Approvals from the Provincial Roads authorities will be obtained where necessary.

2.3 Power and Water

The proposed reclamation activity will require 3kVA of electricity.

Power will be supplied by Eskom and potable water will be purchased from Rand Water Board or the Municipality, with a contingency for portable JoJo tanks or connection to existing water pipeline infrastructure.

In terms of process water, the water cycle operates as a closed circuit, meaning that limited make-up water will be required for the reclamation of the TSF. Water required for the reclamation activity will be sourced from the Kloof Shaft 10# and conveyed through existing process water pipeline to the project site for reuse in a closed-circuit system.

2.4 Life of Operation

The Proposed Project is expected to take approximately 12 years. An estimated amount of 600 000 tons/month of slurry is expected to be pumped from the TSF via existing pipelines to the Driefontein 2 Plant for beneficiation.

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2.5 Infrastructure Proposed for the Project

The following infrastructure will be utilised on site:

- Reclamation infrastructure consisting of a pump station which include:
  - Slurry sump;
  - Penstock;
  - Vibrating Screen
  - Water tank;
  - Motor control centre;
  - Pump;
- A short connecting 600mm pipeline for process water from Kloof Shaft 10#;
- A short connecting 550mm pipeline to the slurry pipeline to Driefontein 2 Plant;
- Stormwater management infrastructure including:
  - Water infrastructure and stormwater systems; and
  - Existing catchment paddocks on the TSF footprint
  - Pollution control paddock;
- An 11 kV overhead powerline capable of transmitting 3 kVA of electricity and electricity reticulation;
- Administration buildings, including change houses and ablution facilities;
- Access roads, routed from existing entry points; and
- Construction contractors' yards (temporary facilities).

2.6 Reclamation Method

The proposed reclamation method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors / cannons to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being mined.

At the sump, finger screens remove any debris that may impact pumping operations, and a penstock will control water flow into the sump. The position of the collection sump will change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation station. To control the volume of water reporting to the reclamation station, flapper valves are used to hold, and release slurry contained in the collection sump. This slurry is then pumped via existing pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation.

The reclaimed slurry will be deposited on the approved pipelines to the Regional TSF (RTSF).

2.7 Rehabilitation

Once reclamation is completed, the area will then be assessed for contamination (particularly in terms of radiation). Contaminated soils will be removed, and the land levelled to its original functioning topography levels.

Following rehabilitation, it is anticipated that the land will be returned to the landowner to use at their discretion. The project will reclaim the historic TSF and remove a pollution source from the area, aiding in the rehabilitation of the mining legacy left behind in the area.

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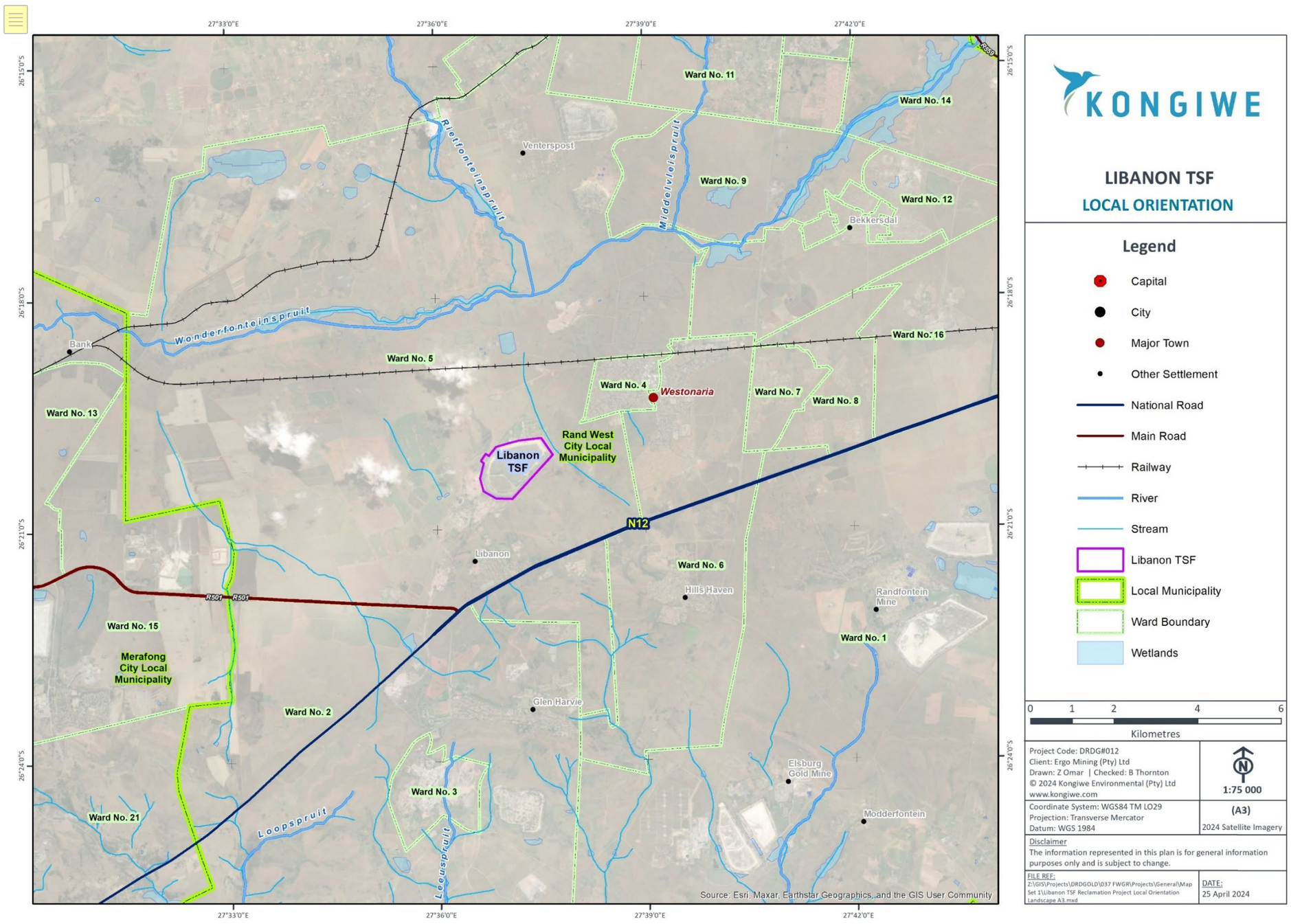


Figure 1: Libanon TSF Locality Map

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3. Legislative Framework

In terms of the environmental legislation, Kongiwe has been appointed by **Far West Gold Recoveries (Pty) Limited** (FWGR), a subsidiary of DRDGOLD Limited, 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 Department of Mineral Resources and Energy (DMRE) for the Proposed Project:

1. **Application for Environmental Authorisation (EA)** for listed activities triggered in Listing Notices GN R983, GN R984 and GN R985[1] 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); and
2. **Application for a waste management licence (WML)** authorising waste management activities listed in GN R921 of 29 November 2013 published in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (as amended) (NEM:WA).

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

1. **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.

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.

[1] 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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4. SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The purpose of an Environmental Impact Assessment (EIA) is to provide the authorities with sufficient information on which to base a decision or to grant environmental approval for the proposed project. Kongiwe within these phases 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 can become involved in the project in the following ways:

An S&EIA consist of three phases as seen in **Figure 2 below:**

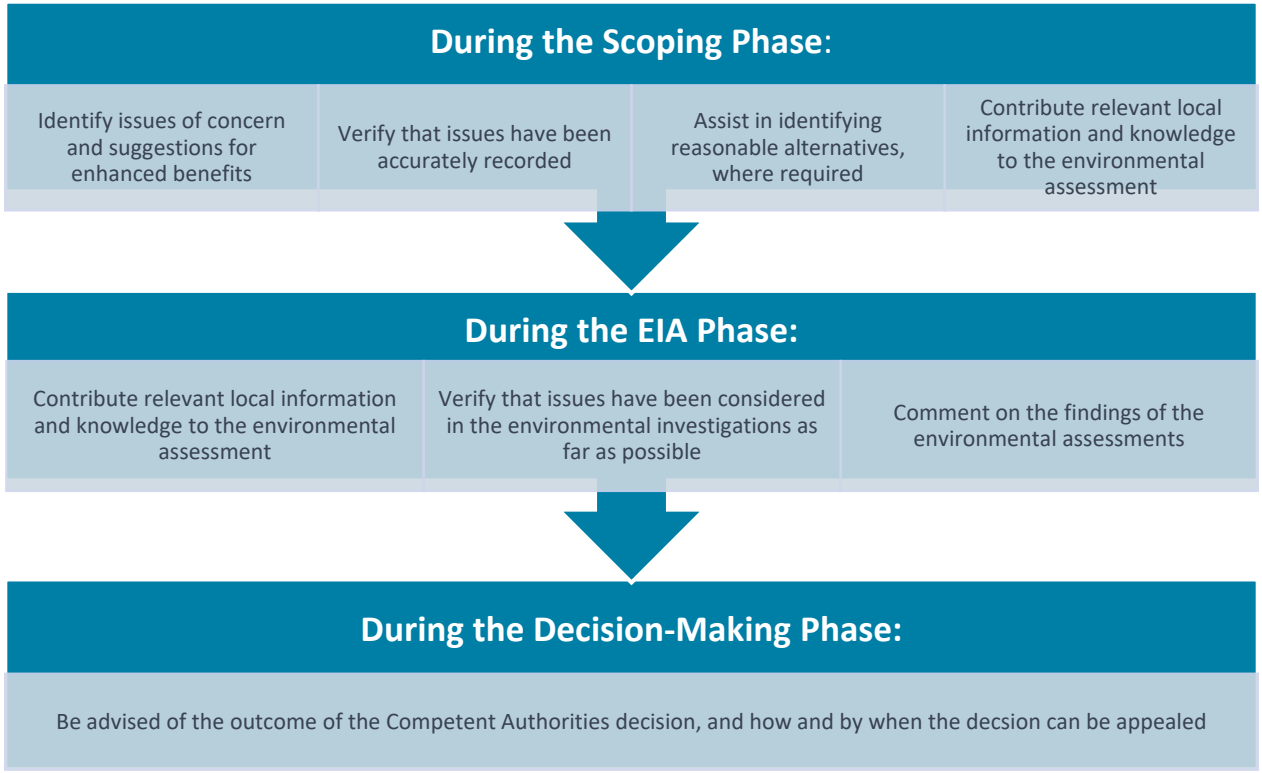


Figure 2: Different phases of the S&EIA process

5. INTEGRATED WATER USE LICENCE

An Integrated Water Use Licence Application will be conducted for water uses set out in Section 21 of the NWA. The IWULA process will be undertaken concurrently with the EA process for the proposed reclamation project.

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6. SPECIALIST STUDIES

Various specialist studies will be undertaken as part of the S&EIA/IWULA process to assess the potential impacts associated with the proposed project. Specialist studies being undertaken include:

- Biodiversity
- Surface Water
- Groundwater
- Wetland Study
- Social Impact
- Air quality

7. PUBLIC PARTICIPATION PROCESS

The PPP will form part of the Integrated EA and the IWULA process. The PPP offers stakeholders a fair opportunity to be informed about the proposed project, to raise issues and to make suggestions for enhanced project benefits. The project team will consider relevant issues and suggestions during the S&EIA/IWULA process.

7.1 AVAILABILITY OF THE SCOPING REPORT FOR PUBLIC REVIEW AND COMMENT

The Draft Scoping Report (DSR) for the proposed project will be made available for public review and comment for a period of 30 days, from **Thursday, 11 July 2024 until Monday, 12 August 2024**.

The DSR will be made available as follows:

- Copies of the DSR will be made available for public review and comment on the following website: Kongiwe's website: http://www.kongiwe.com/publications-view/public-documents/
- A hard copy of the DSR will be made available at the following public place:

Location	Physical Adress	Contact Person
Westonaria Public Library	Corner Neptunus & Saturnus streets, Westonaria, Gauteng, 1780	Mr Thozama Ndabeni, Westonaria Librarian - Supervisor (010) 345 4388/4389

- An electronic copy will be made available on request.
- Copies of the non-executive summary of the DSR will be distributed to all stakeholders on the database.

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

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regarding the availability of the IWULA technical report and how stakeholders can provide their comments will be communicated to all stakeholders.

7.2 STAKEHOLDER MEETINGS

Stakeholders are invited to participate through virtual and non-virtual engagements. Consultation meetings will be held using platforms like Microsoft Teams, telephonic discussions, and an Open Day. The purpose of these meetings is to discuss the proposed project, contents of the Scoping Report, to provide I&APs with an opportunity to raise their comments and to interact with the project team.

Please see below **(Table 3)** for the proposed I&APs meeting schedule.

Table 3: Proposed dates and methods of public engagement

Proposed dates	Available time slots	Method of Engagement
Virtual meeting		
Wednesday, 24 July 2024	10H00 - 11H00	Microsoft teams/scheduled Telephonic discussions
Live meeting: Open Day		
Saturday, 27 July 2024	09H00 - 11H00	Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780

7.3 INVITATION TO BE INVOLVED AS A STAKEHOLDER

Kongiwe Environmental 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 engagements for the proposed project are planned as follows:

- Telephonic consultations;
- Short Message Services;
- Email correspondence - Stakeholders with access to email are requested to send their comments/queries via email;
- One-on-One consultation meetings;
- Online Microsoft Teams meetings;
- Open day;
- Online engagements – Project information will be timeously uploaded on Kongiwe's website. Stakeholders can send their comments by completing an online comment sheet; and
- Electronic comment sheets.

The purpose of the above-mentioned methods of engagements is to encourage dialogue with stakeholders and provide stakeholders with opportunities to raise their comments. Minutes from all engagements with stakeholders will be compiled and recorded in the Comments and Responses Report. Stakeholders are encouraged to indicate their preferred method of engagement to the stakeholder engagement team, please see contact details below.

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For consultation to be inclusive it is the responsibility of stakeholders to:

- Register or ensure you are registered as an Interested and Affected Party (IAP);
- Inform others whom you think may be interested and/or affected by the proposed project;
- Ensure comments are submitted within the allowed timeframes received by the Stakeholder Engagement office;
- Contributing information and/or knowledge of the environment;
- Provide comments on the proposed project; and
- Attend meetings scheduled throughout the process to participation and access information.

8. COMMENTS AND QUERIES:

Any person affected by or who may be interested in the proposed project is asked to register as an I&AP. Should you have any comments/queries, please contact the stakeholder engagement team.

Contact Details:		
Ms Vanessa Viljoen	+27 (10) 140 1725	stakeholders@kongiwe.com
Ms Thuli Phakathi	+27 (10) 140 1726	stakeholders@kongiwe.com

Our team welcomes your participation and looks forward to your involvement throughout this process

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Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRE reference number: To be confirmed
DWS reference number: To be confirmed

Stakeholder Registration and Comment Form

Please return a completed reply form to the Stakeholder Engagement Team:
Ms Vanessa Viljoen / Phone: (010) 140 1725 - Ms Thuli Phakathi Phone: (010) 140 1726 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 phone			Fax				Tel				
Email address												
Postal address												
Please indicate your preferred method of communication		Email		SMS		Post		Fax				

I intend attending the stakeholders' meeting (Please indicate your preference)

Proposed dates	Available time slots	Method of Engagement	Yes	No
Virtual meeting				
Wednesday, 24 July 2024	10H00 - 11H00	Microsoft teams/scheduled Telephonic discussions	Yes	No
Live meeting: Open Day				
Saturday, 27 July 2024	09H00 - 11H00	Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780	Yes	No

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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 of 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:	

THE RECLAMATION OF THE LIBANON TAILINGS STORAGE FACILITY IN THE WEST RAND, GAUTENG PROVINCE

DRAFT SCOPING REPORT - NON TECHNICAL SUMMARY

DMRE REFERENCE NUMBER: TBC

July 2024

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Non-Technical Summary

Kongiwe Environmental (Pty) Ltd (Kongiwe) has been appointed by Far West Gold Recoveries (Pty) Ltd (FWGR), as the independent Environmental Assessment Practitioner (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 **Reclamation of the Libanon Tailings Storage Facility (TSF)** (hereafter the Proposed Project).

Project Introduction and Background

In 2017, Sibanye Gold Limited (Sibanye), a subsidiary of Sibanye-Stillwater Limited, was granted the necessary approvals to execute a project known as the West Rand Tailings Retreatment Project (WRTRP) (Licence No. 10/C22B/ACFGI/4976). Broadly, this project entails the reclamation of several historic TSFs in the West Rand of Gauteng. Tailings were to be treated for gold, with residue material being disposed of onto the Regional TSF (RTSF). The gold-bearing TSFs and related infrastructure to execute this project are spread across several Mining Right Areas owned by Sibanye, namely: Driefontein, Kloof, Cooke and Ezulwini.

A commercial agreement was reached between DRDGOLD Limited and Sibanye resulting in the formation of FWGR in 2018, which acquired certain assets of the WRTRP. This is specifically associated with the surface plant assets and tailings dam assets of Driefontein and Kloof with the possibility of acquiring the additional assets associated with the Cooke operations in the future.

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised.

Infrastructure for the Project

Required infrastructure will include:

- Reclamation infrastructure consisting of a pump station which includes:
  - Slurry sump;
  - Penstock;
  - Vibrating Screen
  - Water tank;
  - Motor control centre;
  - Pump;
- A connecting 600mm pipeline for process water from Kloof Shaft 10#;
- A connecting 550mm pipeline to the slurry pipeline to Driefontein 2 Plant;

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- Stormwater management infrastructure including:
  - Water infrastructure and stormwater systems; and
  - Existing catchment paddocks on the TSF footprint
  - Pollution paddock;
- An 11 kV overhead powerline capable of transmitting 3 kVA of electricity and electricity reticulation;
- Administration buildings, including change houses and ablution facilities;
- Access roads, routed from existing entry points; and
- Construction contractors' yards (temporary facilities).

Method of Reclamation

The proposed method which will be used to remove the TSF is referred to as top-down **hydraulic reclamation**. This technique uses high-pressure water monitors (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being reclaimed.



Figure 1: Mobile tracked hydraulic monitor on a tailings facility in South Africa

At the sump, finger screens remove any debris that may impact pumping operations, and a penstock will control water flow into the sump. The position of the collection sump will change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation station. To control the volume

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of water reporting to the reclamation station, flapper valves are used to hold, and release slurry contained in the collection sump. This slurry is then pumped via pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation.

Reclamation will take place in predetermined benches (or 'cuts') and will move unidirectionally until the entire TSF has been reclaimed.

Rehabilitation

Once the TSF has been reclaimed, rehabilitated, and cleared of radiation, the land will be shaped and revegetated to match the surrounding environment. The land will then be made available to the landowner (Sibanye) to use at their discretion.

The process can be summarised in the flow diagram below:



Figure 2: A summary of the Proposed Project Process

Project Alternatives

No alternatives have been investigated in terms of location. The Libanon TSF is an existing site and is earmarked to be reclaimed as part of various other reclamation projects currently undertaken by FWGR.

The Proposed Project will investigate one pipeline route to link into existing authorised slurry pipelines to convey slurry from the TSF to the Driefontein No. 2 Plant for reprocessing; and return process water to the project site for reclamation. The pipeline configuration will consist of one 550 mm diameter slurry pipeline and, one 600 mm diameter process water pipeline.

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Environmental Authorisation Process

The Department of Forestry and Fisheries and Environment (DFFE), in consultation with the DMRE, identified the need for the alignment of Environmental Authorisations (EAs) and promulgated a single environmental system under the NEMA. This has resulted in simultaneous decisions in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) and other specific environmental management Acts.

As of 2 September 2014, the statutory dispensation regarding environmental management on mines changed with the implementation of the One Environmental System and the commencement of the National Environmental Management Laws Amendment Act (Act No. 25 of 2014) (NEMLAA). In line with the One Environmental System, the Environmental Impact Assessment Regulations (EIA 2014 Regulations) were promulgated and came into force on 8 December 2014. The EIA 2014 Regulations have subsequently been amended on the 7th of April 2017, and again on 11 June 2021. With reference to the aforementioned, this S&EIA, prepared in support of the EA application, will comply with the requirements of the EIA 2014 Regulations, as amended.[1]

The Proposed Project therefore requires EA in terms of the NEMA and the NEM:WA and will follow a 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, the DMRE, within **300 days** from submission of the EA application.

The proposed reclamation activity will require authorisation in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) for Section 21 water uses, the NEMA and the NEM:WA , Category B Activities. 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).

Environmental Considerations

The Proposed Project will adopt the standards as set out in the FWGR's Environmental Policy. The Policy states that FWGR is committed to the responsible management of the environment in which it operates, adopting and implementing environmental practice as outlined in the NEMA. Recognising that the environment is held in trust for the people, the policy commits to:

- Complying with relevant environmental legislation as a minimum, and adopting and applying the best practicable environmental option with respect to current activities as well as prospective projects;

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

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- Evaluating, through a process of monitoring, auditing and reviewing by management, the success of the management and mitigation measures applied; and
- Ensuring that environmental risks and potential emergencies are identified and managed through effective controls and procedures as identified in the applicable Environmental Management Programmes.

Key Findings of the Scoping Report

The report provides a scoping-level identification of potential environmental impacts (physical, biological and social) associated with the Proposed Project, as well as a strategy for how these impacts will be investigated and assessed further in the EIA Phase. The baseline environmental information provided in this DSR is compiled as a high-level desktop investigation, and the project information is sourced from existing background information, relevant to the Proposed Project. The preliminary environmental impacts identified in Table 1 will be further refined, calculated and assessed for all the feasible alternatives identified. Mitigation and management measures will also be suggested by the specialists for all impacts identified. The potential positive and negative impacts which may arise because of the Proposed Project have also been summarised in the Table 1 overleaf.

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Table 1: Potential identified impact because of the Proposed Project

Environmental Component	Component Type	Potential Impact	Specialist Study Planned for EIA
Physical Environment (non-living)	Hydrology (including wetlands, surface water and ground water)	❖ Potential for further acid mine drainage (AMD), increased heavy metal concentrations and increased sulphate concentrations in local surface water and groundwater if runoff from operations is not adequately managed through efficient storm water management structures; ❖ Water and ground contamination due to pipeline leaks/spillages if inadequate preventative measures are not implemented; ❖ Improved surface and ground water quality around the project area due to the removal of the TSF; ❖ Changes in natural surface water flow parameters as a result of the removal of the TSF; ❖ Potential impact on drainage lines from access runoff during the operational phase of the project; ❖ Improved visual aesthetics of the area after the removal of the TSF.	Surface Water Impact Assessment Groundwater Impact Assessment Wetland Impact Assessment
Biological Environment (living)	Ecology and Biodiversity (including fauna and flora)	❖ Displacement of animal habitat by removing the TSF; ❖ Removal of invasive species from the TSF; ❖ Long-term improvement of ecosystem health and functioning of the project area following rehabilitation.	Biodiversity Impact Assessment
Social and Economic Environment	Employment	❖ Continued employment and job security; ❖ Continued investment in local economy; ❖ Removal of the TSF could eliminate the attraction of illegal/informal miners who seek gold.	Social Impact Assessment

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Environmental Component	Component Type	Potential Impact	Specialist Study Planned for EIA
	Land-use	❖ Land use will change to an active reclamation site; ❖ Restoration and unlocking of land for future land uses; ❖ Better management and control of the area against illegal/informal mining.	Social Impact Assessment
	Air Quality	❖ Possible increase in dust levels in some areas during operations; ❖ Overall removal of an air pollution source after the removal of the TSF; ❖ Health impacts on livestock and people in proximity to the project site due to fine particulate emissions during construction and operational phases.	Air Quality Impact Assessment

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Public Review

The Application for Environmental Authorisation (EA) was submitted to the Department of Mineral Resources and Energy (DMRE), which is the Competent Authority (CA) for the Proposed Project, on Monday, 08 July 2024. The Draft Scoping Report (DSR) will be made available for public review from Thursday, 11 July 2024 to Monday, 12 August 2024. Notification of the availability of the documentation for review was distributed on Friday, 17 February 2023.

Overall Conclusions

At this stage, the findings of this DSR indicate that the Proposed Project and its associated infrastructure would pose minimal and short-term negative environmental impacts if adequate and appropriate mitigation measures are implemented; and positive long-term environmental impacts when the project has been completed. Most importantly, the removal of this TSF would assist with the alleviation of a major pollution source.

According to the Way Forward and the Plan of Study, contained in this report, impacts associated with the Proposed Project need to be considered further during the EIA Phase. It is important to take note of the current conditions of the Proposed Project area and the sensitive environment around it. The TSF is a source of pollution and causes other direct and indirect nuisances to the surrounding environment. The Proposed Project is also in line with the Gauteng Mine Residue Area Strategy (2012) and West Rand District Municipality Spatial Development Framework (2017) objectives to remove the TSFs scattered on the Gauteng landscape.

Way Forward

This DSR has been undertaken with the aim of identifying potential positive and negative impacts on the environment and gathering comments on concerns 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.

The procedure for this study going forward is as follows:

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- Submit the finalised Scoping Report to the DMRE for permission to undertake the EIA Phase of the project;
- Upon the decision to grant or refuse the final Scoping Report, all stakeholders will be notified. If granted, stakeholders will also be notified of the conditions of the DMRE for proceeding with the EIA Phase of the project;
- In the case of approval of the final scoping, execute the Plan of Study for the Impact Assessment during the EIA Phase of the project;
- Incorporate and address comments and issues raised during the consultation period on the Scoping Report into the EIA, and make changes to the report where relevant;
- Make the EIA Report and Environmental Management Programme report (EMPr) available to the public, stakeholders and authorities;
- Finalise the EIA Report and submit the final EIA Report to the DMRE; and
- DMRE review period and decision-making for 107 calendar days.

Glossary

Environmental Assessment Practitioner (EAP): An Environmental Assessment Practitioner (EAP) is someone who co-ordinates, manages and integrates the various components of environmental assessment throughout the planning process ;has received an appropriate interdisciplinary training covering both the natural and human environment; has experience in environmental management, environmental assessment and related studies; and demonstrates core competencies that are considered essential to the environmental assessment profession.

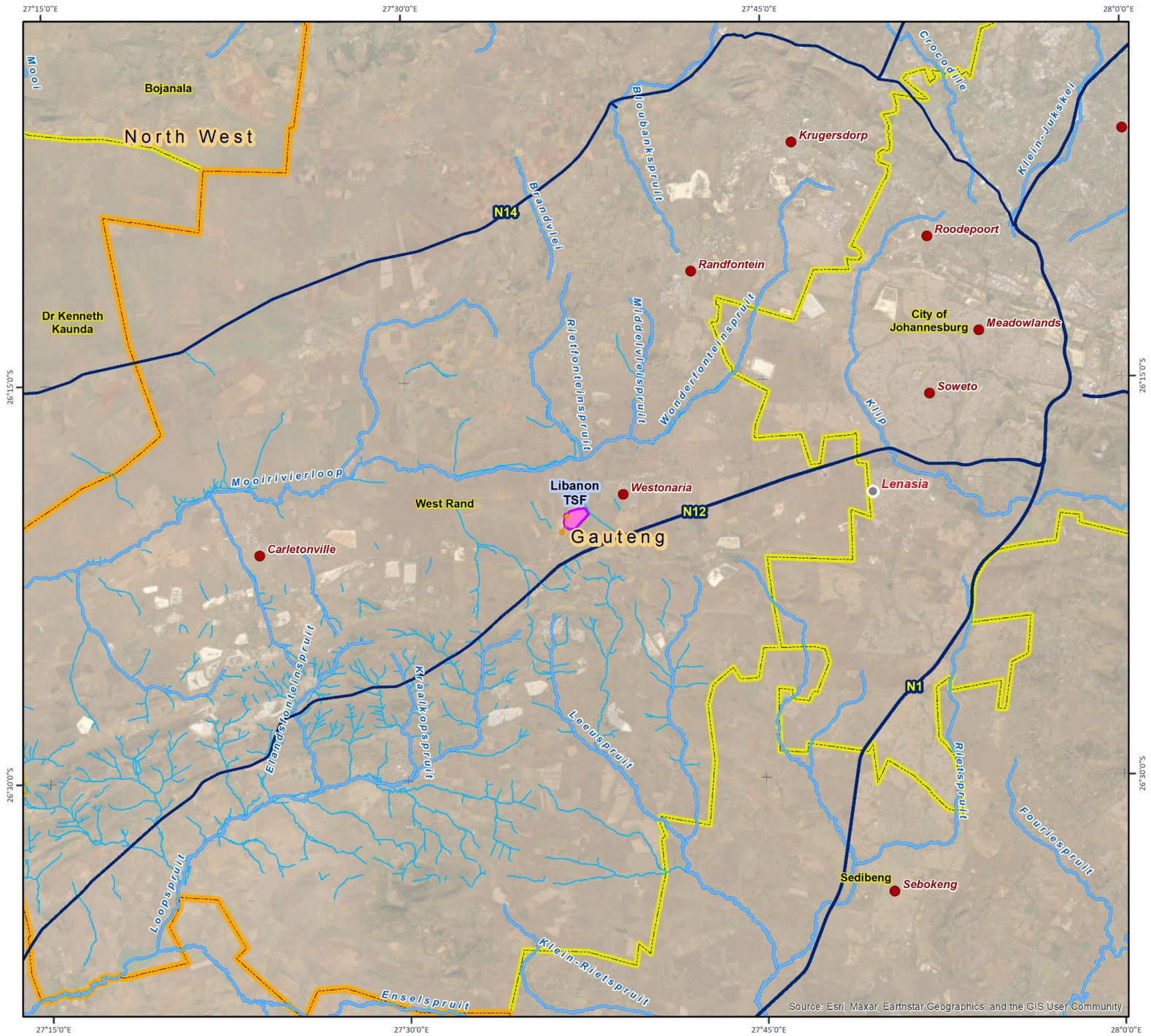
Environmental Impact Assessment (EIA): Environmental Impact Assessment (EIA) is a tool used to assess the significant effects of a project or development proposal on the environment. EIAs make sure that project decision makers think about the likely effects on the environment at the earliest possible time and aim to avoid, reduce or offset those effects. This ensures that proposals are understood properly before decisions are made.

Environmental Management Programme (EMPr): The EMPr is a detailed plan for the implementation of the mitigation measures to minimise negative environmental impacts during the project life-cycle.

Scoping Report: The Scoping Report describes the proposed project and identifies the possible impacts of the proposed development.

Tailings Storage Facility (TSF): A TSF is typically an earth-fill embankment dam used to store byproducts of mining operations after separating the ore from the rock. Tailings can be liquid, solid, or a slurry of fine particles.

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LIBANON TSF
REGIONAL ORIENTATION

Legend

- Major Town
- SecondaryTown
- National Road
- River
- Stream
- Pipelines
- Provincial Boundaries
- District Municipalities
- Libanon TSF
- Pumpstation

0 5 10 20
Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
© 2024 Kongiwe Environmental (Pty) Ltd
www.kongiwe.com

1:250 000

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

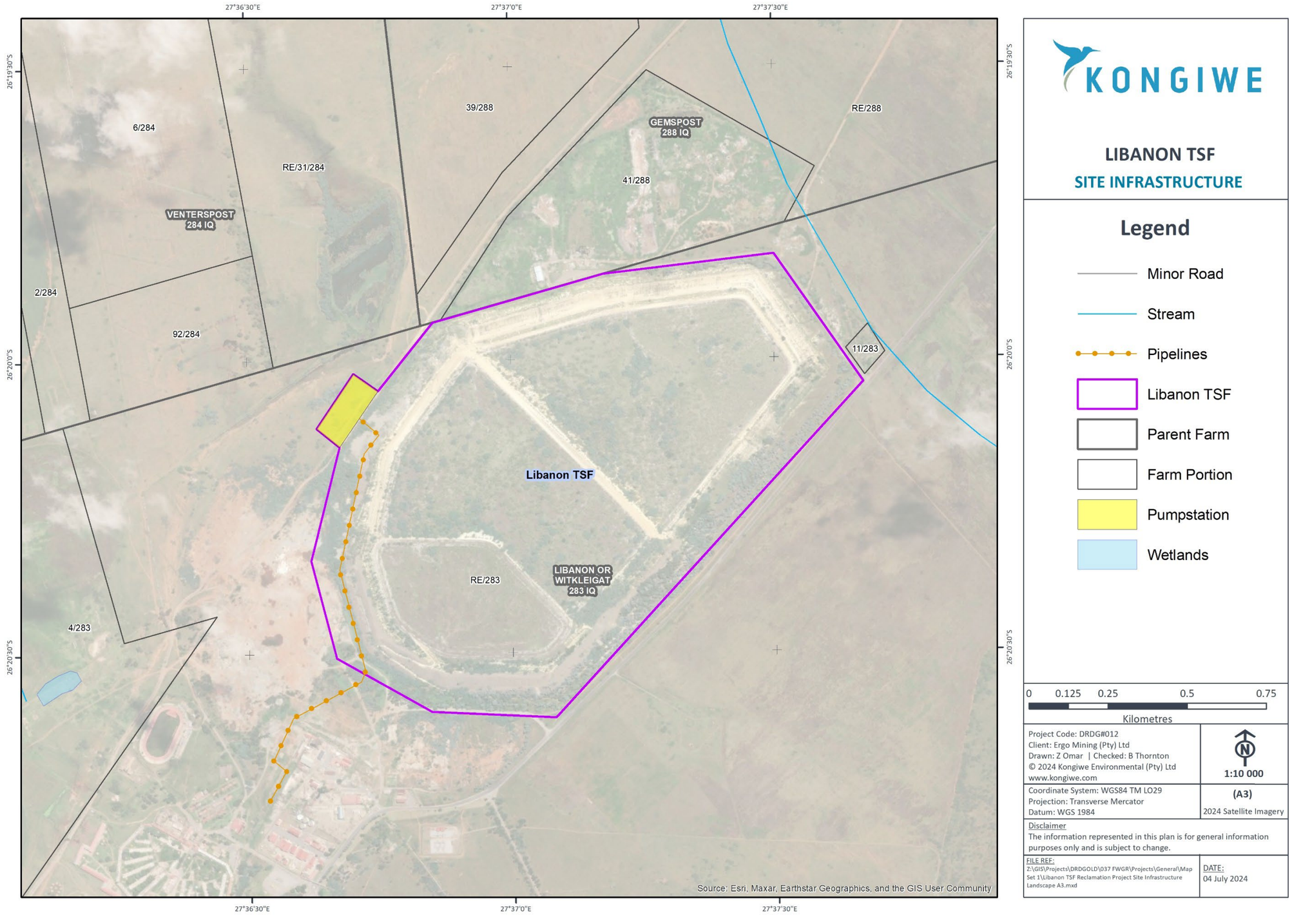
(A3)
2024 Satellite Imagery

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

FILE REF:
Z:\GIS\Projects\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Regional Orientation Landscape A3.mxd

DATE:
04 July 2024

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LIBANON TSF

SITE INFRASTRUCTURE

Legend

- Minor Road
- Stream
- Pipelines
- Libanon TSF
- Parent Farm
- Farm Portion
- Pumpstation
- Wetlands

0 0.125 0.25 0.5 0.75

Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
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www.kongiwe.com

1:10 000

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

(A3)

2024 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\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Site Infrastructure Landscape A3.mxd

DATE:
04 July 2024

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Appendix C4: Newspaper Advertisements



Candice Cloete, Andre Eloff, Ansie Malan en Brenda Eloff.

DBV skud hul blikke

Chanté Bolton
chante@caxton.co.za

***UItvalfontein* — As deel van hul maandelikse fondsinsameling het die RandWes DBV onlangs blik geskud by Tambotie Mall.**

Brenda Eloff, voorstitter van die DBV het verduidelik fondse is baie belangrik vir hulle.

Hierdie afgelope maand was besonders moeilik finansieel en moes hulle twee werkers se salarisse na betaaldag uitsorteer aangesien daar nie genoeg fondse was nie.

"Elke bietjie wat inkom maak wel 'n verskil," het Brenda gesê.

Hulle benodig steeds skoonmaakmiddels, komberse, katsand en staal. Hulle het verduidelik daar is al verskeie kere by hul ingebreek en die hokke waar hulle diere ontvang, is uitgebreek.

Hulle het die hokke weer veilig gemaak vir die diere, maar daar is egter steeds herstelwerk wat gedoen moet word, aangesien daar nou maklike toegang tot die perseel is vir diewe.

Hulle benodig ook gereedskap sodat hulle self herstelwerk kan doen.

Die alternatief is om die gereedskap te leen of te huur, wat 'n ekstra uitgawe is.

Brenda het verder verduidelik hulle sorg vir die diere se daaglikse behoeftes, maar daar is nie ekstras wat hulle vir hulle kan gee nie. As mense dus lekkernye en speelgoed kan skenk sal dit baie waardeer word.

Enige persoon wat wil bydra kan die kantoor by 011 412 3114 skakel of 'n epos stuur na *chairman@spcarandwest.co.za*.



Melissa en Annabelle Doubell maak 'n bydra.

Besigheid red nog rondloperhonde

***Greenhills* —** Burgerhuyser Attorneys is bekommerd oor die aantal verdwaalde of verlore diere in die omgewing. Dit nadat hulle weer ingespring het om die soveelste hond in nood, die keer 'n Jack Russel, te help.

Een van die werknemers, Maryke du Toit, het die Herald vertel dat die einste hond in 'n tuin oorkant hul kantore geslaap het. Een van Maryke se kollegas het toe die hond by die kantoor ingebring. Hulle skat die hond is ongeveer 10 jaar oud. "Ons dink hy is 'n weggooihond want hy is vreeslik oud en verwaarloos," het Maryke vertel. Maryke het verduidelik dat die hond baie skrikkerig in die begin was, maar toe die kollegas 'n kombers om hom gooi en kos gee het hy sy stert begin swaai. Volgens Maryke was die hond baie vriendelik en wou hy heeltyd aandag hê. Dit is wel nie die eerste keer wat die besigheid 'n rondloperhond uithelp nie. Maryke het vertel dat die besigheid uit diereliefhebbers bestaan en daarom geniet hul dit om keer op keer diere in sulke situasies te versorg.

Maryke en haar kollegas, Madeleine Conway, Ansie Cilliers, Charmaine de Wet, Elsie Hatting, Rejoyce Size en Marilize Janse van Vuuren het almal ingespring om die hond aan te hou vir 'n wyle. Ongelukkig het die hond nie te lank gebly nie.

Intussen het die prokureursfirma laat weet dat hul ook 'n pitbull gehelp het voordat hy deur 'n veearts opgeneem is. Volgens Maryke was die hond beseer. Animal Aid Warriors is intussen opsoek na die eienaar. Hy of sy kan Naomi de Beer skakel by 079 834 3957.

Maryke doen nou 'n beroep op hondeienaars om na hul diere om te sien.

"Mense moet na hulle diere kyk. Nes mens 'n gemaklike plek soek om te rus voor jy sterf, wil 'n hond dit ook hê. Honde verdien die gemaklikheid om 'n veilige hawe te hê waar hulle kan dood gaan," het sy vertel.



Maryke du Toit het vertel dat die hond in 'n tuin oorkant die kantoor gevind is.



Die pitbull wat versorg is voordat die veearts hom opgeneem het.

Help Blikkies get a deserving family

***Greenhills* —** Blikkies the dog has been in a shelter since January and is ready for his forever home.



Blikkies is patiently waiting for his forever home.

Four-year-old Blikkies is a medium-sized dog looking for loving human hands to care for him. According to founder and director of No More Tears Animal Rescue Stephan Hendricks, Blikkies is a sweet and resilient dog who, despite his trauma, is a friendly and compassionate companion.

However, Stephan is unsure how Blikkies react around cats. Blikkies is currently at the Nordic Rescue Centre in Tarlton and he is one of the animals who have been at the rescue centre the longest. The No More Tears team found Blikkies in an industrial area in Aureus. Stephan stated that Blikkies had a lot of scars which they suspect might be due to abuse. Stephan suspects that Blikkies had boiling water thrown at him and suffered severe burn wounds.

If you're interested in adopting Blikkies and giving him the happy ending he deserves, send an email to *info@nomoretears.org.za* or contact No More Tears on 084 433 7748.

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

• DMRE reference number: To be confirmed • DWS reference number: To be confirmed

• Applicant: Far West Gold Recoveries (Pty) Ltd **• Project Name:** Reclamation of the Libanon Tailings Storage Facility Project

Notice is given that it is the intention of **Far West Gold Recoveries (Pty) Ltd** (FWGR) to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and alternatively in the future other existing gold plants. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. Required infrastructure will include: Pumpstation, Process water from Kloof Shaft 10#, Pollution paddock, Access Road, Laydown area and Powerlines.

In terms of regional locality, the TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality. The N12 runs 2km to the South of the TSF. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine.

In terms of the environmental legislation, Kongiwe has been appointed by FWGR, a subsidiary of DRDGOLD Limited, 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 Department of Mineral Resources and Energy (DMRE) for the Proposed Project:

1. **Application for Environmental Authorisation (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); and
2. **Application for a waste management licence (WML)** authorising waste management activities listed in GN R921 of 29 November 2013 published in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (as amended) (NEM:WA).

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

1. **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.

AVAILABILITY OF THE SCOPING REPORT FOR PUBLIC REVIEW AND COMMENT: The Draft Scoping Report (DSR) for the proposed project will be made available for public review and comment for a period of 30 days, from **Thursday, 11 July 2024 until Monday, 12 August 2024**. The DSR will also be made available electronically on Kongiwe's website **http://www.kongiwe.com/publications-view/public-documents/**, and an electronic copy will be made available upon request. Non-technical summaries of the DSR will also be distributed to stakeholders upon request. A hard copy of the DSR will be made available at the following public place: **Westonaria Public Library, Mr Thozama Ndabeni, Westonaria Librarian – Supervisor, (010) 345 4388/4389, Corner Neptunus & Saturnus Streets, Westonaria, Gauteng, 1780.**

STAKEHOLDER CONSULTATION MEETINGS: Stakeholders are invited to participate through virtual and non-virtual engagements. One-on-one consultation meetings will be held via on-line forums such as Microsoft Teams, or telephonically. On-line engagement activities will be available during the public review period. The purpose of these meetings is to discuss the proposed project, contents of the Scoping Report, to provide I&APs with an opportunity to raise their comments and to interact with the project team. Please see below the proposed I&APs meeting schedule.

Proposed dates	Available time slots	Method of Engagement
Virtual Meeting		
Wednesday, 24 July 2024	10H00-11H00	Microsoft teams/scheduled Telephonic discussions
Live Meeting: Open Day		
Saturday, 27 July 2024	09H00-11H00	Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780

KONGIWE

To register as an I&AP please contact: Kongiwe Environmental Stakeholder Engagement Team - **Ms Vanessa Viljoen / Phone: (010) 140 1725 - Ms Thuli Phakathi / Phone: (010) 140 1726** or **E-mail: stakeholders@kongiwe.com**
Our team welcomes your participation and looks forward to your involvement throughout this process.

PHYSIOTHERAPIST

Deep oscillator for treatment of lymphoedema, sports injuries and acute post-operative swelling

Other services include treatment for:

- Respiratory conditions
- Sinusitis
- Back, neck, shoulder, knee, hip, ankle and other joints
- Rehabilitation
- Chronic pain management
- Lymphoedema
- Dry needling

We also do home visits

Contact us to find out if we can help

BARKER PHYSIOTHERAPISTS INC.

Rooms Randfontein, Robinson Hospital, Medical Centre, Block 3, Randfontein
Tel: 011 693 5041 | WhatsApp: 079 025 1601 | E: physio@bitcc.co.za | Practice no. 0087351

Young people from far and wide lead praise and worship

Dominique Duvenhage
dominiqued@caxton.co.za

***Uitvalfontein* — Time2Rise Randfontein recently hosted a Youth Bash to welcome youngsters from all over Randfontein and Westonaria to praise and worship.**

According to the organiser, Enrico van Aswegan, the event was an opportunity to have several congregations join hands in unity on neutral ground.

"The Word says we are one body. So, if we can work together as one on various projects and events it will be a blessing for our communities," he expressed.

The evening started with praise and worship and residents from Toekomsrus, Venterspos and even as far as Krugersdorp joined the service. The Word of God was then delivered whereafter personal prayer services were given. Enrico described it as an opportunity to experience, meet the holy spirit and feel God's love.

This event brought more residents than Time2Rise had ever had before.

"The more often we can work together, the better things will be in our communities and congregations. Although each congregation and organisation has its own mandate, vision and mission, it is essential to be able to function in unity to the praise and honour of God."



The event stood as an opportunity to have several congregations join hands in unity on neutral ground.

Organiser Enrico van Aswegan gives a sermon.

Community hero gives back to her alma mater, Brandvlei Primary



Portia Mabala, an emotional Georgina Mapule Mphatswe and Mmapula Zondo.

***Mohlakeng* —** Georgina Mapule Mphatswe who recently attended the 2024 South African Heroes Awards and won first place in the Community Service category, visited her alma mater, Brandvlei Primary School, to donate toiletries to children in need.

Georgina is known as a community hero and does her best to help the less fortunate. Last month, she decided to visit Brandvlei with about 200 sanitary pads, 100 tubes of toothpaste and 50 dignity packs for the school boys.

Georgina mentioned the dignity packs were sponsored by the West Rand Muslim Association and the police's Crime Prevention Unit.

> *The goal was to inspire, motivate and encourage the learners*

"I decided to donate to Brandvlei because this is where my education started and therefore I felt the need to give back to the school. Brandvlei is where I was born and bred," she said.

Georgina said she felt a sense of warmth after donating to her community. It was an emotional moment for her since she was also once a learner in that school.

"The goal of this event was to inspire, motivate and encourage the learners that it is possible to achieve your dreams even when you are coming from a disadvantaged background," she expressed.

Georgina would like to continue supporting local and rural schools while also donating more.

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

• DMRE reference number: GP30/5/1/1/2/000073 BP/BAR • DWS reference number: WU37611

• **Applicant:** Far West Gold Recoveries (Pty) Ltd: • **Project Name:** Reclamation of the Libanon Tailings Storage Facility Project

Kongiwe Environmental (Pty) Ltd (Kongiwe) hereby gives notice that the **Draft Environmental Impact Assessment (EIA), Draft Environmental Management Programme Report (EMPr) and Draft Integrated Water and Waste Management Plan (IWWMP)** reports for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, will be made available for public review and comment.

The Draft EIA/EMPr reports have been compiled and will be made available for a 30-day public review and comment period from **Friday, 10 January 2025 until Monday, 10 February 2025.** The Draft IWWMP report will be made available for a 60-day public review and comment period from Friday 10 January 2025 until Tuesday 11 March 2025.

Copies of the reports will be made available for public review and comment on the following website:
• Kongiwe's website: **https://kongiwe.com/projects/**

A hard copy of the reports will be made available at the following public place:

Location	Physical Address	Contact Person
Westonaria Public Library	Corner Neptunus & Saturnus Streets, Westonaria, Gauteng, 1780	Mr Thozama Ndabeni, Westonaria Librarian - Supervisor - (010) 345 4388/4389

INVITATION TO STAKEHOLDER MEETINGS: Stakeholders are invited to participate through virtual and face to face engagements. Consultation meetings will be held using platforms like Microsoft Teams, telephonic discussions, and an Open Day. The purpose of these Stakeholder Meetings is to discuss the Draft EIA /EMPr and Draft IWWMP, present findings from the specialist studies, provide stakeholders with a platform to raise comments on the Draft EIA / EMPr and Draft IWWMP reports and interact with the project team. Please see table below for the proposed stakeholders' meeting schedule.

STAKEHOLDER MEETINGS

Proposed dates	Available time slots	Method of Engagement
Virtual Meeting		
Wednesday, 22 January 2025	10H00 - 11H00	Microsoft teams/scheduled Telephonic discussions
Face to face meeting		
Saturday, 25 January 2025	09H00 - 10H00	Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780

Any person affected by or who may be interested in the proposed project is requested to register as an Interested & Affected Party (I&AP).
To register as an I&AP/ to confirm your attendance at the meeting, please contact
Kongiwe Environmental (Pty) Ltd, Contact person: Vanessa Viljoen / Thuli Phakathi / Anela Fixi
Tel: 010 140 1725/1726/1729, **Email: stakeholders@kongiwe.com**

KONGIWE

Reaching out to addicts in Toekies

***Toekomsrus* —** Helping The Next Addict (HTNA) NPO recently hosted an outreach and feeding project in Toekomsrus to help those who are struggling with addiction.

Executive member and secretary Gary Paulse stated the reason for the outreach was to help those struggling with substance abuse.

The event was also meant to spread a message of hope and to let addicts know that there is help available.

"The day aimed to get all the addicts from our community together and give them a message of hope while helping those who want help [by getting them into rehab]. We also gave them something to eat because sometimes they do not have something to eat," Gary said.

He further mentioned the highlight of the day was not only the addicts who attended the event but the family members who joined them.
The outreach ended successfully and Gary explained that the number of addicts who gathered to listen to testimonies was tremendous.

"We will be doing more outreaches. We are planning on doing at least one outreach and feeding project every month. We will also be visiting more schools this year as well as going to different prisons. We want to work harder in 2025 to make a difference in our community," he concluded.



Sheldon George delivers a speech to passersby in the street.

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Appendix C5: Site Notice









27°36'0"E

27°39'0"E

26°18'0"S

26°21'0"S

Westonaria

Libanon TSF

Libanon

N12

Hills Haven

1

2

3

4

5

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

KONGIWE

LIBANON

SITE VISIT MAP

Legend

- Major Town
- Other Settlement
- National Road
- Libanon TSF
- Parent Farm

0 0.25 0.5 1 1.5 2

Kilometres

Project Code: DRDG#037
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
© 2024 Kongiwe Environmental (Pty) Ltd
www.kongiwe.com | Date: 12 July 2024

1:30 000

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

(A3)
2024 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\DRDGOLD\037 FWGR\Projects\General\Libanon Site Visit A3 Landscape.mxd

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRE reference number: To be confirmed
DWS reference number: To be confirmed

Notice is given that it is the intention of **Far West Gold Recoveries (Pty) Ltd** (FWGR) to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and alternatively in the future other existing gold plants. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. Required infrastructure will include: Pumpstation, Process water from Kloof Shaft 10#, Pollution paddock, Access Road, Laydown area and Powerlines. In terms of regional locality, the TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality. The N12 runs 2km to the South of the TSF. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine.

In terms of the environmental legislation, Kongiwe has been appointed by FWGR, a subsidiary of DRDGOLD Limited, 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 Department of Mineral Resources and Energy (DMRE) for the Proposed Project:

1. **Application for Environmental Authorisation (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); and
2. **Application for a waste management licence (WML)** authorising waste management activities listed in GN R921 of 29 November 2013 published in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (as amended) (NEM:WA).

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

1. **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.

AVAILABILITY OF THE SCOPING REPORT FOR PUBLIC REVIEW AND COMMENT: The Draft Scoping Report (DSR) for the proposed project will be made available for public review and comment for a period of 30 days, from **Thursday, 11 July 2024 until Monday, 12 August 2024.** The DSR will also be made available electronically on Kongiwe's website http://www.kongiwe.com/publications-view/public-documents/, and an electronic copy will be made available upon request. Non-technical summaries of the DSR will also be distributed to stakeholders upon request. A hard copy of the DSR will be made available at the following public place: **Westonaria Public Library, Mr Thozama Ndabeni, Westonaria Librarian – Supervisor, (010) 345 4388/4389, Corner Neptunus & Saturnus streets, Westonaria, Gauteng, 1780.**

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Proposed dates	Available time slots	Method of Engagement
Virtual meeting		
Wednesday, 24 July 2024	10H00 - 11H00	Microsoft teams/scheduled Telephonic discussions
Live meeting: Open Day		
Saturday, 27 July 2024	09H00 - 11H00	Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780

To register as an I&AP please contact: Kongiwe Environmental Stakeholder Engagement Team
Ms Vanessa Viljoen / Phone: (010) 140 1725 - Ms Thuli Phakathi / Phone: (010) 140 1726 or E-mail: stakeholders@kongiwe.com

Our team welcomes your participation and looks forward to your involvement throughout this process.

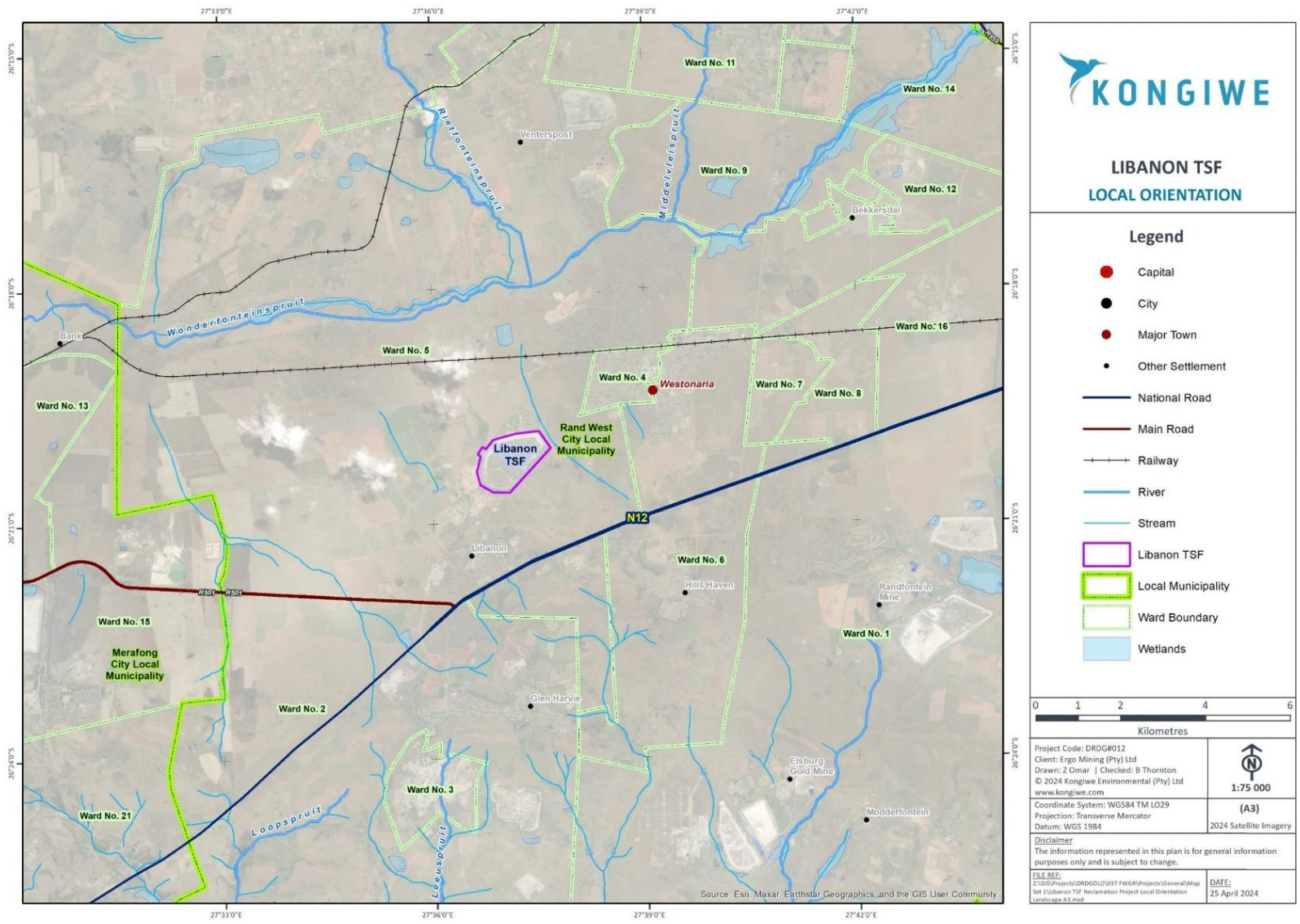
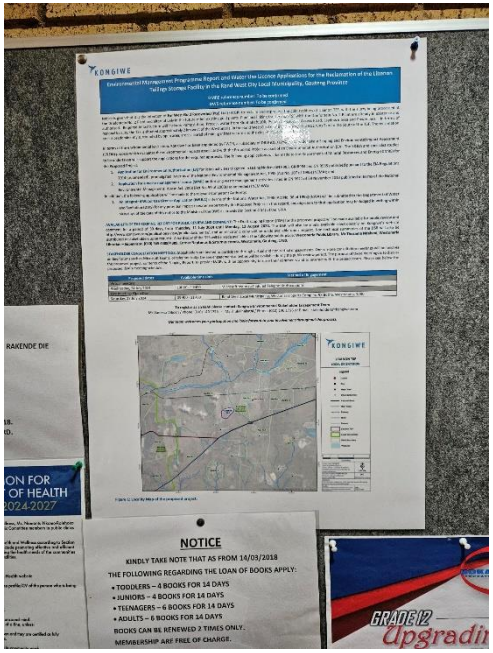
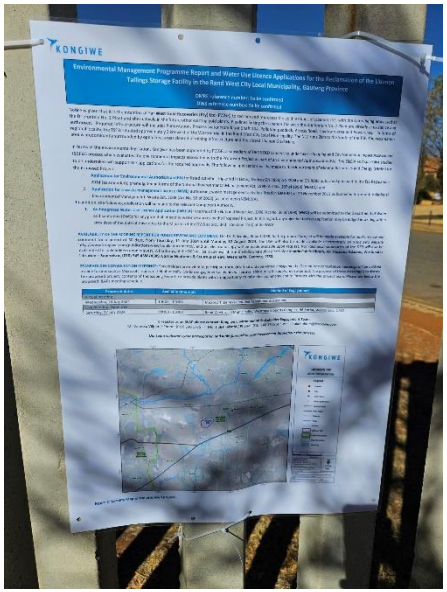
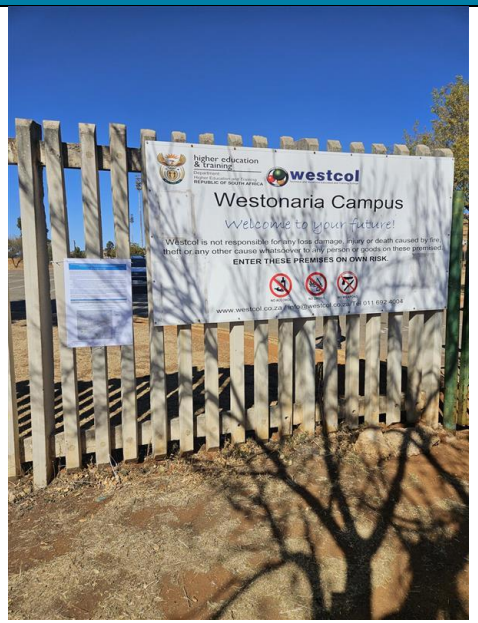


Figure 1: Locality Map of the proposed project.

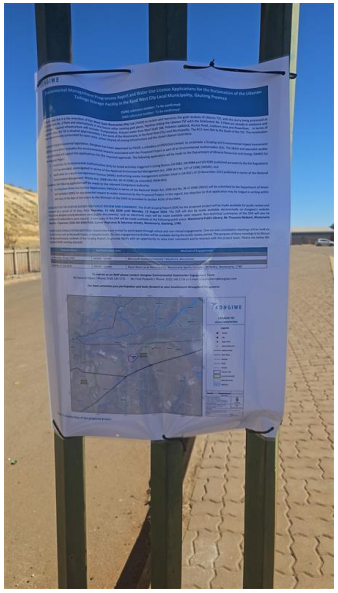
Environmental Authorisation and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

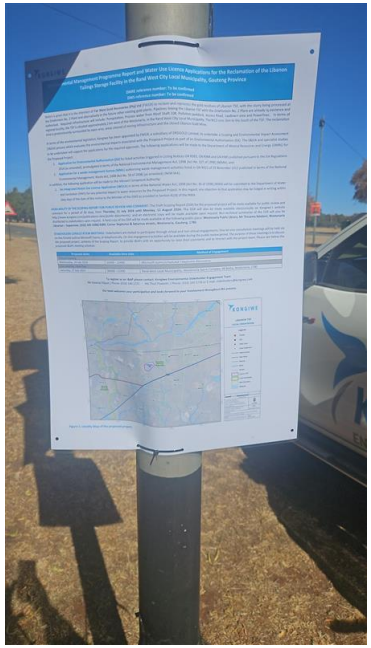
Site Notice Placement Report - Thursday, 11 July 2024

Site Notice Number	Location	Co-ordinates	Photo	
1.	Westonaria Public Library	26 ^{0} 19'48,4932" S 27 ^{0} 39'9,4572" E		

Site Notice Number	Location	Co-ordinates	Photo	
2.	Westonaria Sports Complex	26^0 19'30,5832" S 27^0 38'35,0592" E		

Site Notice Number	Location	Co-ordinates	Photo	
3.	Next to the Libanon Tailings Storage Facility (TSF)	26^0 20’2,4288” S 27^0 37’39,9648” E		

Site Notice Number	Location	Co-ordinates	Photo	
4.	Libanon Landfill	26^0 19’51.1536” S 27^0 37’9,5592” E		

Site Notice Number	Location	Co-ordinates	Photo	
5.	Goldfields Technical Security Management/ Libanon Rec Club	26^0 20’58,3296”S 27^0 36’39,492”E		

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Appendix C6: Correspondence

Vanessa Viljoen

From: Vanessa Viljoen
Sent: Thursday, 04 July 2024 09:10
To: Kongiwe Stakeholder Engagement
Cc: Thuli Phakathi; Gerlinde Wilreker
Subject: Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility
Attachments: 1July24_BID.pdf; 1July24_Registration_Form.pdf

Dear Stakeholders

This email serves to inform you that it is the intention of Far West Gold Recoveries (Pty) Ltd (FWGR) to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and alternatively in the future other existing gold plants. In terms of regional locality, the TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality. The N12 runs 2km to the South of the TSF. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine.

In terms of the environmental legislation, Kongiwe has been appointed by Far West Gold Recoveries (Pty) Limited (FWGR), a subsidiary of DRDGOLD Limited, 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).

AVAILABILITY OF THE SCOPING REPORT FOR PUBLIC REVIEW AND COMMENT
The Draft Scoping Report (DSR) for the proposed project will be made available for public review and comment for a period of 30 days, from **Thursday, 11 July 2024 until Monday, 12 August 2024.**

INVITATION TO AN OPEN DAY
Interested and Affected Parties (I&APs) are invited to attend an Open Day which will be held at the **Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780 on Saturday, 27 July 2024 from 09H00 - 11H00**. The purpose of these meetings is to discuss the proposed project, contents of the Scoping Report, to provide I&APs with an opportunity to raise their comments and to interact with the project team.

Any person affected by or who may be interested in the proposed project is asked to register as an I&AP by completing the attached Stakeholder Registration and Reply Form or by contacting the stakeholder engagement team.

Any person affected by or who may be interested in the proposed project is asked to register as an I&AP. Should you have any comments/queries, please contact the stakeholder engagement team.

Contact Details:		
Ms Vanessa Viljoen	+27 (10) 140 1725	stakeholders@kongiwe.com
Ms Thuli Phakathi	+27 (10) 140 1726	stakeholders@kongiwe.com

For more information, please refer to the attached Background Information Document.

Kind Regards,

The Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 6508 | Fax: +27 (86) 476 6438 | 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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From: Kongiwe Stakeholder Engagement <stakeholders@kongiwe.com>
Sent: Friday, 19 July 2024 13:00
To: Gerlinde Wilreker; Thuli Phakathi
Cc: Kongiwe Stakeholder Engagement
Bcc:
Subject: REMINDER: Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility
Attachments: 1July24_BID_2.pdf; 1July24_Registration_Form.pdf; Non-Technical Summary.pdf

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Stakeholder

This email serves as a reminder that it is the intention of Far West Gold Recoveries (Pty) Ltd (FWGR) to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant and alternatively in the future other existing gold plants. In terms of regional locality, the TSF is situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality. The N12 runs 2km to the South of the TSF. The reclamation area is predominantly surrounded by open area, areas cleared of mining infrastructure and the closed Libanon Gold Mine.

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Any person affected by or who may be interested in the proposed project is asked to register as an I&AP. Should you have any comments/queries, please contact the stakeholder engagement team.

Contact Details:		
Ms Vanessa Viljoen	+27 (10) 140 1725	stakeholders@kongiwe.com
Ms Thuli Phakathi	+27 (10) 140 1726	stakeholders@kongiwe.com

For more information, please refer to the attached Background Information Document and the Draft Scoping Report non-technical summary.

Kind Regards,

The Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.

Tel: +27 (10) 140 6508 | Fax: +27 (86) 476 6438 | 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

Disclaimer: The provisions of Section 11 of the Electronic Communications and Transactions Act 25 of 2002 apply to this email notice and make it enforceable and binding on the recipient/addressee. This email message (including attachments) contains information which may be confidential and/or legally privileged. Unless you are the intended recipient, you may not use, copy or disclose to anyone the message or any information contained in the message or from any attachments that were sent with this email, and If you have received this email message in error, please advise the sender by email, and delete the message. Unauthorised disclosure and/or use of information contained in this email may result in civil and criminal liability. Everything in this e-mail and attachments relating to the official business of Kongiwe Environmental (Pty) Ltd is proprietary to the company. Caution should be observed in placing any reliance upon any information contained in this e-mail, which is not intended to be a representation or inducement to make any decision in relation to Kongiwe Environmental (Pty) Ltd. Any decision taken based on the information provided in this e-mail, should only be made after consultation with appropriate legal, regulatory, tax, technical, business, investment, financial, and accounting advisors. The e-mail address of the sender may not be used, copied, sold, disclosed or incorporated into any database or mailing list for spamming and/or other marketing purposes without the prior consent of Kongiwe Environmental (Pty) Ltd. Unless the intention to contract has been expressed in this message, this message cannot be regarded as a solicitation to contract, nor be seen as an offer or acceptance of contractual agreement. Neither the sender of the e-mail, nor Kongiwe Environmental (Pty) Ltd shall be liable to any party for any direct, indirect or consequential damages, including, without limitation, loss of profit, interruption of business or loss of information, data or software or otherwise. No warranties are created or implied that an employee of Kongiwe Environmental (Pty) Ltd and/or a contractor of Kongiwe Environmental (Pty) Ltd is authorised to create and send this e-mail.

Kongiwe Stakeholder Engagement

From: Kongiwe Stakeholder Engagement <stakeholders@kongiwe.com>
Sent: Monday, 26 August 2024 15:31
To: Gerlinde Wilreker; Thuli Phakathi; Anela Fixi
Subject: Availability of the Final Scoping Report (FSR): Reclamation of the Libanon TSF
Attachments: 26Aug24_FSR_Notif_Let.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Dear Stakeholder

Kongiwe Environmental (Pty) Ltd (Kongiwe Environmental) hereby gives notice to stakeholders of the availability of the Final Scoping Report (FSR) for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province.

Please see attached notification letter for details.

Should you have any queries please contact the stakeholder engagement team.

Kind Regards,

Stakeholder Engagement Team | Kongiwe Environmental (Pty) Ltd.
Tel: +27 (10) 140 6508 | Fax: +27 (86) 476 6438 | 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 C7: Authority Correspondence

mineral resources
& energy
Department:
Minerals Resources and Energy
REPUBLIC OF SOUTH AFRICA

Private Bag X 5,Braamfontein,2017 222 Smit Stree,8 Floor, Braamfontein.
Tel: 011 358 9700 Email: nicholas.chavalala@dmre.gov.za Ref No: / GP30/5/1/1/2(000073) BP/BAR
From: Mineral Regulation: Gauteng Office **Enquiries:** Mr WN Chavalala

Per Mail

Far West Gold Recoveries (Pty) Ltd
PO Box 12442
Carletonville
2499

Attention: Anja Esterhuizen

ACKNOWLEDGEMENT OF RECEIPT OF AN APPLICATION FOR A WASTE MANAGEMENT LICENSE FOR RECLAMATION OF TAILINGS STORGAE FACILITY FOR GOLD, SITUATED ON PORTIONS 31 AND 92 OF THE FARM VENTERSPOST 284 IQ, A PORTION OF PORTION 4 AND PORTION OF THE REMAINDER OF THE FARM LIBANON 283 IQ, A PORTION OF PORTION 39 AND 41 OF THE FARM GEMSPOST 288 IQ, LISTED IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT, 2008 (ACT NO. 59 OF 2008): AS AMENDED), IN THE MAGISTERIAL DISTRICT OF CARLETONVILLE.

1. The above-mentioned application lodged on **08 July 2024,** refers. The Department hereby acknowledges receipt of an application for waste management license in respect of the above-mentioned proposed project.
2. Acknowledgment of your application for waste management license does not grant you the right to commence with management activities.
3. Only activities listed on the application will be considered when issuing the waste management license and the onus is on the applicant to ensure that **all activities** related to the proposed project are included on the application.
4. You are also requested to consult with every organ of state that administers any law relating to matters affecting the environment as stipulated on Regulation 7(2) of NEMA: EIA Regulations, 2014 read with section 24(k) of NEMA.

5. Take note that the timeframe for the submission of a Scoping Report (SR) will begin on the date of application and the submission date of such SR will be within 44 days. Kindly note that failure to submit the three (3) copies of SR (within 44 days) which has been subjected to a public participation process of at least 30 days in terms of Regulation 40 of the EIA Regulations, 2014, your application for an EA will be deemed to have lapsed in terms of Regulation 45 of the NEMA EIA Regulations, 2014.

Should you have any queries, please do not hesitate to contact the inquiry person above.

Yours faithfully

.....

REGIONAL MANAGER
MINERAL AND PETROLEUM REGULATION
GAUTENG REGION
DATE: 05/09/2024

05/09/24

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Appendix C8: Meeting Minutes

Environmental Management Programme Report and Water Use Licence Applications for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

Stakeholder Meeting Schedule

Date of meeting	Attendees	Organisation & Address	Time	Method & Resources used	Project Team Member attending
Thursday, 18 July 2024	**Attended:** ▪ Friedah Khoza, Property Manager **Apologies:** • M Jacob Mahloko, Acting Regional Manager • Ms Lerato Mbatha • Ms Desire Msimango	**Directly Affected Landowner** Department of Public Works and Infrastructure (DPWI)	10H00	Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe
Monday, 22 July 2024	**Attended:** ▪ Mr Sylvester Nkwe, Acting Unit Manager Environmental Compliance ▪ Mr Bashan Govender, Manager Environmental Compliance SA Region ▪ Ms Grace Langa, Superintendant Environmental Compliance Coordinator ▪ Mr Stephan Botes, Supervisor Mineral Rights ▪ Evelyn Mekgwe, Superintendent Environmental Compliance Projects **Apologies:** • N/A	**Directly Affected Landowner** Sibanye Gold Limited	12H00	Virtual Meeting ▪ Presentation Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe Mr Greg Ovens, Environmental Manager, FWGR
Tuesday, 23 July 2024	**Attended:** ▪ Mr Mzubanzi Silinga, Executive Director Community Services ▪ Mr Vuyani Bekwa, Executive Director Economic Development & Planning ▪ Mr Moses Mokwana ▪ Ms Kgomotso Sekgobela **Apologies:**	**Directly Affected Landowner** Local Government Rand West City Local Municipality	12H30	Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe Mr Greg Ovens, Environmental Manager, FWGR Ms Anja Esterhuizen, Environmental Officer, FWGR

	▪ N/A				
Saturday, 27 July 2024	**Attended:** ▪ Mr Anele Saba, Ward Councillor, Ward 25 ▪ Mr Sinethemba Ngwiqi, Ward Officer, Ward 25 ▪ Ms Nkosi Zodwa, Ward Councillor, Ward 24 ▪ Ms Amanda Sityebi, Ward Councillor, Ward 26 ▪ Ms Thandokazi Stefane, PR Councillor, Ward 25 ▪ Ms Princess Sebanda, Ward Committee, Ward 25 ▪ Ms Onesimo Dotyeni, Ward Committee, Ward 25 ▪ Mr Maxwell Ndezele, Community member, Ward 25 ▪ Ms Lisakhanya Majuqu, Community member, Ward 25 ▪ Ms Akhona Ndongeni, Ward Committee, Ward 25 ▪ Mr Lazarus Molebatsi, Convener, Ward 26, Community Engagement Forum (Sibanye Stillwater) ▪ Mr Ramadibeng Father Ratsoeu, Dep Admin, Ward 32, Community Engagement Forum (Sibanye Stillwater) ▪ Ms Bunny Saxokashe, Community Member, Ward 25 Mr David Mayaba, Ward Committee Member, Ward 25	**Open Day for all Stakeholders** Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780	09H00 – 11H00	Face to Face Meeting: ▪ Presentation Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe Mr Greg Ovens, Environmental Manager, FWGR Ms Anja Esterhuizen, Environmental Officer, FWGR
Meeting was not held	**Attended:** ▪ Mr Thembinkosi Memela, Property Technician **Apologies:** • N.A	**Indirectly Affected Landowner** Transnet Limited		Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe **<u>Kongiwe inquired if a meeting was necessary, and Transnet replied that it was not needed as they were not directly affected.</u>**
Wednesday, 01 August 2024	**Attended:** ▪ Mariette Liefferink, CEO	**Environmental NGO** Federation for Sustainable Environment (FSE)	10H00	Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe Mr Greg Ovens, Environmental Manager, FWGR

	▪			▪	
Wednesday, 24 July 2024	**Attended:** ▪ Ms Sentle Mofokeng, Chief Environmental Health Practitioner, Department of Health ▪ Ms Cynthia Dineo Mokhali, Environmental Health Practitioner, Department of Health ▪ Ms Londolani Mutshekwa, Environmental Officer Specialised Production- Mine Water Management, Department of Water and Sanitation ▪ Ms Ntanta Thandile, Department of Water and Sanitation ▪ Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation ▪ Ms Grace Langa, Superintendent Environmental Compliance Coordinator, Sibanye-Stillwater Ltd	**Online Meeting for all Stakeholders** Department of Water and Sanitation Sibanye Still Water	10H00 - 10H30	Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe Ms Anja Esterhuizen, Environmental Officer, FWGR
Monday, 19 August 2024	**Attended:** ▪ Ms Basani Nkuna, Environmental Officer Specialised Production, Department of Water and Sanitation – Case Officer ▪ Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation ▪ Ms Dineo Josephine Dineo, Environmental Officer	**Pre-Application Meeting** Department of Water and Sanitation	12H00	Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Anela Fixi, Kongiwe Ms Phumla Mngwengwe, Kongiwe Mr Greg Ovens, Environmental Manager, FWGR
Tuesday, 3 September 2024	**Attended:** ▪ Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation	**Woonderfontein Catchment Forum**	10H00	Virtual Meeting ▪ Presentation ▪ Attendance Register	Ms Gerlinde Wilreker, Kongiwe Ms Vanessa Viljoen, Kongiwe Ms Thuli Phakathi, Kongiwe Ms Anela Fixi, Kongiwe Mr Greg Ovens, Environmental Manager, FWGR Ms Anja Esterhuizen, Environmental Officer, FWGR
Thursday, 12 September 2024	**Attended:** ▪ Ms Basani Nkuna, Environmental Officer Specialised Production, Department of Water and Sanitation – Case Officer	**Site Visit Meeting** Department of Water and Sanitation	12H00	In-Person Meeting ▪ Presentation ▪ Attendance Register	Ms Phumla Mngwengwe, Kongiwe Ms Thuli Phakathi, Kongiwe Mr Ripfumelo Macevele, Kongiwe Ms Anja Esterhuizen, Environmental Manager, FWGR

	▪ Ms Zanele Nyamende, Environmental Officer Specialised Production: Section (c) and (i), Department of Water and Sanitation ▪ Ms Portia Chawane, Environmental Officer Specialised Production, Department of Water and Sanitation				

DRDGOLD Limited

Far West Gold Recoveries – Libanon Reclamation Project

Stakeholder Engagement Meeting - Sibanye –Stillwater

DMRP reference number: GP30/5/1/1/2/000073 BP/BAR

DWS reference number: WU37611

July 2024

Agenda

1. Purpose of the Meeting
2. Important Notice
3. Introduction
4. Kongiwe’s Role as an Independent Environmental Assessment Practitioner
5. Project Location
6. Project Background
7. Project Description: The Process
8. Project Infrastructure
9. Specialist Studies
10. Legislative Framework
11. Project Progress to date
12. Questions & Answers

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Purpose of the Meeting

- Discuss the proposed Libanon Reclamation Project.
- Provide an overview of the Scoping and Environmental Impact Assessment process.
- 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 Resources and Energy (DMRE) 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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Introduction

- **Kongiwe**
  - Gerlinde Wilreker – Project Manager & EAP
  - Bradly Thornton – Project Director
  - Vanessa Viljoen – Stakeholder Engagement
  - Thuli Phakathi – Stakeholder Engagement
  - Anela Fixi – Stakeholder Engagement
- **Far West Gold Recoveries**
  - Greg Ovens

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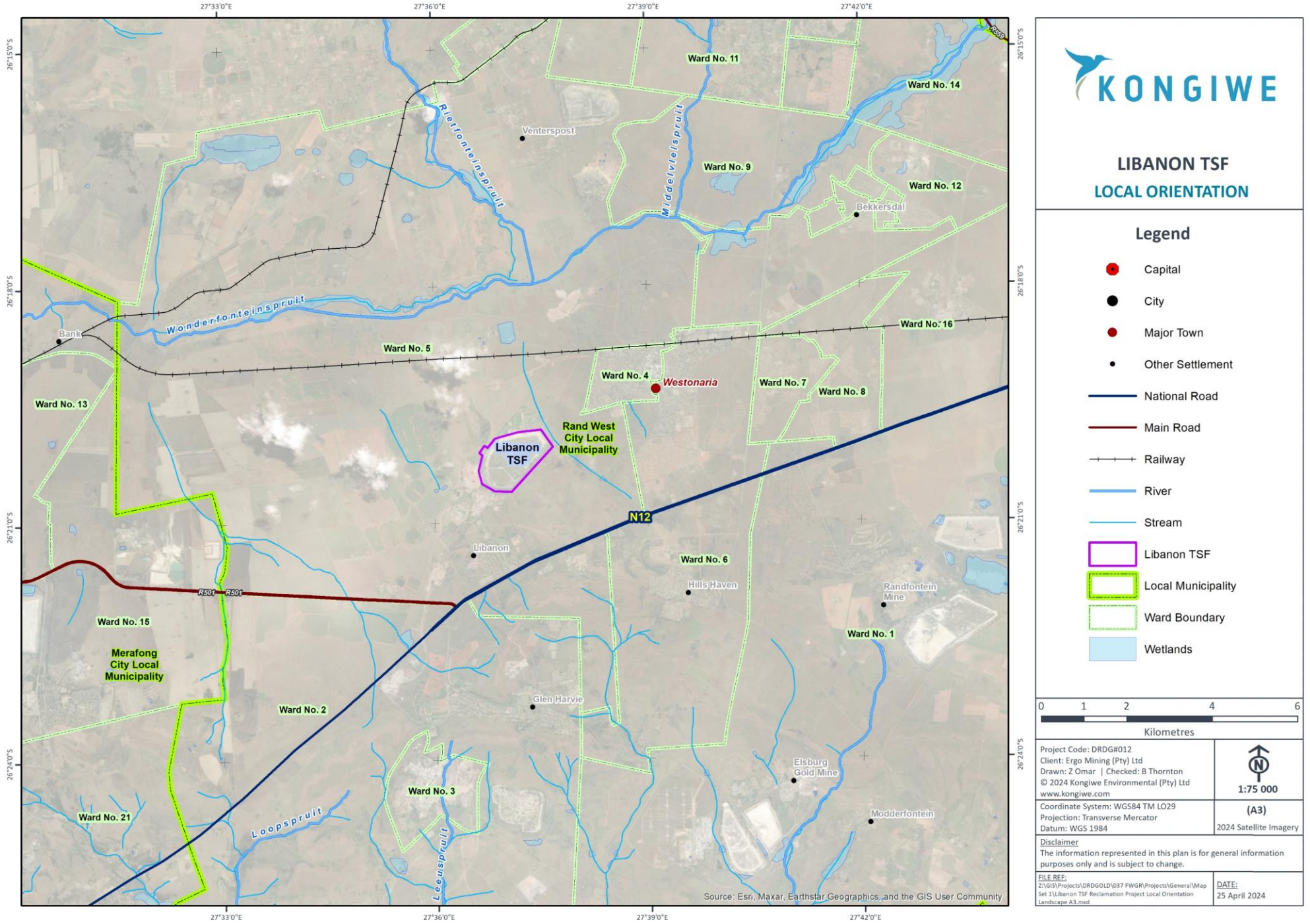
Kongiwe's Role

- 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 DMRE with the documentation so that they can determine if the project should proceed or not.



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Project Location



KONGIWE

LIBANON TSF
LOCAL ORIENTATION

Legend

- Capital
- City
- Major Town
- Other Settlement
- National Road
- Main Road
- Railway
- River
- Stream
- Libanon TSF
- Local Municipality
- Ward Boundary
- Wetlands

0 1 2 4 6
Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
© 2024 Kongiwe Environmental (Pty) Ltd
www.kongiwe.com

1:75 000

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

(A3)
2024 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\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Local Orientation Landscape A3.mxd

DATE: 25 April 2024

Project Background

- **Applicant**: Far West Gold Recoveries (Pty) Ltd
- **Reclamation**: The project aims to reclaim gold and other minerals from the Libanon TSF (107 Ha).
- **Reclamation Method:** Hydraulic Reclamation.
- **Life of Operation:** 12 years.
- This TSF is an historical mineral storage deposit (slimes dam), situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality.
- The proposed project will investigate one pipeline from Kloof Shaft #10 to provide process water to the reclamation station at the TSF.
- One pipeline will be required to transport slurry from the reclamation station to Kloof #10 shaft. From there it will join an existing pipeline to Driefontein #2 Plant.
- **Rehabilitation:** Once reclamation is completed the area will then be assessed for contamination (particularly in terms of radiation), contaminated soils if found will be remediated and the land levelled to a functioning topography, to allow for development of the footprint.

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Project Description: The Process

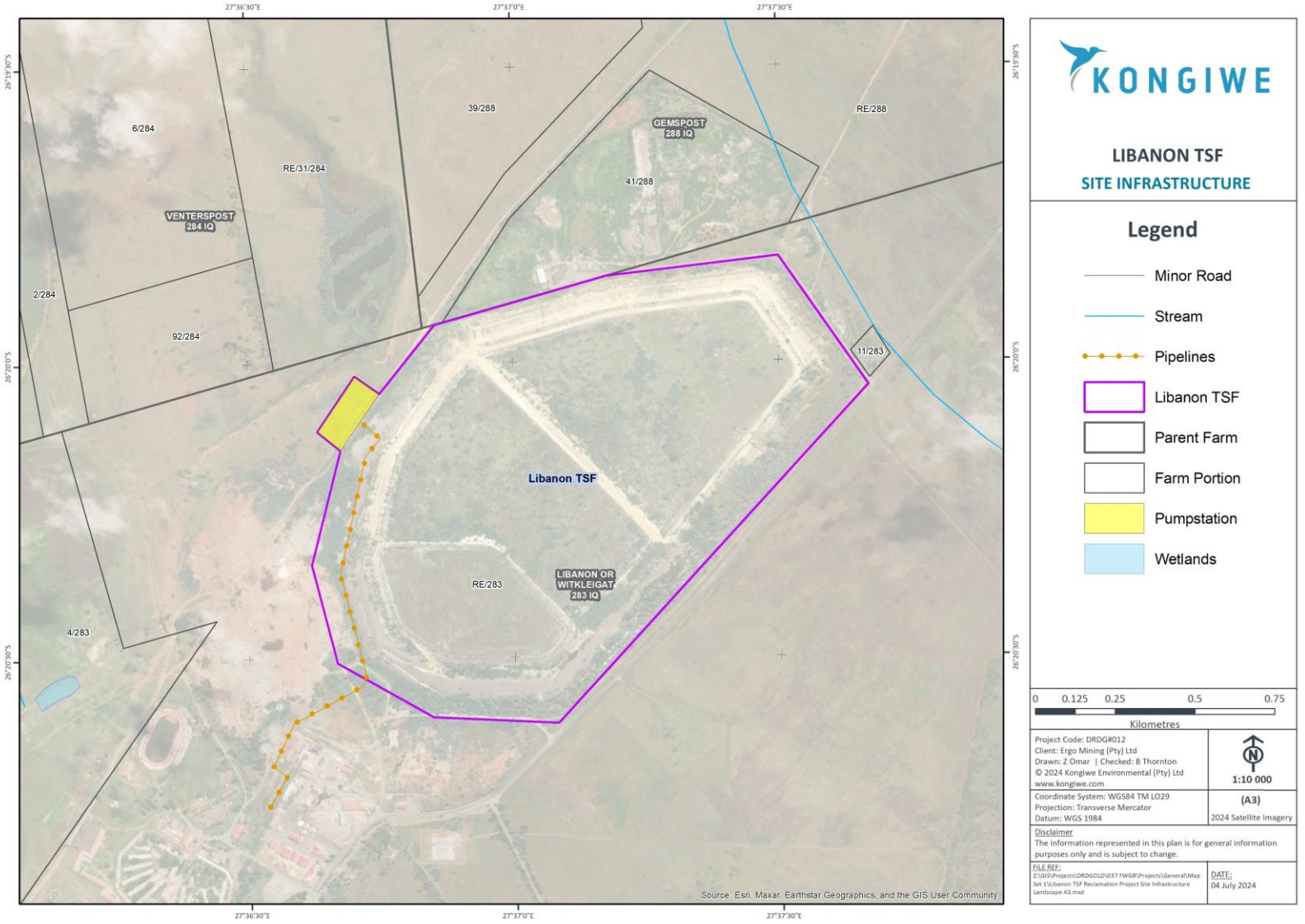
- The reclamation process makes use of high-pressure water monitors.
- During the reclamation process, process water (dirty water) mixes with the unconsolidated material of the slimes dam, resulting in what is known as a ‘slurry’.
- This slurry will be conveyed to the Driefontein #2 Plant (or other authorized plants) for reprocessing using existing and operational pipelines, within surface right permits and other rights held by FWGR.
- Final deposition of processed slurry will be on the Regional TSF (RTSF).
- In terms of process water, the water cycle operates as a closed circuit, meaning that limited make-up water will be required for the reclamation of the dump.
- Water required for the reclamation activities will be sourced from the adjacent Kloof #10 Shaft with makeup water from the RTSF.



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Project Infrastructure

- Required infrastructure will include:
  - Pumpstation
  - Process water from Kloof Shaft 10#
  - Pollution control paddock
  - Access road
  - Laydown area
  - Powerlines



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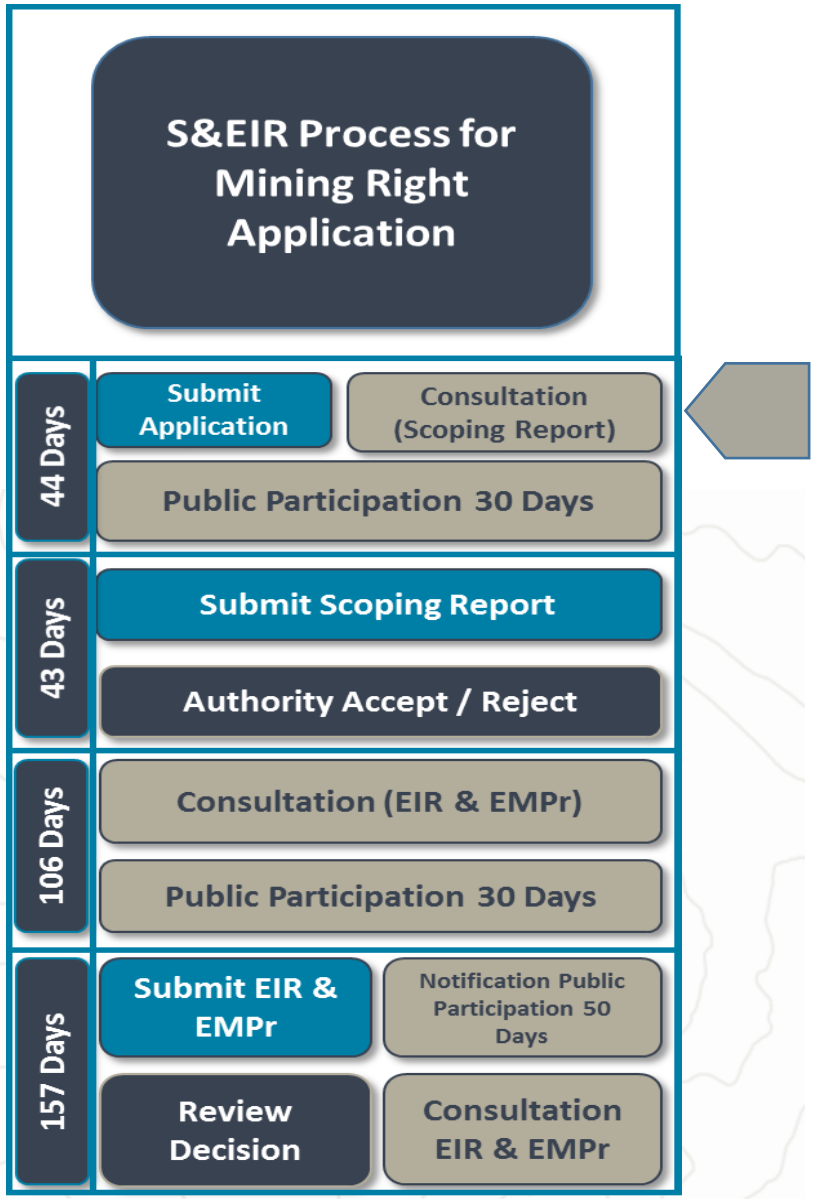
Specialist Studies

Proposed Specialist Studies	
Biodiversity Impact Assessment	Wetlands Impact Assessment
Surface Water Impact Assessment	Groundwater Impact Assessment
Air Quality Impact Assessment	Social Impact Assessment

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Legislative Framework

- An integrated Environmental Authorisation (EA) application will be submitted to the DMRE as the Competent Authority for the proposed project.
- The applicable applications to be assessed by the DMRE are as follows:
  - Application for an Environmental Authorisation for listed activities triggered in Listing Notices GN R983 and GN R984 in terms of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, as 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 in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) and the Activities listed in GN R921 of 29 November 2013 published in terms of NEM:WA.
- In addition, the following applications will be made to the relevant Competent Authorities:
  - An Integrated Water Use Licence Application (IWULA) will be undertaken in accordance with the National Water Act, 1998 (Act No.36 of 1998) (NWA). The Department of Water and Sanitation will be the Competent Authority to assess the IWULA for the proposed project.



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The Project to Date

- The required **Environmental Application** was submitted to the DMRE on **08 July 2024.**
- The **Draft Scoping report** was submitted for public review on **11 July 2024**. The review period is **ongoing until 12 August 2024**:
  - Westonaria Public Library
  - Kongiwe website: http://www.kongiwe.com/publications-view/public-documents/
- An **Online Meeting** will be held on **Wednesday, 24 July 2024** from 10h00-11h00 on MS Teams.
- An **Open Day** will be held on the **Saturday, 27 July 2024** from 09h00-11h00 at Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780.
- Landowner and stakeholder meetings are ongoing.
- The **Draft Scoping report** will then be finalised and submitted after the required public participation process has been undertaken.
- Comments will be recorded in a Comments and Response Report.
- The Integrated Water Use Licence Application will be submitted and the process is ongoing.

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Comment & Discussion

- Discussion
- Action Points
  - Responsibility
  - Due Date
- Closing



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Contact

- **Name: Vanessa Viljoen / Thuli Phakathi**
- **Tel: 010 140 1725/26**
- **Email: Stakeholders@kongiwe.com**

Kongiwe Environmental
150 Bryanston Drive, Bryanston, Sandton, 2191, South Africa.
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info@kongiwe.com
www.kongiwe.com

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRP reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Meeting Minutes: Department of Public Works and Infrastructure

Date:	Thursday, 18 July 2024
Time:	10:00 – 10:30
Venue:	Microsoft Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Department of Public Works and Infrastructure (DPWI)	Ms Frieda Khoza	Property Manager
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement
No apologies		
N/A		

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.*

1. **Welcome and Introductions**
   - The project manager welcomed the meeting attendees and introduced all the attendees

2. **The purpose of the meeting was to:**
   - Discuss the proposed Libanon Reclamation Project.
   - Provide an overview of the Scoping and Environmental Impact Assessment (SEIA) process.
   - Provide the DPWI Property Manager with an opportunity to raise comments/seek clarity and provide input into the Project; and
   - Record comments raised and then include them in the Comments and Responses Report (CRR) which will be integrated into the Scoping Report (Environmental Impact Assessment Scoping Report (SR).

3. **Meeting Agenda:**
   - Purpose of the meeting
   - Important Notices
   - Kongiwe's Role as an independent Environmental Assessment Practitioner
   - Project Location
   - Project Background

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- Project Description: The process
- Project Infrastructure
- Specialist Studies
- Legislative Framework
- Project Progress to date
- Questions and Answers

Kongiwe Environmental made a presentation to the DPWI property manager. This presentation is attached as Appendix A.

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4. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Ms Frieda Khoza, Property Manager, Department of Public Works and Infrastructure	Ms Khoza stated that the presentation was clear and straight to the point. She added that she was fine with the project and would be happy to assist if Kongiwe requires anything from their side.	Ms Wilreker explained to Ms Khoza that the purpose of the meeting was to make the Department of Public Works and Infrastructure aware of the project as the directly affected landowners. Additionally, she stated that if there is anything needed during the project, Kongiwe will notify them.
Ms Gerlinde Wilreker, Project Manager, Kongiwe Environmental (Pty) Ltd	Ms Wilreker stated that if a landowner's consent is requested for the Water Use Licence it would be communicated with the DPWI.	Ms Khoza stated that they will be happy to assist if Kongiwe required anything from DPWI side.

5. Closing

COMMENT	RESPONSE
The project team thanked Ms Khoza for her time and input.	Ms Khoza thanked Kongiwe for the meeting.

Ms Wilreker thanked the meeting attendees for their questions and comments before the meeting adjourned at 10:30 am.

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Appendix A

Presentation

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRP reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Meeting Minutes: Sibanye-Stillwater Limited

Date:	Monday, 22 July 2024
Time:	12:00 – 13:00
Venue:	Microsoft Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Sibanye-Stillwater	Mr Stephan Botes	Unit Manager - Mineral Rights
Sibanye-Stillwater	Ms Evelyn Mekgwe	Superintendent Environmental Compliance Projects
Sibanye-Stillwater	Ms Grace Langa	Superintendent Environmental Compliance Coordinator
Sibanye-Stillwater	Ms Kahmani Gounden	Supervisor Mineral Rights
Sibanye Stillwater	Mr Bashan Govender	Manager Environmental Compliance
Sibanye-Stillwater	Mr Sylvester Nkwe	Acting Unit Manager Environmental Compliance
Far West Gold Recoveries (Pty) Ltd (FWGR)	Mr Greg Ovens	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager (EAP)
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Mr Bradly Thornton	Project Director
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement
No apologies		
N/A		

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.*

1. **Welcome and Introductions**
   - The project manager welcomed the meeting attendees and introduced the attendees

2. **The purpose of the meeting was to:**
   - Discuss the proposed Libanon Reclamation Project.
   - Provide an overview of the Scoping Report (SR) and the Water Use Licence (WUL) process.
   - Provide the Sibanye-Stillwater with an opportunity to raise comments/seek clarity and provide input into the Project; and
   - Record comments raised and then include them in the Comments and Responses Report (CRR)

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3. Meeting Agenda:

- Purpose of the meeting
- Important Notices
- Introduction
- Kongiwe's Role as an independent Environmental Assessment Practitioner
- Project Location
- Project Background
- Project Description: The process
- Project Infrastructure
- Specialist Studies
- Legislative Framework
- Project Progress to date
- Questions and Answers

Kongiwe Environmental made a presentation to the Sibanye-Stillwater attendees. This presentation is attached as Appendix A.

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4. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Mr Greg Ovens, Project Manager, FWGR	After Ms Wilreker's presentation, Mr Ovens provided clarity to the Sibanye-Stillwater team, explaining that the project is a continuation of the larger West Rand Tailings Reclamation Project (WRTRP).	The Sibanye team noted the explanation.
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	Mr Govender suggested that Mr Ovens adopt a blanket approach for reclaiming the tailing dams, rather than addressing each TSF individually. He emphasised that this approach could streamline the process, particularly in relation to the water use license issue. Mr Govender highlighted a disconnect regarding the authorisation of the central tailing's storage facility. He sought clarification on this authorisation within the context of the current discussion, arguing that a holistic approach to authorisation would simplify the process. By consolidating the work into a single package for the application, it would be easier for consultants to manage and for stakeholders to review. From a compliance perspective, Mr Govender noted that managing a single comprehensive document is more efficient than handling multiple documents for individual projects. This approach would also facilitate the streamlining of compliance reports and annual reporting, making it significantly easier to manage.	Mr Ovens explained the rationale behind the decision to split the projects. He stated that FWGR owns four remaining assets: Libanon, Kloof 1, Venterspost North and Venterspost South. Due to the urgent need to commence construction activities at Libanon as soon as authorization is granted, the projects were divided. Ideally, FWGR would have submitted a single application covering all four TSFs, but it opted against this to avoid the risk of delaying other projects if one of the applications faced an appeal. The remaining applications are expected to be filed within the next two months.

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STAKEHOLDER	COMMENT	RESPONSE
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	Mr Govender stated that he accepted Mr. Ovens' rationale for splitting the facility, noting that the delay of one project would affect the operation of the others.	Mr Ovens noted that.
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	Mr Govender stated that the IWULA for the Libanon project needs to complement the authorization granted for the TSF. He emphasized that any 21(g) activities arising from this are yet to be submitted. The application must not duplicate those covered by the existing RTSF authorization. Furthermore, he noted that the design of the IWULA will be critical.	Mr Ovens explained that the design of the IWULA is intended to be independent of the existing WRTRP authorization. He stated that it will be a separate application that adheres to appropriate engineering requirements as it is intended for a pollution padlock. Ms Wilreker added that the project is still in the pre-application stage for the water use licence. The final water uses are yet to be identified and will be specifically for the activities at Libanon and there are no activities related to the RTSF that are included in this application.
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	Mr Govender stated that in the previous week, they had a very constructive meeting with the Department of Water and Sanitation (DWS) team, which included the legal services team, Portia and Hellen. During the meeting, they addressed past issues. He noted that one of the factors discussed was that Sibanye had been resisting certain issues that could not be contested and lacked a solid basis for their arguments. He emphasized the importance of remaining open-minded to all advice from DWS and highlighted the need to preserve this relationship. Further, he stated that maintaining a positive relationship with DWS will be crucial for expediting authorization.	Mr Ovens added that every application they submit currently complies with the legislation and does not challenge it. Consequently, FWGR has successfully obtained water use licences in the past 18 months.
Mr Stephan Botes, Unit Manager: Mineral Right, Sibanye-Stillwater Ltd	Mr Botes inquired whether it would be possible to provide a consolidated depiction of the TSF's and an update on their	Mr Ovens stated that the team can provide Mr. Botes with a detailed overview showing which TSF FWGR owns and which ones it does not.

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STAKEHOLDER	COMMENT	RESPONSE
	status with respect to all Environmental Authorizations (EAs) and other relevant approvals.	
Ms Evelyn Mekgwe, Superintendent Environmental Compliance Projects, Sibanye-Stillwater Ltd	Ms Mekgwe requested clarity regarding the pending IWULA and pending Part 2 amendments, specifically concerning the removal of facilities that have been sold to DRDGOLD/FWGR. She mentioned that these facilities include Kloof and Driefontein, which were sold to DRDGOLD/FWGR and have a positive IWUL or EA dated back to 2018. She asked whether the authorizations were granted to Sibanye-Stillwater or FWGR and sought information on what was included in those authorizations.	Mr Ovens provided an overview of the West Rand retreatment projects, and the authorization processes involved in transferring these rights from Sibanye to FWGR, starting in 2018. He explained that the West Rand tailings retreatment project includes four mining right areas previously owned by Sibanye: Driefontein, Kloof, Ezulwini, and Cook, which together comprised the Greater West Rand Retreatment Project. Environmental Authorizations (EAs) for these areas were issued in 2018. Following this, DRDGOLD and Sibanye completed a transaction in 2018 involving the purchase of several TSFs: Driefontein 5 TSF, Driefontein 3 TSF, and Driefontein 4 TSF. The authorization for reclaiming these three TSFs was also issued in 2018. DRDGOLD purchased the DP2 tailings facility, and FWGR acquired the rights to dispose of tailings at Driefontein 4. Both the plant and deposition rights were included in the regional Driefontein EA. Mr Ovens added that the Regional Tailings Storage Facility (RTSF), which falls under the Kloof mining right, has a separate EA that was approved and successfully transferred to DRDGOLD in August 2022. This EA was initially issued to Sibanye in 2018 and was subsequently transferred to FWGR. Mr Ovens stated that the water use license for the WRTRP was subsequently transferred to FWGR from Sibanye. Furthermore, activities associated with managing DP2, including pipelines and shaft

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STAKEHOLDER	COMMENT	RESPONSE
		abstractions at Driefontein Shaft 10, as well as deposition at Driefontein 4, are licenced within the Driefontein water use license. Consequently, FWGR has applied for a new water use licence to assume responsibility for these water use licences. He further clarified that the current application pertains to the reclamation of the Libanon TSF, which was not included in the West Rand tailings retreatment projects. Although it was mentioned as part of the West Rand tailings retreatment, it will be reprocessed and disposed of at the RTSF. Mr Ovens also stated that he will develop a flowchart to illustrate how the various authorizations are interconnected, showing which areas are covered by each authorization.
Ms Evelyn Mekgwe, Superintendent Environmental Compliance Projects, Sibanye-Stillwater Ltd	Ms Mekgwe asked where the Driefontein TSF 3 and 5 stand in relation to the current application, considering that TSF 4 has already been transferred. She also inquired whether the Libanon facility is included under Kloof 1 or if it is being removed.	Ms Wilreker stated that Driefontein TSF 3 and TSF 5 have been excluded from the current licence application. Mr Ovens added that approval for TSF 3 and TSF 5 has already been obtained. These facilities have been transferred to FWGR, and the necessary authorizations are in place.
Ms Evelyn Mekgwe, Superintendent Environmental Compliance Projects, Sibanye-Stillwater Ltd	Ms Mekgwe recommended that a table or flow diagram would be a quick reference tool.	Mr Ovens stated that he can only provide information based on what he has. He cannot comment on the status of Sibanye's licences, as he is unaware of whether the submitted application amendments have been approved.
Ms Evelyn Mekgwe, Superintendent Environmental Compliance	Ms Mekgwe stated that Sibanye is still in the application process, and the licences have not yet been granted.	Mr Ovens noted the comment.

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STAKEHOLDER	COMMENT	RESPONSE
Projects; Sibanye-Stillwater Ltd		
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	Mr Botes stated that, with the addition of new personnel in the environmental sector on their team, a flow chart from FWGR is required to depict the TSFs owned by FWGR. This chart must include explanations of the status of each TSF regarding permitting and authorization. He further stated that this will provide their environmental team with a comprehensive overview of the situation.	Ms Wilreker noted the suggestion.
Mr Greg Ovens, Project Manager, FWGR	Mr Ovens provided a detailed explanation of the Libanon reclamation process, as outlined in the presentation.	
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	Mr Botes requested to be briefed on the details discussed in the meeting, as he joined while the meeting was already in progress.	Ms Wilreker explained that, since the dam is situated on Sibanye-Stillwater land, the National Environmental Management Act (NEMA) requires consultation with landowners and other directly and indirectly affected parties. As a landowner, Sibanye is considered a directly affected party. Mr Ovens added that the reclamation activities planned for Libanon trigger NEMA-listed activities not covered by the West Rand tailings retreatment authorization. Consequently, certain activities related to the successful reclamation of the Libanon TSF need to be authorized.
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	Mr Botes inquired about the time frames and what actions are required on their side.	Mr Ovens stated that Kongiwe Environmental is consulting with all interested and affected parties, with Sibanye being one of the directly affected parties as the landowner.

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STAKEHOLDER	COMMENT	RESPONSE
		Mr Ovens stated that the discussions are still ongoing regarding access to infrastructure for the proposed Libanon project, such as water from the shafts and power agreements. These matters are managed by engineers directly in coordination with other engineering teams and area managers. Mr Ovens stated that Kongiwe Environmental is responsible for addressing environmental and water use-related aspects and obtaining the necessary authorizations. Actual operations and ongoing site requirements are managed by the responsible entities at Sibanye. Ms Wilreker added that during the water use licence application process, landowner consent is required. She further stated that if the project site still falls under Sibanye by the time the water use licence activities are advanced, Kongiwe Environmental will need landowner consent from Sibanye for water use authorization.
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	Mr Botes stated that Mr Govender and Ms Mekgwe need to provide input on any concerns, as they have done in the session. He also mentioned that, based on the explanation provided, he understood the context of the presentation and requested that the presentation be sent to them.	Ms Wilreker explained that the Environmental Impact Assessment (EIA) is a lengthy process, and the application is still in the early scoping phase. Consultations will continue throughout the EIA process, and Sibanye will be involved at every stage. She also stated that the presentation, along with the meeting minutes, will be sent to them.
Mr Greg Ovens, Project Manager, FWGR	Mr Ovens asked whether the agreement FWGR has with Sibanye to return the project land to wilderness standards is still in effect or if it is aligned with the proposed rehabilitation plan.	Mr Govender stated that the approach will align with the closure objectives led by Tharina. He further noted that returning the land to its natural state would be sufficient, as it does not preclude its use for

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STAKEHOLDER	COMMENT	RESPONSE
		other activities, which will be addressed through town planning. Ideally, achieving its native state would be preferred. Mr Ovens stated that he will need to discuss with Tharina and Mpho the potential for proposed developments on the project site after reclamation. This will help avoid the costs and efforts involved in grassing the area if it will subsequently need to be ploughed for future development.
Ms Gerlinde Wilreker, Project Manager (EAP), Kongiwe Environmental	Ms Wilreker stated that Kongiwe will include this approach on the EIA report.	Mr Ovens stated that for the EIA report, Kongiwe must include that the site will be returned to its natural wilderness or grassland environment, and that any financial provisions required will be provided. Additionally, if the closure plan changes during the reclamation process or if new development requirements are uncovered, FWGR will adjust accordingly

5. Closing

COMMENT	RESPONSE
The project team thanked Sibanye-Stillwater team for their time and input.	Attendees thanked Kongiwe for the meeting.

Ms Wilreker thanked the meeting attendees for their questions and comments before the meeting adjourned at 13:00 pm.

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Appendix A

Presentation

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRP reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Meeting Minutes: Rand West City Local Municipality

Date:	Tuesday, 23 July 2024
Time:	10:00 – 10:30
Venue:	Microsoft Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Rand West Local Municipality	Mr Vuyani Bewa	Executive Director: Economic Development, Human Settlement and Planning
Rand West Local Municipality	Mr Cassie Pelser	Senior Town Planner
Rand West Local Municipality	Mr Banzi Silinga	Executive Director: Community Services
Rand West Local Municipality	Ms Sewela Malehopa	Town Planner
Rand West Local Municipality	Mr Moses Mokwana	Waste Management
Rand West Local Municipality	Ms Diteboho Moabi	Town Planner
Far West Gold Recoveries	Ms Anja Esterhuizen	Applicant
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement
No apologies		
N/A		

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.*

1. **Welcome and Introductions**
   - The project manager welcomed the meeting attendees and introduced all the attendees

2. **The purpose of the meeting was to:**
   - Discuss the proposed Libanon Reclamation Project.
   - Provide an overview of the Scoping Report (SR) and Water Use Licence (WUL) process.
   - Provide the Rand West City Local Municipality property manager with an opportunity to raise comments/seek clarity and provide input into the Project; and
   - Record comments raised and then include them in the Comments and Responses Report (CRR) which will be integrated into the Scoping Report (SR).

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3. Meeting Agenda:

- Purpose of the meeting
- Important Notices
- Kongiwe's Role as an independent Environmental Assessment Practitioner
- Project Location
- Project Background
- Project Description: The process
- Project Infrastructure
- Specialist Studies
- Legislative Framework
- Project Progress to date
- Questions and Answers

Kongiwe Environmental made a presentation to the RWLM stakeholders. This presentation is attached as Appendix A.

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4. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Ms Gerlinde Wilreker, Project Manager, Kongiwe Environmental (Pty) Ltd	After providing the presentation, Ms Wilreker asked the attendees if they had any queries and comments regarding the project.	Mr Bekwa stated that the Rand West Local Municipality will provide feedback after reviewing the presentation and submit any comments in writing.
Mr Vuyani Bewa, Executive Director: Economic Development, Human Settlement and Planning, Rand West Local Municipality	Mr Bewa requested that the presentation be sent to the local municipality for further review and comments.	Ms Wilreker Stated that the presentation, the Background Information Document (BID), and the non-technical summary report will be sent to Mr Bewa.
Mr Moses Mokwana, Waste Management, Rand West Local Municipality	Mr Mokwana stated that the Waste Management Department will also review the scoping report and provide comments, as the project is located next to their landfill site and all the operations will affect it.	Ms Wilreker thanked Mr Mokwana for raising that point.

5. Closing

COMMENT	RESPONSE
The project team thanked attendees for their time and input.	Rand West Local Municipality attendees thanked Kongiwe for the meeting.

Ms Wilreker thanked the meeting attendees for their questions and comments before the meeting adjourned at 10:30 am.

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Appendix A

Presentation

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRP reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Meeting Minutes: Stakeholder Engagement

Date:	Wednesday, 24 July 2024
Time:	10:00 – 10:30
Venue:	Microsoft Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Department of Health	Ms Sentle Mofokeng	Chief Environmental Health Practitioner
Department of Health	Ms Cynthia Dineo Mokhali	Environmental Health Practitioner
Department of Water and Sanitation	Ms Londolani Mutshekwa	Environmental Officer Specialised Production, Mine Water Management
Department of Water and Sanitation	Ms Ntanta Thandile	
Department of Water and Sanitation	Ms Xolelwa Bhele	Environmental Officer Specialised Production
Sibanye-Stillwater Ltd	Ms Grace Langa	Superintendent Environmental Compliance Coordinator
Far West Gold Recoveries (Pty) Ltd	Ms Anja Esterhuizen	Applicant
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Vannessa Viljoen	Stakeholder Engagement
No apologies		
N/A		

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.*

1. **Welcome and Introductions**
   - ❖ The project manager welcomed the meeting attendees and introduced all the attendees

2. **The purpose of the meeting was to:**
   - ❖ Discuss the proposed Libanon Reclamation Project.
   - ❖ Provide an overview of the Scoping Report (SR) and Water Use Licence (WUL) process.

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- Provide the stakeholders with an opportunity to raise comments/seek clarity and provide input into the Project; and
- Record comments raised and then include them in the Comments and Responses Report (CRR) which will be integrated into the Scoping Report (SR).

3. Meeting Agenda:

- Purpose of the meeting
- Important Notices
- Kongiwe's Role as an independent Environmental Assessment Practitioner
- Project Location
- Project Background
- Project Description: The process
- Project Infrastructure
- Specialist Studies
- Legislative Framework
- Project Progress to date
- Questions and Answers

Kongiwe Environmental made a presentation to the different stakeholders. This presentation is attached as Appendix A.

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4. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation	Ms Bhele inquired about the source of water that will be used for this project.	Ms Wilreker stated that the water will be sourced from Kloof shaft 10 and pumped back to the Regional Tailing Storage Facility (RTSF).
Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation	Ms Bhele asked if the water use licence application had started yet and if it has, who is the assessor for this application?	Ms Wilreker stated that Kongiwe has started the eWULA process. It is in the pre-application phase and has received a reference number (WU37611). However, a case officer has not been assigned yet.
Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation	Ms Bhele asked if Kongiwe would be interested in presenting this project to the forum on the 3rd of September 2024.	Ms Wilreker said that Kongiwe would be interested in presenting this project at the forum on 3rd September 2024.
Mrs Londolani Mutshekwa, Mine Water Management, Department of Water and Sanitation	Mrs Mutshekwa inquired about the lifespan of the project and if there was going to be a deposition within the mine void of the project.	Ms Wilreker stated that the lifespan of the project will be 12 years. She further indicated that the slurry that would be processed at the plant would be deposited on the authorised Driefontein RTSF.
Mrs Londolani Mutshekwa, Mine Water Management, Department of Water and Sanitation	Mrs Mutshekwa asked if the Libanon TSF was existing or new.	Ms Wilreker stated that it is an existing Tailings Storage Facility.

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5. Closing

COMMENT	RESPONSE
The project team thanked attendees for their time and input.	The attendees thanked Kongiwe for the meeting.

Ms Wilreker thanked the meeting attendees for their questions and comments before the meeting adjourned at 10:30 am.

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Appendix A

Presentation

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRP reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Meeting Minutes: Open Day

Date	Saturday, 27 July 2024
Time:	09H00 – 11H00
Venue:	Westonaria Sports Complex

List of attendees:

Organisation	Name of attendee	Designation
Rand West City Local Municipality	Mr Anele Saba	Ward Councillor, Ward 25
Rand West City Local Municipality	Mr Sinethemba Ngwiqi	Ward Officer, Ward 25
Rand West City Local Municipality	Ms Nkosi Zodwa	Ward Councillor, Ward 24
Rand West City Local Municipality	Ms Amanda Sityebi	Ward Councillor, Ward 26
Rand West City Local Municipality	Ms Thandokazi Stefane	PR Councillor, Ward 25
Rand West City Local Municipality	Ms Princess Sebanda	Ward Committee, Ward 25
Rand West City Local Municipality	Ms Onesimo Dotyeni	Ward Committee, Ward 25
Rand West City Local Municipality	Mr Maxwell Ndezele	Community member, Ward 25
Rand West City Local Municipality	Ms Lisakhanya Majuqu	Community member, Ward 25
Rand West City Local Municipality	Ms Akhona Ndongeni	Ward Committee, Ward 25
Community Engagement Forum (Sibanye Stillwater)	Mr Lazarus Molebatsi	Convener, Ward 26
Community Engagement Forum (Sibanye Stillwater)	Mr Ramadibeng Father Ratsoeu	Dep Admin, Ward 32
Rand West City Local Municipality	Ms Bunny Saxokashe	Community Member, Ward 25
Rand West City Local Municipality	Mr David Mayaba	Ward Committee Member, Ward 25
Far West Gold Recoveries (Pty) Ltd	Mr Greg Ovens	Applicant
Far West Gold Recoveries (Pty) Ltd	Ms Anja Esterhuizen	Applicant
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Vanessa Viljoen	Stakeholder Engagement

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.*

1. Welcome and Introductions

The project team welcomed all Open Day attendees upon arrival.

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2. The purpose of the Open Day was to:
   - Present and discuss the proposed Libanon Reclamation Project**;**
   - Provide an overview of the Scoping Report and the Integrated Water Use Licence Application (IWULA) processes;
   - Provide the stakeholders with an opportunity to raise comments/seek clarity and provide input into the Project; and
   - Record comments raised and then include them in the Comments and Responses Report (CRR) which will be integrated into the Scoping Report, and the IWULA.

3. Open Day Agenda:

- Kongiwe's Role as an Independent Environmental Assessment Practitioner;
- Stakeholder Role;
- Public Participation Process;
- Stakeholder Engagement;
- Way Forward;
- Summary

Please refer to **Appendix B** for the posters that were on display.

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4. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Mr Anele Saba, Ward Councillor, Ward 25, Rand West City Local Municipality	Mr Saba welcomed Kongiwe and all the attendees. He stated that he would share the information with the community after Gerlinde Wilreker's presentation on the proposed Reclamation of the Libanon Tailings Storage Facility. Mr. Saba noted that he had encountered similar projects before, including one proposed by an Australian company and expressed satisfaction that the project is now moving forward, with hopes of generating job opportunities. However, he raised concerns about dust and beneficiation: 1. **Dust**: Mr Saba inquired about the environmental impact study related to dust. He mentioned that, due to the impacts of dust, previously, a hostel was demolished as part of the Sibanye closure. Currently, there are two communities and farmers residing near the Libanon TSF who might be affected by dust during the project operation. He requested information on the measures that will be implemented to manage dust throughout the project. 2. **Beneficiation**: Mr Saba indicated that given that mine closure impacts the Libanon community, He questioned the beneficiation approach concerning job opportunities. He further wanted to understand how the project will address job creation and other benefits for the local community.	Mr Ovens reported that, to his knowledge, the Australian company is still interested in the tailings on the Randfontein side towards Soweto. The tailings on the Libanon Rand West side are owned by Far West Gold Recoveries (FWGR), which it acquired from Sibanye. He mentioned that the removal of these tailings dams (TSFs) is part of the mine closure process, intended to address their environmental and social impacts and return the land to its natural state, given that no further development is planned for the area. He expressed that the purpose of the project is to address both social and environmental impacts, as well as to extract economic benefits, particularly gold, to support the continuation of the business. In terms of beneficiation, Mr. Ovens stated that FWGR currently employs about 180 people, including members from West Rand communities. He noted that if the TSFs are not removed, these employees could lose their jobs. Mr Ovens explained that the proposed project is a continuation of an existing tailings retreatment operation. The process involves replacing one TSF with another, with the same team moving from one TSF to the next. While it will continue to provide jobs for those currently working on the TSFs, there will also be smaller job opportunities as operations shift to different areas. Ms Wilreker added that a specialist will be consulted to provide recommendations on air quality. One of the recommendations is to keep the area of disturbance as small as possible and to use water to minimize dust.

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STAKEHOLDER	COMMENT	RESPONSE
		Mr Ovens further stated that dust monitors will be installed in and around the TSFs to measure dust levels. The project will adhere to dust control regulations established by the Department for Environmental Affairs, ensuring that dust emissions do not exceed acceptable levels. Although silicosis is not a significant issue in surface mining, any problems that arise will be addressed through a claims process available to the community.
Mr Anele Saba, Ward Councillor, Ward 25, Rand West City Local Municipality	Mr Saba expressed dissatisfaction with the current approach to community benefits, noting that community members, who are directly affected by the tailings, are also among those who are unemployed. He emphasized that FWGR needs to ensure that the local community is actively involved in and employed through the project. He further stated there should be a clear strategy to demonstrate that residents are given opportunities to participate in and benefit from this project.	The project team noted the concern.
Mr Lazarus Molebatsi, Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26	Mr Molebatsi suggested that community engagements should involve all members of the community. He emphasized that projects should be discussed in the Sibanye Community Engagement Forum to ensure broad participation. He also noted that he did not receive an invitation to the current engagement, highlighting a need for improved communication and inclusivity in such meetings.	Mr Saba stated that Kongiwe's approach was appropriate. He said that the ward councillors present at the meeting represent each ward and will be responsible for disseminating the information to their respective communities.
Mr Lazarus Molebatsi, Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26	Mr Molebatsi mentioned that FWGR is not represented in their forums and noted that Sibanye should have informed them about these forums.	Mr Ovens thanked Mr Molebatsi for raising the issue and clarified that FWGR is not affiliated with Sibanye. He emphasized that the public participation process is ongoing and that Kongiwe is still in the early stages. He gave the assurance that there will be further consultations and that other community members not currently present will be

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STAKEHOLDER	COMMENT	RESPONSE
		considered. Mr Ovens offered to engage with Sibanye and convey the community's concerns to them.
Ms Thandokazi Stefane, PR Councillor Ward 25, Rand West City Local Municipality	Ms Stefane stated that the beneficiaries from Ward 25 would be directly affected by the mine operations and emphasized that representatives from outside of Ward 25 should not be speaking on behalf of Ward 25.	The project team noted the comment.
Mr Ramadibeng Father Ratsoeu, Dep Admin, Community Engagement Forum (Sibanye Stillwater), Ward 32	Mr Ratsoeu raised concerns about the environmental, social, political, and health impacts of the mining operations that took place over the past 30 years. He highlighted that the community has not seen significant benefits from these projects and criticized the Department of Mineral Resources and Petroleum (DMRP) for its lack of action on compliance issues. He noted that people are suffering from silicosis and expressed widespread dissatisfaction with the mining impacts. Mr. Ratsoeu emphasized that the community is exhausted by the situation and needs concrete action rather than just discussion.	Mr Ovens stated that FWGR entered the mining business only recently in 2018, and therefore he cannot address past mining issues. However, he expressed a willingness to work collaboratively with the community moving forward.
Mr Sinethemba Ngwiqi, Ward Officer, Ward 25, Rand West City Local Municipality	Mr Ngwiqi thanked Kongiwe for informing them about the project and expressed satisfaction with the willingness to address the environmental impact of dust. He emphasized the importance of ensuring that residents receive job opportunities. While he is not opposed to FWGR bringing in its skilled workers, he raised concerns about potential conflicts if the community sees unfamiliar faces. He stressed that the initial beneficiaries should be from the Ward 25 community. Mr Ngwiqi also highlighted that different forums may present various viewpoints, which could potentially delay the project. He urged FWGR to find ways to empower the local community by providing them with skills transfer that would make the	Mr Ovens noted the comment.

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STAKEHOLDER	COMMENT	RESPONSE
	community members employable both during and after the project's lifespan.	
Mr Anele Saba, Ward Councillor, Ward 25, Rand West City Local Municipality	Mr Saba revisited the purpose of the project and advised attendees to look carefully at Kongiwe's presentation and address any differences after the meeting. He stated that they have reviewed and commented on the presentation and are satisfied with the rehabilitation approach, specifically the goal of restoring the natural topography for future development. He indicated that they would relay this information to their respective ward communities and encourage participation in future meetings. He stated that they plan to discuss internally and return with proposed solutions. He mentioned that the next meeting of the proposed project would be to address the beneficiation from the project. .	The project team noted the comment.
Mr Lazarus Molebatsi, Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26	Mr Molebatsi clarified that his concerns were not specifically about this project but rather about mine TSFs in general, with the aim of enforcing compliance among mining companies. His primary concern is safety. He suggested that FWGR should align their safety standards with global standards. For the next meeting, Mr Molebatsi requested the following: 1. Third-Party Audit 2. Multilateral Agencies: Inclusion of relevant multilateral agencies and Benchmark Foundation on board to ensure comprehensive oversight. 3. FSC	The project team noted the comment.

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STAKEHOLDER	COMMENT	RESPONSE
Ms Gerlinde Wilreker, Project Manager, Kongiwe Environmental (Pty) Ltd	Ms Wilreker requested that attendees distribute the non-technical report to their communities. She asked that any comments or queries be forwarded to stakeholder@kongiwe.com, where they will be recorded on the Comments and Response Report (CRR).	All attendees noted.

The project team thanked all the attendees for their presence and the Ward 25 councillor thanked Kongiwe for the meeting. The open day adjourned at 11H00.

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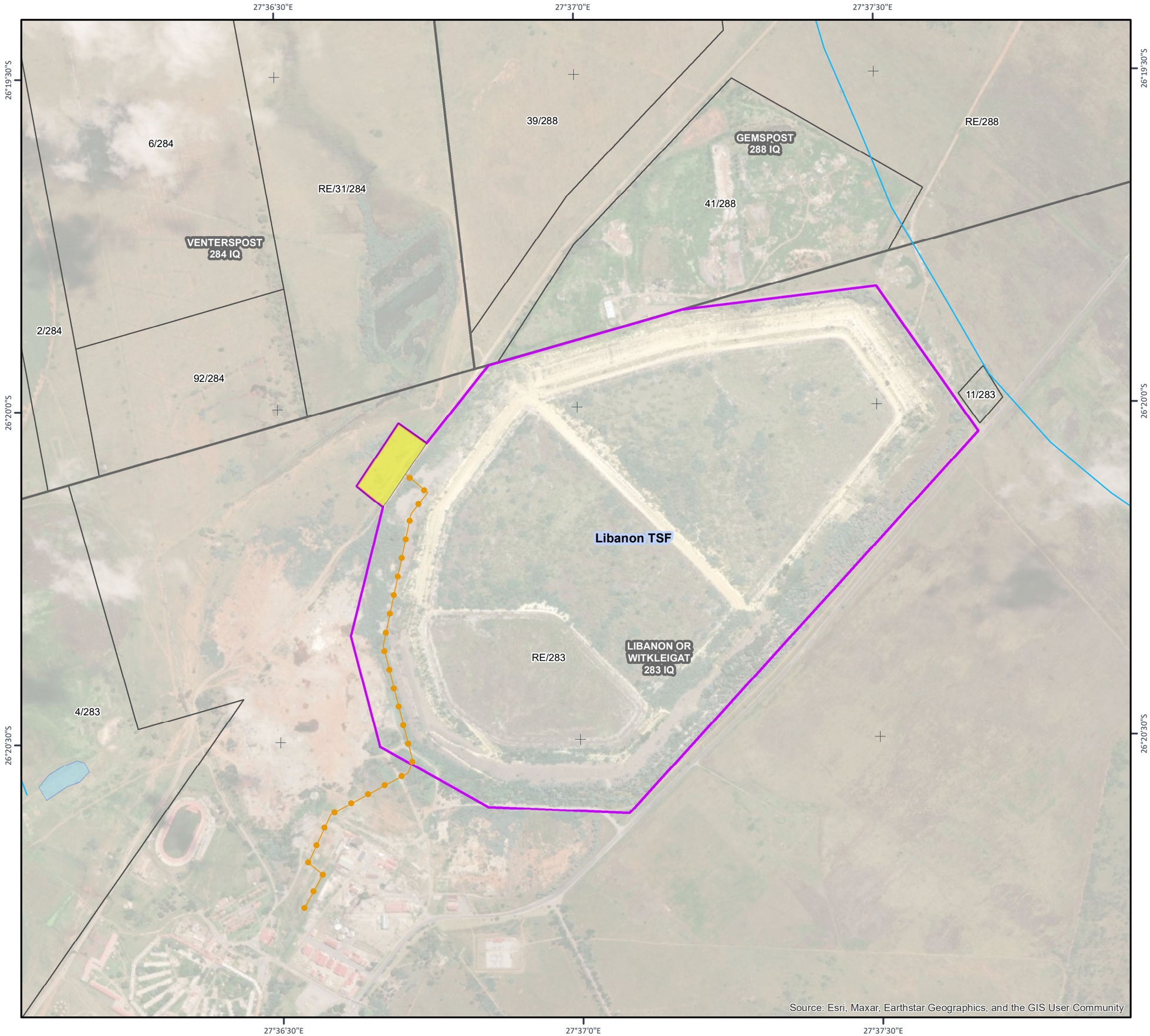
Appendix A

Attendance Register

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Appendix B

Posters



KONGIWE

LIBANON TSF

SITE INFRASTRUCTURE

Legend

- Minor Road
- Stream
- Pipelines
- Libanon TSF
- Parent Farm
- Farm Portion
- Pumpstation
- Wetlands

0 0.125 0.25 0.5 0.75

Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
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www.kongiwe.com

1:10 000

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

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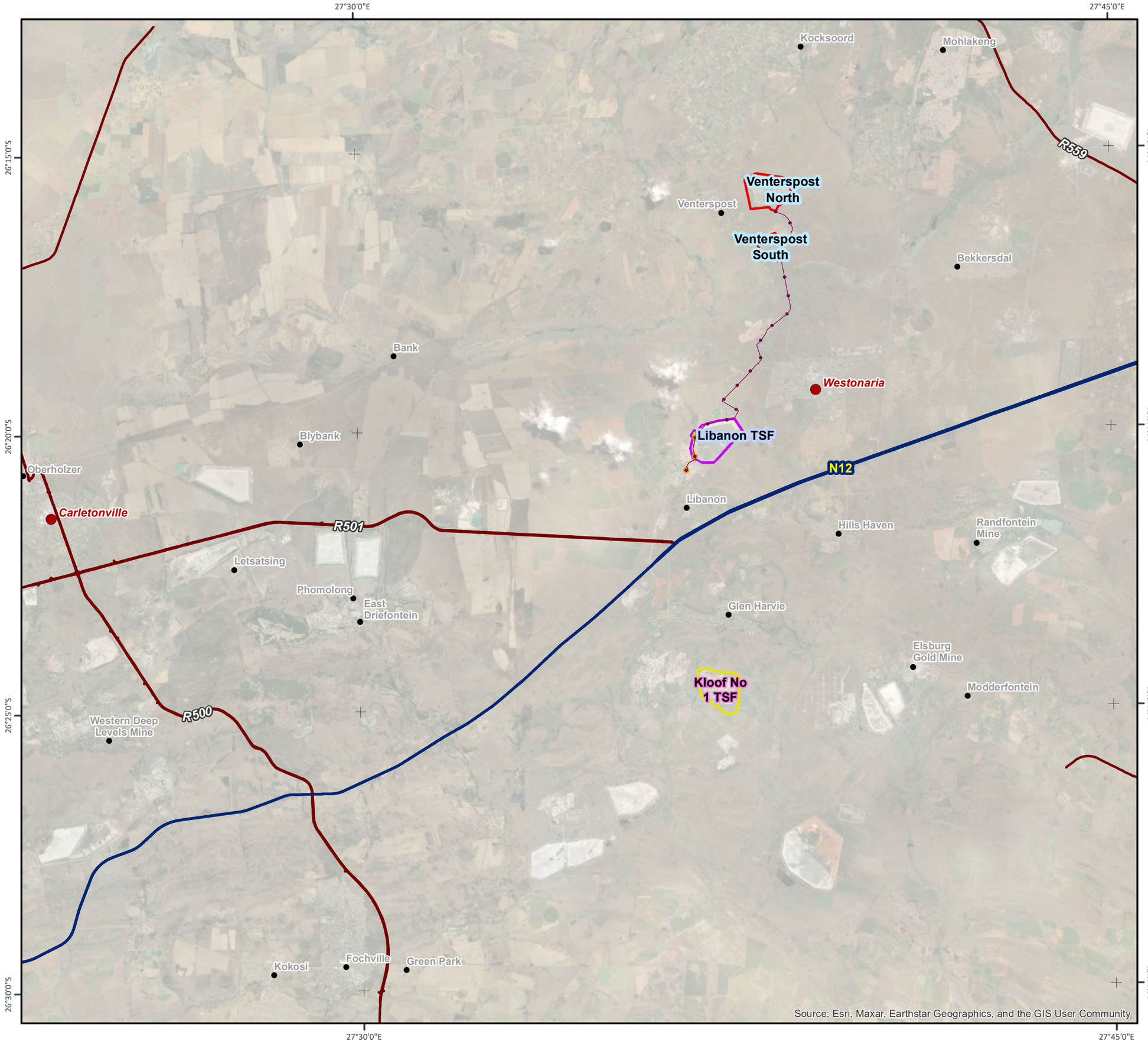
2024 Satellite Imagery

Disclaimer

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

FILE REF:
Z:\GIS\Projects\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Site Infrastructure Landscape A3.mxd

DATE:
04 July 2024



KONGIWE

LIBANON TSF

LOCAL ORIENTATION

Legend

- Major Town
- Other Settlement
- National Road
- Main Road
- Libanon to Venterspost South
- Pipelines
- Venterspost
- Kloof TSF
- Libanon TSF
- Pumpstation

0 1.75 3.5 7 10.5

Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
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1:120 000

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

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2024 Satellite Imagery

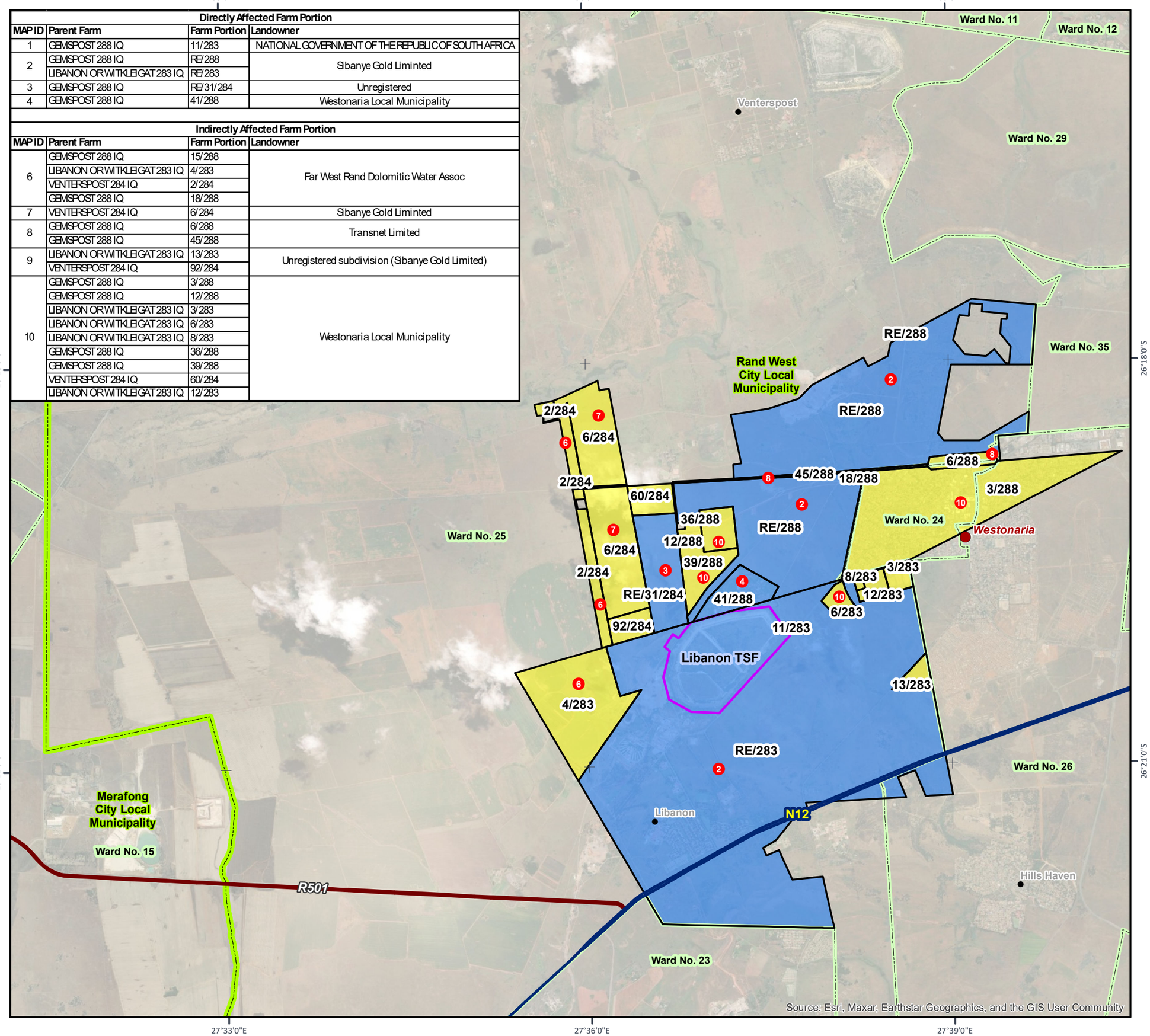
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FILE REF:
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DATE:
04 July 2024

Directly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
1	GEMSPOST 288 IQ	11/283	NATIONAL GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA
2	GEMSPOST 288 IQ	RE/288	Sibanye Gold Limited
	LIBANON OR WITKLEIGAT 283 IQ	RE/283	
3	GEMSPOST 288 IQ	RE/31/284	Unregistered
4	GEMSPOST 288 IQ	41/288	Westonaria Local Municipality

Indirectly Affected Farm Portion			
MAP ID	Parent Farm	Farm Portion	Landowner
6	GEMSPOST 288 IQ	15/288	Far West Rand Dolomitic Water Assoc
	LIBANON OR WITKLEIGAT 283 IQ	4/283	
	VENTERSPOST 284 IQ	2/284	
	GEMSPOST 288 IQ	18/288	
7	VENTERSPOST 284 IQ	6/284	Sibanye Gold Limited
8	GEMSPOST 288 IQ	6/288	Transnet Limited
	GEMSPOST 288 IQ	45/288	
9	LIBANON OR WITKLEIGAT 283 IQ	13/283	Unregistered subdivision (Sibanye Gold Limited)
	VENTERSPOST 284 IQ	92/284	
10	GEMSPOST 288 IQ	3/288	Westonaria Local Municipality
	GEMSPOST 288 IQ	12/288	
	LIBANON OR WITKLEIGAT 283 IQ	3/283	
	LIBANON OR WITKLEIGAT 283 IQ	6/283	
	LIBANON OR WITKLEIGAT 283 IQ	8/283	
	GEMSPOST 288 IQ	36/288	
	GEMSPOST 288 IQ	39/288	
	VENTERSPOST 284 IQ	60/284	
	LIBANON OR WITKLEIGAT 283 IQ	12/283	



KONGIWE

LIBANON TSF RECLAMATION

LAND TENURE

Legend

- Major Town
- Other Settlement
- National Road
- Main Road
- Libanon TSF
- Local Municipality
- Ward Boundary
- Directly Affected
- Indirectly Affected

0 0.5 1 2 3

Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
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1:50 000

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

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2024 Satellite Imagery

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FILE REF:
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DATE:
08 July 2024

Far West Gold Recoveries (Pty) Ltd: The Reclamation Of The Libanon Tailings Storage Facility in the West Rand, Gauteng Province
Draft Scoping Report Findings



Project Background

In 2017, Sibanye Gold Limited (Sibanye), a subsidiary of Sibanye-Stillwater Limited, was granted the necessary approvals to execute a project known as the West Rand Tailings Retreatment Project (WRTRP) (Licence No. 10/C22B/ACFGI/4976). Broadly, this project entails the reclamation of several historic TSFs in the West Rand of Gauteng. Tailings were to be treated with residue material being disposed of onto the Regional TSF (RTSF). The gold-bearing TSFs and related infrastructure to execute this project are spread across several Mining Right Areas owned by Sibanye, namely: Driefontein, Kloof, Cooke and Ezulwini.

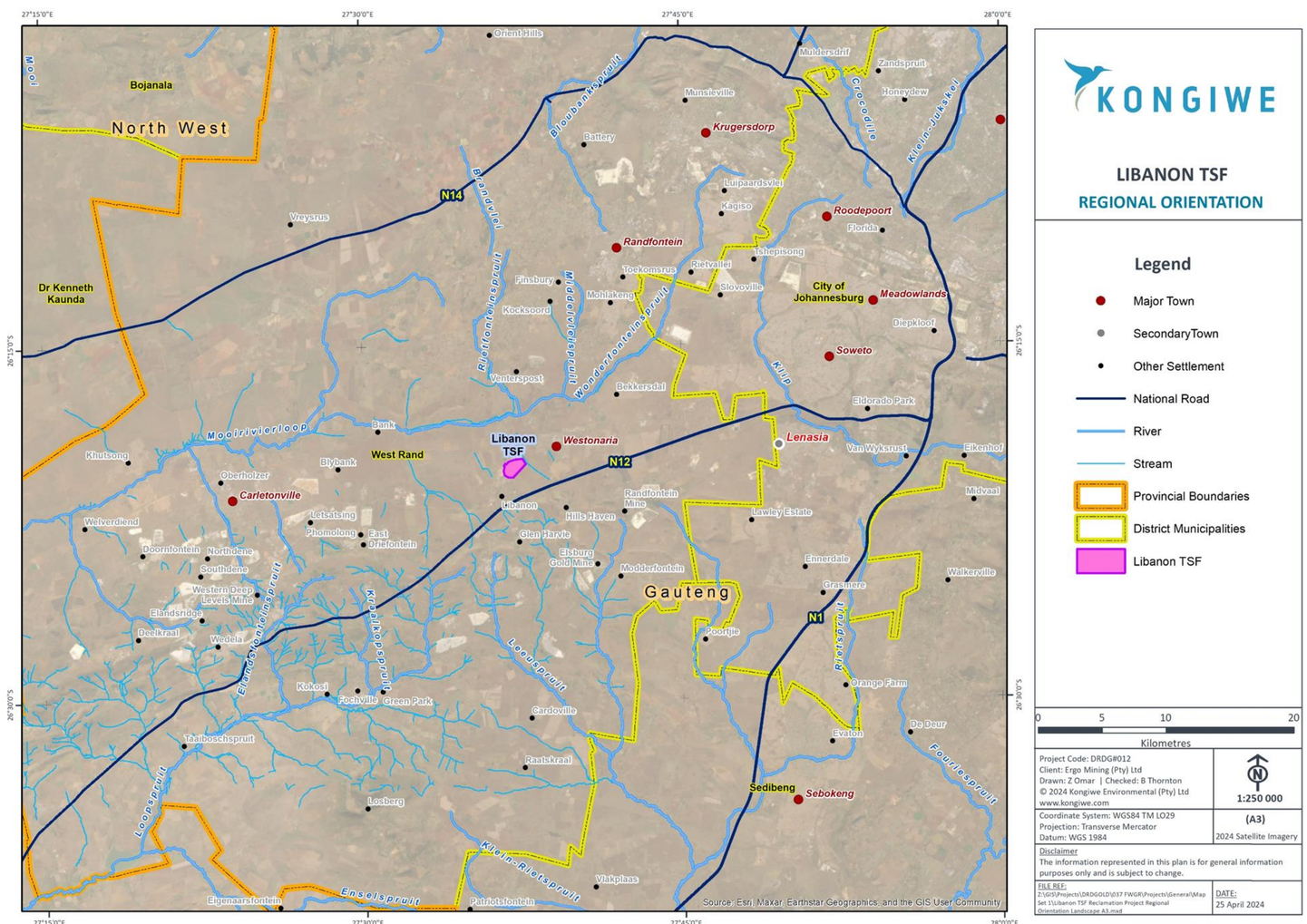
Proposed Project

Kongiwe Environmental (Pty) Ltd (Kongiwe) has been appointed by Far West Gold Recoveries (Pty) Ltd (FWGR), to conduct the Scoping and Environmental Impact Assessment (S&EIA) process which is aimed at critically evaluating the potential environmental and social impacts of the proposed Reclamation of the Libanon Tailings Storage Facility (TSF) located at Rand West City Local Municipality under West Rand District Municipality, Gauteng Province.

The site is located approximately 2 km west of Westonaria and covers 170 hectares.

The pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised. The slurry will be pumped via existing pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation.

The Proposed Project is expected to take approximately 12 years. An estimated amount of 600,000 tons/month of slurry is expected to be pumped from the TSF via existing pipelines.



Key Findings of the Scoping Report

Environmental Component	Component Type	Potential Impact	Specialist Study Planned for EIA
Physical Environment (non-living)	Hydrology (including wetlands, surface water and groundwater)	❖ Potential for further acid mine drainage (AMD), increased heavy metal concentrations and increased sulphate concentrations in local surface water and groundwater if runoff from operations is not adequately managed through efficient storm water management structures; ❖ Water and ground contamination due to pipeline leaks/spillages if inadequate preventative measures are not implemented; ❖ Improved surface and ground water quality around the project area due to the removal of the TSF; ❖ Changes in natural surface water flow parameters as a result of the removal of the TSF; ❖ Potential impact on drainage lines from access runoff during the operational phase of the project; ❖ Improved visual aesthetics of the area after the removal of the TSF.	Surface Water Impact Assessment Groundwater Impact Assessment Wetland Impact Assessment
Biological Environment (living)	Ecology and Biodiversity (including fauna and flora)	❖ Displacement of animal habitat by removing the TSF; ❖ Removal of invasive species from the TSF; ❖ Long-term improvement of ecosystem health and functioning of the project area following rehabilitation.	Biodiversity Impact Assessment
Social and Economic Environment	Employment	❖ Continued employment and job security; ❖ Continued investment in local economy; ❖ Removal of the TSF could eliminate the attraction of illegal/informal miners who seek gold.	Social Impact Assessment
	Land-use	❖ Land use will change to an active reclamation site; ❖ Restoration and unlocking of land for future land uses; ❖ Better management and control of the area against illegal/informal mining.	Social Impact Assessment
	Air Quality	❖ Possible increase in dust levels in some areas during operations; ❖ Overall removal of an air pollution source after the removal of the TSF; ❖ Health impacts on livestock and people in proximity to the project site due to fine particulate emissions during construction and operational phases.	Air Quality Impact Assessment

Far West Gold Recoveries (Pty) Ltd: The Reclamation Of The Libanon Tailings Storage Facility in the West Rand, Gauteng Province
Draft Scoping Report Findings

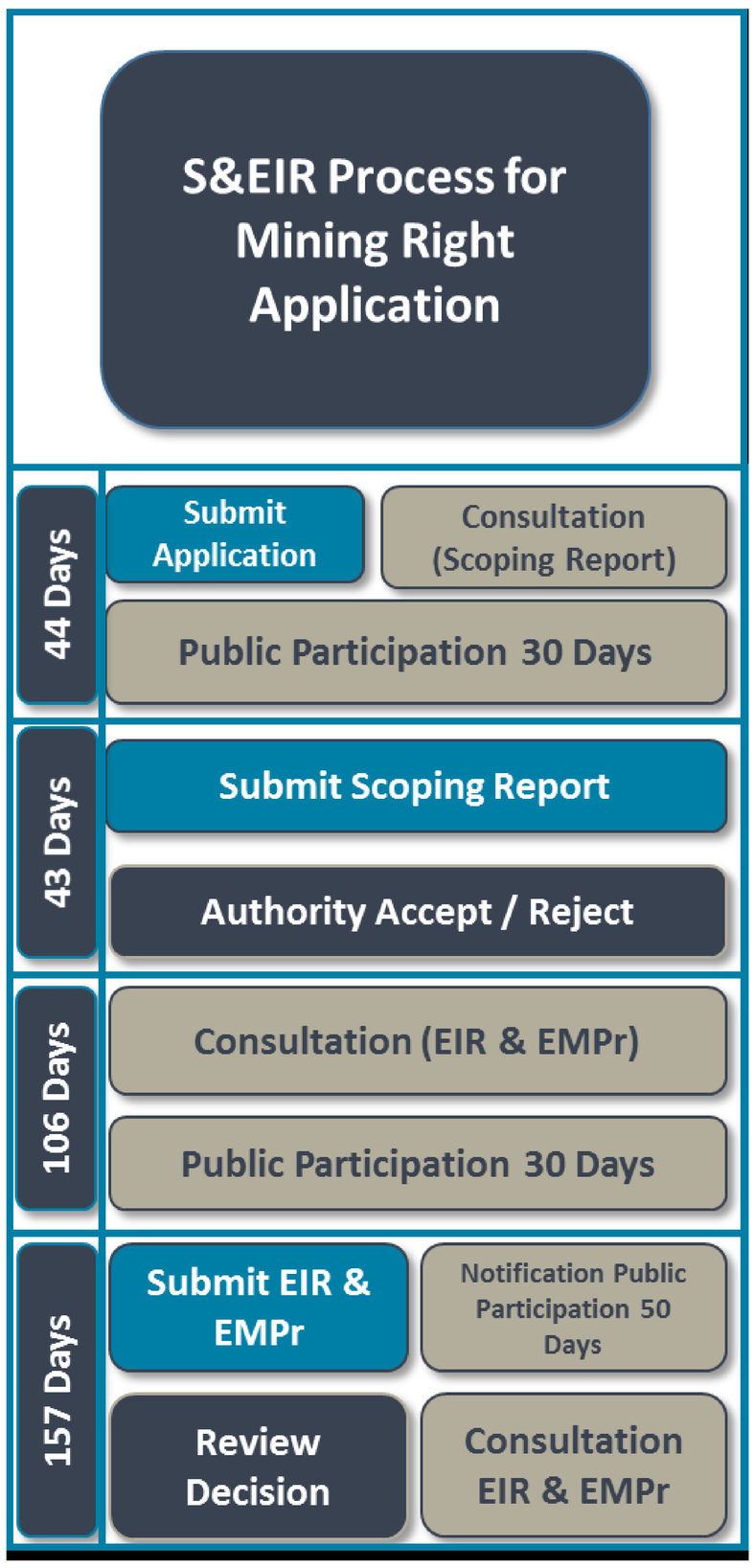
Reclamation Method

The proposed reclamation method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors/cannons to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being mined.









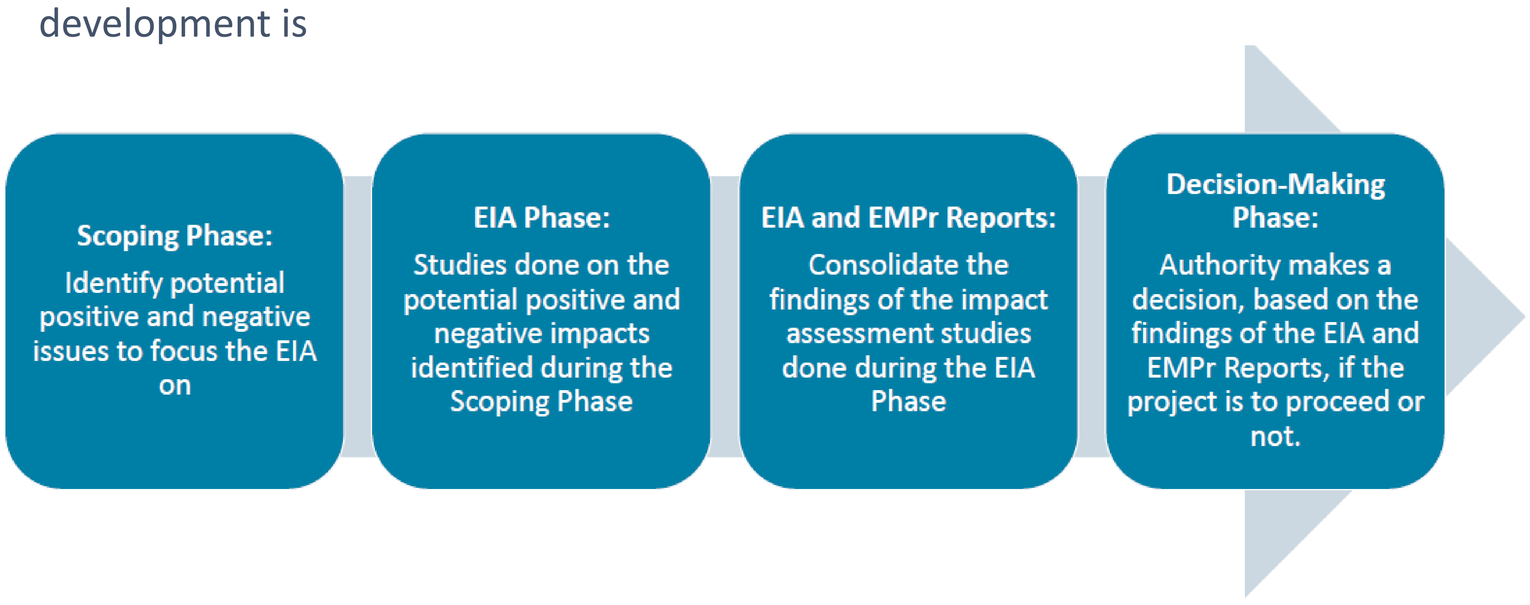
NEMA and NWA

The Proposed Project requires an Environmental Authorisation (EA) in terms of the NEMA and
the NNM:WA and will follow a Scoping & Environmental Impact Assessment (SEIA) 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, the DMRE, within 300 days from the submission of the EA application.

The Proposed Project will require a water use licence in terms of the National Water Act (Act No. 36 of 1998) for Section 21 (g) water uses. An Integrated Water Use Licence Application 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 other necessary supplementary Reports.

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



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Environmental Authorisation and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRE reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

Meeting Minutes: Federation for a Sustainable Environment

Date:	Thursday, 01 August 2024
Time:	10:00 – 11:00
Venue:	Microsoft Office Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Federation for Sustainable Environment	Ms Mariette Liefferink	Chief Executive Officer
DRD Far West Gold Recoveries (FWGR)	Mr Greg Ovens	Project Manager
DRD Far West Gold Recoveries (FWGR)	Ms Anja Esterhuizen	Environmental Officer
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager (EAP)
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Vanessa Viljoen	Stakeholder Engagement
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Stakeholder Engagement
No apologies		
N/A		

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.*

1. **Welcome and Introductions**

- The project manager welcomed the meeting attendees.
- The attendee introduced themselves.

2. **The purpose of the Meeting was to:**

- Present and discuss the proposed Scoping Report (SR) and the Integrated Water Use Licence Application (IWULA) for the Reclamation of the Libanon Tailings Storage Facility project.
- Provide the stakeholder with an opportunity to raise comments/seek clarity and provide input into the proposed project; and
- Record comments raised and then include them in the Comments and Responses Report (CRR) which will be integrated into the Final Scoping Report.

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3. **Meeting Agenda:**
   - Purpose of the meeting
   - Important Notice
   - Introduction
   - Kongiwe's Role as an independent Environmental Assessment Practitioner
   - Project Location
   - Project Background
   - Project Description: The process
   - Project Infrastructure
   - Specialist Studies
   - Legislative Framework
   - Project Progress to date
   - Questions and Answers

Kongiwe Environmental made a presentation to the Federation for a Sustainable Environment attendee. This presentation is attached as Appendix A.

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4. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink stated that she had reviewed the non-technical report and noted that the presentation emphasized what was covered in the report. She referenced a paper prepared by the Council for Geoscience and the Department of Minerals and Energy (2008) titled *South Africa's Challenges to Mine Closure*. The paper discusses regional mining and closure strategies and assumes that FWGR will apply for closure once the Libanon TSF is reclaimed. She mentioned that since the reclamation is expected to take 12 years, it will require a rehabilitation plan to achieve a sustainable end land use. Ms Liefferink further highlighted that the paper indicates that past TSF reclamation activities have revealed several cases where re-mining was incomplete, often due to lack of funds or the eutrophication of the TSF. Ms Liefferink inquired whether FWGR plans on re-mining the entire TSF, even if some sections are not economically profitable. She noted also that the paper suggests that if the applicant does not process the entire TSF, the reprocessing could result in creating two contaminated sites. The paper advised that granting rights and authorizations for reprocessing individual residue deposits may need to be reviewed to ensure that value extraction from a portion of a site includes reinvestment into the rehabilitation of the entire mining area. This approach aligns with what the FSE would recommend, emphasizing that benefits should be ploughed back into the entire area, not just the footprint of the remaining TSF.	The certification of registration, FWGR has its own Certificate of Registration (COR) that includes the Libanon TSF, and this is not related to Sibanye Stillwater. He further noted that before any activities commence on their sites, a public safety assessment is undertaken. While the necessary regulations required under the National Nuclear Regulator (NNR) have not yet been fully performed, they are in the process of being carried out. This addresses the requirements concerning NNR regulations. The full process, including surveys and all necessary actions to meet NNR requirements, are being implemented. The NNR are a commenting authority on this application. **Land Rehabilitation:** Mr Ovens expressed his intention to take Ms Liefferink to the Driefontein 5 tailings facility, where they are finalizing the footprint rehabilitation of the site. He highlighted that at that facility, they are performing concurrent rehabilitation of the footprint, known as "floor roll-up." The area is being concurrently grassed, and the land has been restored to its correct topography. Driefontein 5 serves as a good example of their rehabilitation efforts. **Closure:** Mr Ovens explained that Sibanye Gold is the landowner of the properties, while FWGR owns the removable assets. The agreement between them stipulates that the land where the TSF is located needs

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STAKEHOLDER	COMMENT	RESPONSE
	Regarding radioactivity, Ms Liefferink inquired whether there is a need to apply for a certificate of registration under the National Nuclear Regulatory Act or if Sibanye Stillwater currently holds such a certification. She mentioned that according to the Geoscience paper, radiometric surveys of previous reprocessed mining residue deposits have sometimes shown elevated levels of residential radioactivity in the soil, making these areas unsuitable for unrestricted development.	to be returned to its natural wilderness state. The same plan is currently being developed for Driefontein 3 and Libanon in the future. **Mining Uneconomical Items:** Mr Ovens acknowledged that dealing with uneconomical materials is always challenging. They have included these materials in their concurrent mining process to avoid leaving suboptimal material behind. Non-viable material is transported to nearby TSF for construction or disposal purposes. **Libanon site:** Mr Ovens further noted that the rock material found at the Libanon TSF is being removed by Sibanye, as FWGR does not have the infrastructure to process rock—only slurry material. The goal for the Libanon TSF is to return it to that of a wilderness land use. If there are changes in the spatial development framework within the municipality or in the closure plan related to Sibanye, FWGR will update and adjust its plans accordingly.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink inquired about other minerals that will be mined, as mentioned in the presentation. She asked if the applicant plans to re-mine and reclaim both gold and additional minerals.	Mr Ovens stated that their process includes the extraction silver and copper, which are associated minerals as byproducts of the gold extraction. However, uranium is not part of the minerals FWGR plans to extract from this dump.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink inquired whether there is a specific reason FWGR is not extracting uranium, or if it is simply no longer profitable.	Mr Ovens stated that the concentration of uranium within Libanon TSF is low. High uranium concentrations are found at the Cook TSF, and the assets associated with Rand Uranium, which are part of Sibanye's assets. The residue of uranium is minimal in the Libanon TSF.

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STAKEHOLDER	COMMENT	RESPONSE
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink stated that after the reclamation assessment, an application for a closure certificate will be required. Regulation 56 of the MPRDA regulations requires that land be rehabilitated as closely as practicable to its natural state or to a pre-determined or agreed-upon standard or land use that conforms to the principles of sustainable development. According to the scoping report, the predetermined land use is designated as wilderness status. Ms Liefferink expressed concerns about this designation, emphasizing that any future land use must adhere to sustainable development principles, including the provision of sustainable livelihood opportunities. She referenced the work of Karen Bosman and Professor Louis Kotze from North-West University, which suggested that rehabilitation plans should not pose immediate harm to human health or safety and must ensure that ground and surface water are suitable for current and future use. Additionally, vegetation should not be eliminated, and soil must be suitable for its intended use. Ms Liefferink noted that Esabel concurs with these principles and argues that measures such as sloping, grassing, wilderness status, revegetation, woodlands, and stockpiling material are insufficient for effective remediation and mine closure. She highlighted these concerns based on observations that, after a mine dam has been reclaimed, the land often becomes sterile and lacks sustainable livelihood opportunities. Therefore, she stressed that future land use should be agreed upon with interested and affected parties, particularly the neighbouring communities who may be impacted.	Ms Wilreker acknowledged the report, noting that Sibanye has outlined its requirements for rehabilitation. She emphasized that while FWGR must adhere to these requirements, they should also consider Ms Liefferink's advice on what constitutes sustainable land use. Ms Wilreker suggested that this issue could be further discussed between FWGR and Sibanye to explore possibilities for improved end land use.

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STAKEHOLDER	COMMENT	RESPONSE
Ms Gerlinde Wilreker, Project Manager (EAP), Kongiwe Environmental (Pty) Ltd	Ms Wilreker asked Mr Ovens about FWGR's position regarding the end land use. She further suggested that he should consult Tharina, who leads closure projects at Sibanye Stillwater.	Mr Ovens stated that FWGR is in a challenging position as a smaller player focused on removing the mine dam. He mentioned that, to his knowledge, Sibanye has planned various projects, such as farming initiatives and solar plants, as part of their closure strategy. However, he is not fully informed about the specific plans for the Libanon area. Mr Ovens acknowledged Ms Liefferink's valid concerns and committed to consulting with Tharina (Sibanye Stillwater), who leads the closure efforts, to determine the regional closure plans for that area. He assured that FWGR will ensure alignment with these plans, whether the area is designated as wilderness or requires grassing and other rehabilitative measures.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink mentioned that she is part of Tharina's engagement team as an associate researcher at North-West University, focusing on tourism as a sustainable future land use for the Far West Rand and West Rand. She is also well-acquainted with the Bokamoso Barona project. She suggested that it would be beneficial to include in the application, detailed proposals for future land use and assess whether they align with the principles of sustainable development and sustainable livelihood opportunities. She noted that simply designating the area as wilderness is too generic.	Mr Ovens acknowledged Ms Liefferink's opinion and agreed to further engage on the matter, promising to return with additional information. He suggested that they can leave the discussion as it stands for now and aim to provide more detailed information during the EIA phase, at which point they can discuss it further.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink sought to confirm whether her assumptions were correct regarding the need for authorization. She inquired if the following still requires authorization: • The 600mm pipeline for process water from Kloof Shaft 10 • The 550mm pipeline connecting to the slurry pipeline at Driefontein 2 plant	Mr Ovens confirmed that some of the elements are already authorized. Specifically, the pipeline routes addressed in the Pipeline Optimization Project, which Ms Liefferink was involved in, were managed through Digby Wells Environmental. The Environmental Authorization application for this project has been submitted to the DMRP and is expected to receive a record of decision within about a month, hopefully with a positive outcome. The project will use these optimized

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STAKEHOLDER	COMMENT	RESPONSE
	• The 11 kV overhead powerline • The administration buildings • The access road • The contractor's yard She asked whether her understanding was accurate or if some of these elements were already authorized or existing.	pipeline routes. If the authorizations are not favourable, alternative existing pipelines authorized under the regional West Rand tailing retreatment projects could be used, although they are less economical and efficient. Regarding the other infrastructure, Mr Ovens stated that there are NEMA-listed activities that are triggered, which is why they are undertaking this process. However, not all infrastructure such as the powerlines, necessarily trigger specific authorizations but are included as part of the project scope and describe the activities on the site.
Ms Gerlinde Wilreker, Project Manager (EAP), Kongiwe Environmental (Pty) Ltd	Ms Wilreker noted that the powerlines do not meet the threshold for listed activities; however, their description is included to provide a comprehensive overview of all expected infrastructure on site. She mentioned that there are existing roads around the TSF, which are relevant from an access perspective. The intention of including all these details is to ensure stakeholders are fully informed about the activities and infrastructure on the site.	Ms Liefferink noted the comment.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink pointed out that when reclaiming an existing tailings storage facility, it is essential to identify potentially new sources of acid mine drainage, especially since water cannons will be used. She assumed that the water used to produce the slurry might be of poor quality, potentially increasing acid mine drainage. She asked whether this issue would be assessed during the specialist study.	Ms Wilreker confirmed that the issue will be addressed as part of the groundwater modelling process that will be conducted.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink commended Kongiwe for including a glossary in the document to facilitate understanding of the terminology. She acknowledged Kongiwe's commitment to complying with the POPIA Act and informed them that they may use their	Ms Wilreker explained that in the comments and response report, would have the details of the dates of consultations, the types of consultations, and all comments raised, emails received are reviewed, and their content is incorporated into the comments and response

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STAKEHOLDER	COMMENT	RESPONSE
	information. However, she emphasized the importance of documenting criticisms to provide evidence of active participation in the process, especially for interested and affected parties who have not contributed. She requested that her name, contact details, and those of FSE be included in the report.	report. This report is then submitted to the DMRP. While POPIA allows for this process, the documents released to the public will not include email addresses or personal contact information. Instead, without disclosing personal details, the Comments Consultation and Response Report (CRR) will list all consultations with different parties, including their names and affiliations.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink inquired about the distance between the regional storage facility and the Libanon facility. She clarified that she is asking because Mr Ovens mentioned that excess water would be pumped from the regional tailing's storage facility for use in the Libanon reclamation, which is why she needs to know the distance.	Mr Ovens stated that the distance is approximately 27 kilometres.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink asked to confirm if the lifespan of the reclamation is 12 years.	Mr Ovens confirmed that the 12-year timeframe includes the entire process from initiation to closure. The actual reclamation work may only take a portion of those 12 years.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink stated that she assumes all those pipelines will be authorised within that 12-year timeframe.	Mr Ovens agreed with Ms Liefferink.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink extended an invitation to anyone interested in visiting Sand Dam 20, which is part of Sibanye Stillwater's reclamation operations. She noted that the dam has been under reclamation for 20 years and is still not complete. This extended period highlights the challenges of rehabilitating such a footprint, particularly because the area was historically a wetland. The visit could provide valuable insights into both the reclamation process and the challenges associated with using the footprint.	Mr Ovens acknowledged that Sand Dam 20 presents significant challenges due to its location and past mismanagement. He expressed hope that the visit would offer insights into different reclamation scenarios. He noted that their current mine TSFs are situated in different locations from Dump 20, none are in wetlands, streams, or areas with substantial runoff, which complicates reclamation. He mentioned that Ms Liefferink would observe the advantages of the topography at Driefontein 5, where the slope of the land facilitates reclamation, contrasting with the difficulties faced at Sand Dam 20.

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STAKEHOLDER	COMMENT	RESPONSE
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink requested ongoing engagement with interested and affected parties throughout the project. She noted that the West Rand Treatment Project, which was authorized in 2017, experienced time lapses that led to concerns and grievances. She urged that the applicant and its consultants must ensure that the interested and affected parties are kept informed throughout the entire process.	The project team agreed to keep interested and affected parties informed throughout the process. Mr Ovens emphasized that they are learning from past mistakes and are committed to improving communication moving forward.
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	Ms Liefferink pointed out that institutional memory can be an issue when it is lost, as this can lead to significant problems. She emphasized the importance of maintaining thorough records and documentation within institutions to avoid setbacks and ensure continuity.	Ovens agreed with Ms Liefferink

5. Closing

COMMENT	RESPONSE
The project team thanked Ms Liefferink, for her time and input.	Ms Liefferink thanked Kongiwe for the meeting.

Ms Gerlinde Wilreker thanked the meeting attendees for their questions and comments before the meeting adjourned at 11:00 am.

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Appendix A

Presentation

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province
DWS reference number: WU37611

Pre-Application Meeting Minutes: Department of Water and Sanitation

Date:	Monday, 19 August 2024
Time:	12:00 – 13:00
Venue:	Microsoft Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Department of Water and Sanitation (DWS)	Ms Basini Lerato Nkuna	Case Officer
DWS	Ms Xolelwa Gloria Bhele	Environmental Officer
DWS	Ms Josephine Dineo Magolego	Environmental Officer
DWS	Ms Thabelo Tshipate	Environmental Officer
Far West Gold Recoveries	Mr Greg Ovens	Applicant Representative
Far West Gold Recoveries	Ms Anja Esterhuizen	Applicant Representative
Kongiwe Environmental (Pty) Ltd	Ms Phumla Mngwengwe	WULA Consultant
Kongiwe	Mr Bradly Thornton	Project Director
Kongiwe	Ms Anela Fixi	Environmental & Stakeholder Engagement
Kongiwe	Mr Ripfumelo Macevele	Environmental Consultant
No apologies		
N/A		

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.*

1. **Welcome and Introductions**
   - Ms Mngwengwe welcomed the meeting attendees
   - The attendees introduced themselves

2. **Meeting Agenda:**
   - Introductions
   - Project Description
   - Identified Water Uses
   - Specialist Studies
   - Public Participation Process
   - Comments and Discussion

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Ms Mngwengwe presented the Proposed Project to the Department of Water and Sanitation (DWS) officers. The presentation is attached as Appendix A.

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3. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Ms Basini Lerato Nkuna, Environmental Officer, Department of Water and Sanitation (DWS)	Ms Nkuna thanked Ms Mngwengwe for the presentation and requested clarification on what the purple line represents. She inquired whether the purple line represents the Tailings Storage Facility (TSF) or delineates a wetland.	Ms Mngwengwe confirmed that the purple line represents the TSF.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna asked what the dotted blue line represents.	Ms Mngwengwe stated that the blue line represents the 500m buffer. She further explained that the line indicates a specialist buffer used to determine what lies within the 500m radius from the project site, but it is not a regulated area.
Mr Bradly Thornton, Project Director, Kongiwe	Mr Thornton added that the light blue line can be interpreted as an area of interest or study. He explained that this area, buffered by half a kilometre, is used to identify any wetlands surrounding the TSF or the project area. He emphasised that this is not a regulated area but rather a designated study area.	Ms Nkuna stated that she understood Mr Thornton's explanation.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna pointed out that the whole study area is within the 500m buffer zone of the wetlands. Even though the wetlands are artificial, she mentioned that this activity might still fall under the Section 21(c) and (i) water uses regulations because it is within 500m of these wetlands.	Ms Mngwengwe noted this.
Ms Phumla Mngwengwe, WULA Consultant, Kongiwe	Ms Mngwengwe inquired whether Section 21(c) and (i) regulations would still apply if a specialist finding shows that there is no risk from the project activities and the sensitivity is low, which would subsequently make a risk matrix for General Authorisation (GA) unnecessary.	Ms Nkuna confirmed that Section 21(c) and (i) regulations still apply to a GA. She stated that a risk matrix should be provided to demonstrate that the risk is low.
Mr Greg Ovens, Project Manager, Far West Gold Recoveries (FWGR)	Mr Greg Ovens explained that the artificial wetlands are actually historical mine infrastructure. The upper area was used as a return water dam, while the other area was used as a waste rock	Ms Nkuna noted this

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STAKEHOLDER	COMMENT	RESPONSE
	dump and was never removed. He further stated that, since none of these features are natural and lack ecological function, the specialist's justification is that they do not have an impact. He suggested writing a motivation letter for the Department's consideration to explain this context.	
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether all these old mine dumps were not rehabilitated and asked how they resulted in artificial wetlands. She expressed her belief that they were supposed to be rehabilitated to prevent the current issues.	Mr Ovens stated that the areas should have been rehabilitated but were not. He explained that part of the current project involves removing this pollution point source (TSF) to prevent any further environmental impacts.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether the scope of the project includes the rehabilitation of those areas.	Mr Ovens stated that the scope of the project includes the rehabilitation of the mine footprint and the areas outside that are not owned by Far West Gold Recoveries (FWGR) and are owned by Sibanye-Stillwater.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired about the number of properties affected by this activity. She noted that even if the damage was caused by Sibanye-Stillwater, any activity within 500m of the project site might still have an impact. She emphasised that if the specialist asserts there is no impact, this must be reflected in the report and the risk assessment matrix (RAM). She highlighted that, according to the National Water Act (NWA) and Regulations, any activity within 500m of a watercourse triggers a Section 21(c) and (i) water use. She stated that supporting documents will be needed to confirm that the damage at the site was caused by previous mining activities, that the land was not rehabilitated, and that Sibanye - Stillwater is either required to rehabilitate the site or is in the process of doing so.	The project team noted this.
Ms Xolelwa Gloria Bhele, Environmental Officer, DWS	Ms Bhele inquired whether there is an existing licence for the water uses and if this project constitutes additional water uses.	Mr Ovens explained that this project is linked to the licence issued by Mr Victor for the West Rand Tailings Retreatment Project

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STAKEHOLDER	COMMENT	RESPONSE
	She also asked whether Kloof will be the source of water for the project.	(WRTRP). He noted that the WRTRP did not include Section 21(g), which is required for the Libanon Project. He further explained that the licence covered all the pipelines needed for the Libanon TSF. He further explained that it was only in 2016 when they realised that they needed to apply for a Section 21(g) water use in relation to the pollution paddocks, and that is why the additional water use will be added.
Ms Xolelwa Gloria Bhele, Environmental Officer, DWS	Ms Bhele acknowledged Mr Ovens' explanation and mentioned that she wanted to connect the dots, as it appears that the deposition will be directed to the regional tailings storage facility (RTSF).	Mr Ovens explained that this activity is part of the same project. However, with this specific activity, they learned from the relationship they have with the DWS that they need to apply for a Section 21(g) water use for the pollution control paddock linked to the pump station.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether FWGR is adding this activity to the existing licence or if this is a separate application on its own.	Mr Ovens stated that this is a new application because it involves a new water use; it is not an amendment to the existing licence.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether FWGR intends to consolidate this application with the existing licence or keep them separate.	Mr Ovens explained that their intention is to keep this application separate and proceed with the specific processes required for this project, such as public participation, without the delays that might arise from combining it with other licences.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired about the number of properties affected by this activity.	Ms Mngwengwe confirmed that this activity affects only one property.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether the affected property is owned by FWGR.	Mr Ovens stated that the property is owned by Sibanye-Stillwater.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether the artificial wetland needs to be included in this application. She stated that they will engage with the DWS specialist regarding it triggering a Section 21 (c) and (i) water use, she stated that a report explaining why the wetlands should not be included will be required. She stated that from her observation, any activity within 500m of the	Ms Mngwengwe stated that for stormwater management, there are paddocks on the TSF and berms around the TSF to separate clean water from dirty water. Additionally, the lined catchment paddocks will assist with managing stormwater.

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STAKEHOLDER	COMMENT	RESPONSE
	wetland triggers a Section 21 (c) and (i) water use. She asked whether FWGR plans to construct a stormwater management system for this project and if so, where the stormwater will be discharged.	
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired about the discharge point for all the collected stormwaters.	Mr Ovens explained that the stormwater is redirected back to the pump station and utilised in the process. He confirmed that no dirty stormwater leaves the site. Additionally, the pollution paddocks behind the pump station are used to manage all overflow stormwater.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna requested clarification on whether FWGR has a dam within the system to collect the stormwater or if the water is being disposed of in a nearby artificial wetland or river.	Mr Ovens confirmed that no water is being discharged. He explained that the system is closed, but behind the pump station there is a pollution paddock designed to contain any excess stormwater that overflows from the pump station and cannot be managed in the process. Therefore, no dirty stormwater leaves the site or is directed to the artificial wetlands.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired where the clear water is discharged after the separation process.	Mr Ovens explained that there is a berm around the pump station that diverts clean water and prevents any contamination. He further stated that it would be easier to explain this process in detail during a site visit.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired about the location of the berm and requested that Mr Ovens clarify the associated processes. She also asked whether the pollution paddocks were authorised. If they were not, she advised that they should be included in this application.	Mr Ovens explained the entire process regarding the paddocks by illustrating on the map where both the proposed paddocks and berms are situated.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna noted Mr Ovens' explanation and mentioned that a site visit would provide a better understanding of the layout.	Mr Oven noted this.
Mr Bradly Thornton, Project Director, Kongiwe	Mr Thornton explained in detail the methodology for separating clean water from dirty water using berms and	Ms Nkuna noted this.

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STAKEHOLDER	COMMENT	RESPONSE
	pollution paddocks, and how overflow stormwater is managed. He further highlighted that the artificial wetlands will not be used as part of this process.	
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired whether the overhead cables would be replaced by a substation, or if FWGR would rely on Eskom for power, or if they have other sources for power connection.	Mr Ovens stated that the site was previously a shaft area of Sibanye-Stillwater, with power available for operations and substations and transformers located there. He further noted that they are finalizing their power off-take arrangements but emphasized that this does not trigger any Environmental Authorization (EA) requirements, as there are no identified water resources.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired about the planned route of the cables, the source of the power connection, and the destination of the transported power. She also requested that FWGR provide a consent letter from the entity operating the substation they will connect to, as well as confirmation that the substation has the capacity to accommodate the project.	Mr Ovens explained that all the power stations near the site are owned by Sibanye-Stillwater. He noted that there is an existing agreement for use and access, which was included as part of the transaction when they purchased the tailings dam.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna inquired if any officials from the DWS team had additional questions.	Ms Bhele confirmed that she has no further questions, as this project is similar to other FWGR TSF Projects that FWGR. However, she expressed a greater interest in seeing this project on site.
Ms Thabelo Tshipate, Environmental Officer, DWS	Ms Tshipate inquired about the source of water for dust suppression.	Mr Ovens stated that the water for dust suppression will come from Kloof Shaft 10#.
Ms Thabelo Tshipate, Environmental Officer, DWS	Ms Tshipate supported Ms Nkuna's suggestion of a wetland buffer and advised that it must be maintained for the artificial wetlands, extending from the edge of the wetlands to the TSF. She also requested clarification on the disposal of clean stormwater.	Mr Ovens explained that Mr Thornton had provided a clear illustration of the clean water disposal method. He also explained that they will provide the DWS with a detailed stormwater management plan. Additionally, he mentioned that there is a berm around the TSF to separate clean and dirty water. Mr Ovens reiterated that the artificial wetlands identified by the specialist are old mining infrastructure, including a return water

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STAKEHOLDER	COMMENT	RESPONSE
		dam and an old rock dump. He emphasized that FWGR's intention is not to avoid applying for Section 21(c) and (i) water uses, but rather to provide clarity on the current conditions at the site.
Ms Phumla Mngwengwe, WULA Consultant, Kongiwe	Ms Mngwengwe sought advice from DWS officials on whether to begin Phase 1 of the e-WULAAS immediately using the specialist findings or to wait for the site visit to confirm the findings before starting phase 1 e-WULAAS.	Ms Nkuna stated that Phase 1 can be opened before the site visit, as the site visit is part of Phase 2 e-WULAAS. However, she advised against commencing Phase 1 activities of the e-WULAAS before the site visit. She further said that she is willing to open Phase 1 of the e-WULAAS for Kongiwe, but water uses must not be uploaded until everything is confirmed by DWS officials and the specialist.
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Ms Nkuna highlighted that Phase 1 of the e-WULAAS can be challenging in situations where it is unclear whether the application falls under a GA or a full Water Use Licence Application. The site visit provides the necessary clarity to resolve any uncertainties.	Ms Mngwengwe noted this.
Mr Bradly Thornton, Project Director, Kongiwe	Mr Thornton sought clarification regarding the application of Section 21(c) and (i) water uses on artificial wetlands. He noted that recent advice indicated that artificial wetlands do not trigger Section 21 (c) and (i) activities. He requested clarification on the DWS's position concerning artificial wetlands: do they trigger Section 21 (c) and (i)? Ms Mngwengwe also sought clarification on the advice they received, which stated that artificial wetlands do not trigger Section 21 (c) and (i) unless they are found to have ecological importance. She further requested guidance on how to undertake such applications.	Ms Tshipate explained that wetlands are considered wetlands regardless of whether they are artificial or natural. Therefore, any activity taking place within a regulated area triggers Section 21 (c) and (i) water use, unless proof is provided that verifies the activity will not affect the wetland. The RAM and wetland assessment report will need to be submitted as proof. She further stated that during the site visit, a specialist will be present to advise Kongiwe accordingly.

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STAKEHOLDER	COMMENT	RESPONSE
Mr Bradly Thornton, Project Director, Kongiwe	Mr Thornton requested the DWS Case Officer to open Phase 1 of the e-WULAAS so that Kongiwe can begin populating the information, given the urgency of the project.	Ms Nkuna confirmed that Phase of the 1 e-WULAAS will be opened for Kongiwe and requested for Kongiwe to not return the document after adding the water uses and administrative details. Instead, the document should remain open until the site visit is completed.
Ms Phumla Mngwengwe, WULA Consultant, Kongiwe	Ms Mngwengwe inquired about the possible date for the site visit from Ms Nkuna.	Ms Nkuna indicated that the site visit is provisionally scheduled for September 2024. She will first check the availability of DWS' specialists and then inform Kongiwe of the date so that planning can commence. ***Post meeting note:*** ***The site visit was on the 12th of September 2024***
Mr Bradly Thornton, Project Director, Kongiwe	Mr Thornton highlighted that the project is extremely urgent and requested that Ms Nkuna inform Kongiwe of their first available date in September. Kongiwe will then adjust their schedule to accommodate that date.	Ms Nkuna acknowledged the urgency and promised to keep in touch with Kongiwe regarding the availability date.

4. Closing

COMMENT	RESPONSE
The Kongiwe project team thanked the DWS attendees for their time and input.	The attendees thanked Kongiwe for the meeting.

The meeting adjourned at 13:00pm.

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Appendix A

Presentation

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRE reference number: GP30/5/1/1/2/000073 BP/BAR

DWS reference number: WU37611

Meeting Minutes: Wonderfontein Catchment Forum Meeting

Date:	Tuesday, 03 September 2024
Time:	10:00 – 13:00
Venue:	Microsoft Teams Online Meeting

List of attendees:

Organisation	Name of attendee	Designation
Department of Water and Sanitation	Mr Mogale Matseba	Control Environmental Officer, Wonderfontein Catchment Forum Chair
Department of Water and Sanitation	Mr Ayanda Mtetwa	Environmental Officer
Kongiwe Environmental (Pty) Ltd	Ms Gerlinde Wilreker	Project Manager
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement Consultant
Kongiwe Environmental (Pty) Ltd	Ms Anela Fixi	Environmental & Stakeholder Engagement Consultant
No apologies		
N/A		

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.*

1. **Welcome and Introductions**
   - Ms Wilreker greeted the attendees and delivered her presentation.

2. **Meeting Agenda:**
   - Purpose of the meeting
   - Important Notices
   - Introduction
   - Kongiwe's Role as an independent Environmental Assessment Practitioner
   - Project Location
   - Project Background
   - Project Description: The process
   - Project Infrastructure
   - Specialist Studies
   - Legislative Framework

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- Project Progress to date
- Questions and Answers

Kongiwe Environmental made a presentation to the Wonderfonteinspruit Catchment Forum stakeholders. This presentation is attached as Appendix A.

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3. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Mr Mogale Matseba, Control Environmental Officer, Department of Water and Sanitation (DWS)	Mr Matseba thanked Ms Wilreker for her presentation and request clarification regarding the current status of Kloof 10. Additionally, he asked Ms Wilreker to provide information about the other authorized plants.	Ms Wilreker explained that Kloof 10 is responsible for pumping water, and some of this water will be directed to the Libanon project for processing purposes. She clarified that this is the only activity currently taking place at Kloof 10. Regarding other authorized plants, Ms Wilreker stated that currently, only the Driefontein No. 2 plant is authorized. However, there may be additional plants constructed in the future. At present, the Driefontein No. 2 plant is the processing plant in use.
Mr Mogale Matseba, Control Environmental Officer, DWS	Mr Matseba expressed concern, noting that it appears that Sibanye Stillwater may be serving as the water service provider for Far West Gold Recoveries (FWGR) based on the explanation provided. He requested confirmation from Mr Van Niekerk who represented Sibanye Stillwater in the forum.	Mr Van Niekerk confirmed that they are indeed the water service provider for FWGR. He further explained that, since FWGR is a subsidiary of Sibanye Still-water, they are essentially reallocating water to their other internal operations.
Mr Mogale Matseba, Control Environmental Officer, DWS	Mr Matseba noted that Sibanye Still-water is aware of the water services provider conditions in accordance with the Water Services Act. He emphasized that water from Kloof has specific management conditions and cannot be redirected to other locations without the necessary permissions. He enquired if FWGR is currently engaging in the process of acquiring a water use license.	Ms Wilreker agreed that FWGR is currently in the process of acquiring a water use license for Libanon project. It was confirmed that FWGR have a WUL for the use of the water from Kloof #10 shaft.
Mr Mogale Matseba, Control Environmental Officer, DWS	Mr Matseba stated that they will provide comments on the water use application document if other officials from the Department of Water and Sanitation (DWS) have not yet done so.	Ms Wilreker stated that any comments or questions from attendees should be sent to stakeholders@kongiwe.co.za, and they will respond accordingly. She further stated that they are currently in consultation with the DWS. They already had a pre-application meeting with them, and they will conduct a site visit the following

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STAKEHOLDER	COMMENT	RESPONSE
		week. Any further comments from the department will be addressed in due course. Ms Wilreker added that the Integrated Water and Waste Management Plan (IWWMP), along with the specialist report and the Environmental Impact Assessment (EIA), will also be made available during the EIA phase.
Mr Ayanda Mtetwa, Environmental Officer, DWS	Mr Mtetwa inquired about the anticipated end land use plan following the reclamation of the Libanon Tailings Storage Facility (TSF).	Ms Wilreker stated that the current proposed end land use plan by Sibanye Still-water as the landowner's of the site is wilderness

4. Closing

COMMENT	RESPONSE
Ms Wilreker thanked the forum chairperson and attendees for their time and input.	The forum chairperson thanked Ms Wilreker for the presentation.

The meeting adjourned at 13:00 am.

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Appendix A

Presentation

DRDGOLD Limited

Far West Gold Recoveries – Libanon Reclamation Project

Stakeholder Engagement Meeting - Wonderfonteinspruit Catchment Forum

DMRE reference number: GP30/5/1/1/2/000073 BP/BAR

DWS reference number: WU37611

Tuesday, 03 September 2024

Agenda

1. Purpose of the Meeting
2. Important Notice
3. Introduction
4. Kongiwe’s Role as an Independent Environmental Assessment Practitioner
5. Project Location
6. Project Background
7. Project Description: The Process
8. Project Infrastructure
9. Specialist Studies
10. Legislative Framework
11. Project Progress to date
12. Questions & Answers

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Purpose of the Meeting

- Discuss the proposed Libanon Reclamation Project.
- Provide an overview of the Scoping and Environmental Impact Assessment process.
- 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 Resources and Energy (DMRE) 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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Introduction

- **Kongiwe**
  - Gerlinde Wilreker – Project Manager & EAP
  - Thuli Phakathi – Stakeholder Engagement
  - Anela Fixi – Stakeholder Engagement
- **FWGR**
  - Anja Esterhuizen

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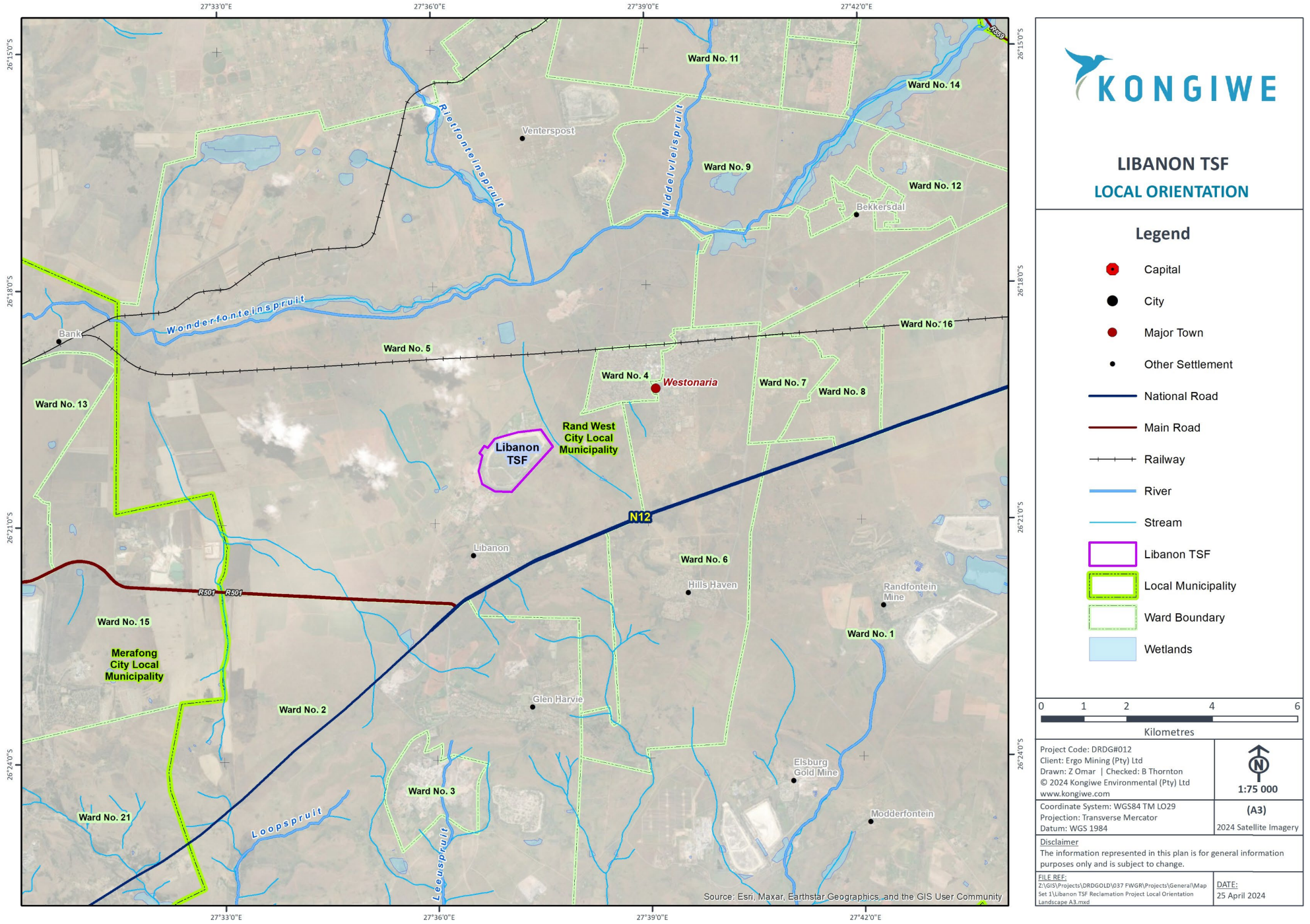
Kongiwe's Role

- 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 DMRE with the documentation so that they can determine if the project should proceed or not.



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Project Location



KONGIWE

LIBANON TSF
LOCAL ORIENTATION

Legend

- Capital
- City
- Major Town
- Other Settlement
- National Road
- Main Road
- Railway
- River
- Stream
- Libanon TSF
- Local Municipality
- Ward Boundary
- Wetlands

0 1 2 4 6
Kilometres

Project Code: DRDG#012
Client: Ergo Mining (Pty) Ltd
Drawn: Z Omar | Checked: B Thornton
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www.kongiwe.com

1:75 000

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

(A3)
2024 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\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Local Orientation Landscape A3.mxd

DATE:
25 April 2024

Project Background

- **Applicant**: Far West Gold Recoveries (Pty) Ltd
- **Reclamation**: The project aims to reclaim gold and other minerals from the Libanon TSF (107 Ha).
- **Reclamation Method:** Hydraulic Reclamation.
- **Life of Operation:** 12 years.
- This TSF is an historical mineral storage deposit (slimes dam), situated approximately 2 km west of the Westonaria, in the Rand West City Local Municipality.
- The proposed project will investigate one pipeline from Kloof Shaft #10 to provide process water to the reclamation station at the TSF.
- One pipeline will be required to transport slurry from the reclamation station to Kloof #10 shaft. From there it will join an existing pipeline to Driefontein #2 Plant.
- **Rehabilitation:** Once reclamation is completed the area will then be assessed for contamination (particularly in terms of radiation), contaminated soils if found will be remediated and the land levelled to a functioning topography, and revegetated.

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Project Description: The Process

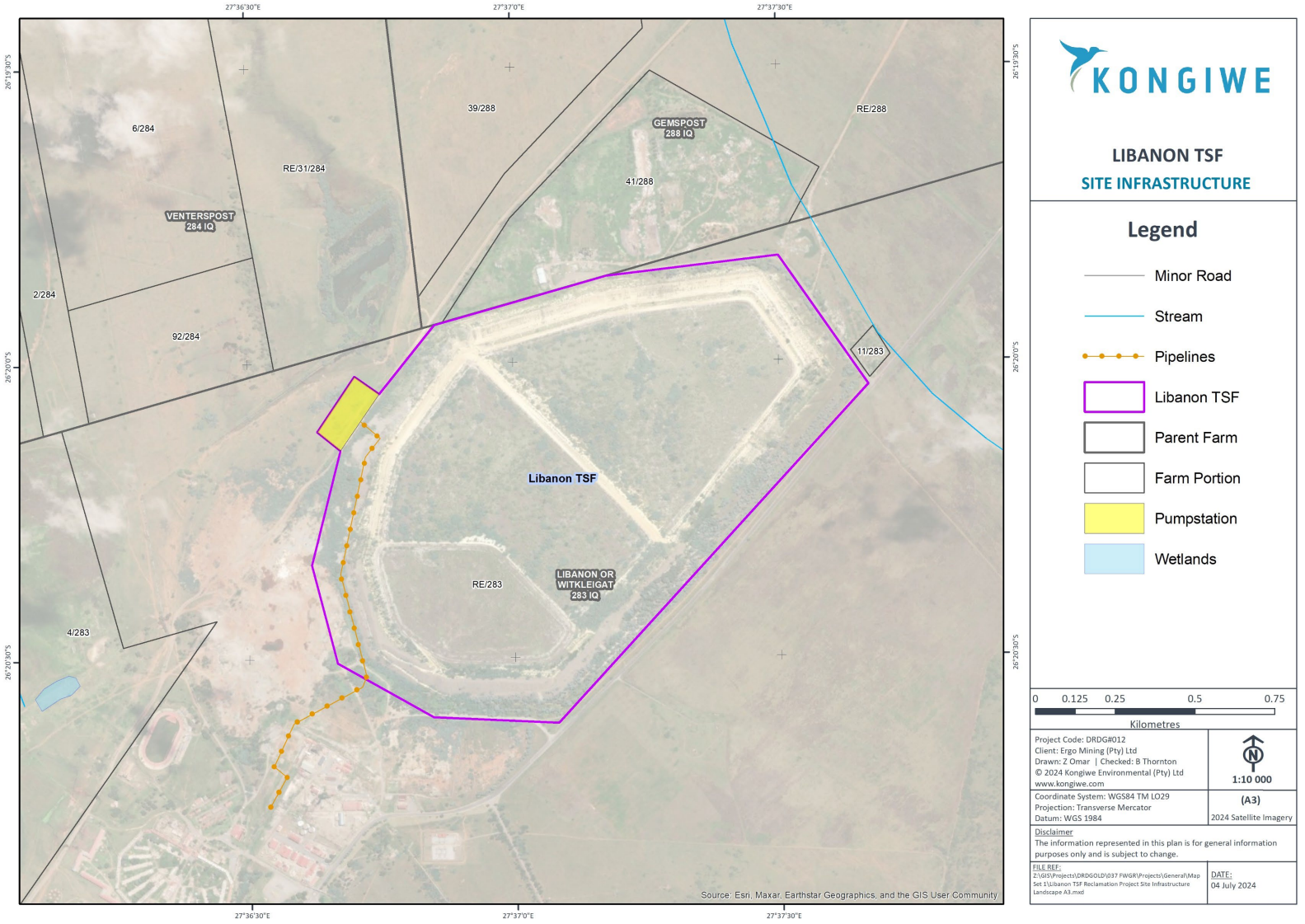
- The reclamation process makes use of high-pressure water monitors.
- During the reclamation process, process water (dirty water) mixes with the unconsolidated material of the slimes dam, resulting in what is known as a ‘slurry’.
- This slurry will be conveyed to the Driefontein #2 Plant or other authorized plants for reprocessing using existing and operational pipelines, within surface right permits and other rights held by FWGR.
- Final deposition of processed slurry will be on the Regional TSF (RTSF).
- In terms of process water, the water cycle operates as a closed circuit, meaning that limited make-up water will be required for the reclamation of the dump.
- Water required for the reclamation activities will be sourced from the adjacent Kloof #10 Shaft with makeup water from the RTSF.



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Project Infrastructure

- Required infrastructure will include:
  - Pumpstation
  - Process water from Kloof Shaft 10#
  - Pollution control paddock
  - Access road
  - Laydown area
  - Powerlines



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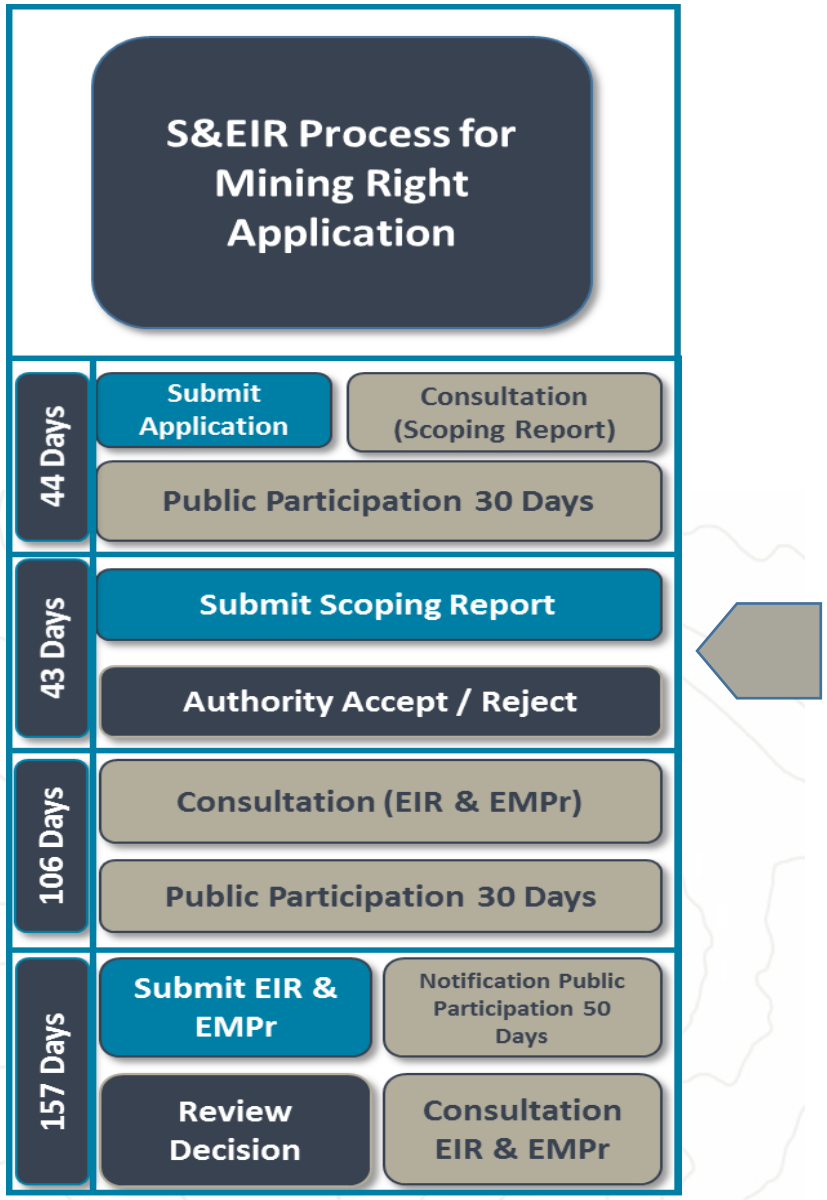
Specialist Studies

Proposed Specialist Studies	
Biodiversity Impact Assessment	Wetlands Impact Assessment
Surface Water Impact Assessment	Groundwater Impact Assessment
Air Quality Impact Assessment	Social Impact Assessment

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Legislative Framework

- An integrated Environmental Authorisation (EA) application will be submitted to the DMRE as the Competent Authority for the proposed project.
- The applicable applications to be assessed by the DMRE are as follows:
  - Application for an Environmental Authorisation for listed activities triggered in Listing Notices GN R983 and GN R984 in terms of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, as 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 in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) and the Activities listed in GN R921 of 29 November 2013 published in terms of NEM:WA.
- In addition, the following applications will be made to the relevant Competent Authorities:
  - An Integrated Water Use Licence Application (IWULA) will be undertaken in accordance with the National Water Act, 1998 (Act No.36 of 1998) (NWA). The Department of Water and Sanitation will be the Competent Authority to assess the IWULA for the proposed project.



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The Project to Date

- The required **Environmental Application** was submitted to the DMRE on **08 July 2024.**
- The **Draft Scoping report** was submitted for public review on **11 July 2024**. The review period was until**12 August 2024**:
  - Westonaria Public Library
  - Kongiwe website: http://www.kongiwe.com/publications-view/public-documents/
- An **Online Meeting** was held on **Wednesday, 24 July 2024** from 10h00-11h00 on MS Teams.
- An **Open Day** was held on the **Saturday, 27 July 2024** from 09h00-11h00 at Rand West Local Municipality, Westonaria Sports Complex, 98 Botha, Westonaria, 1780.
- Landowner and stakeholder meetings are ongoing.
- The **Scoping report** was finalised and submitted after the required public participation process was undertaken on **22 August 2024**.
- Comments will be recorded in a Comments and Response Report.
- The Integrated Water Use Licence Application has commenced and the process is ongoing.

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Comment & Discussion

- Discussion
- Action Points
  - Responsibility
  - Due Date
- Closing



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Contact

- **Name: Vanessa Viljoen / Thuli Phakathi**
- **Tel: 010 140 1725/26**
- **Email: Stakeholders@kongiwe.com**

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Find text or tools

KROMDRAAI CATCHMENT

Agenda of the Wonderfontein-/Loopspruit Forum Meeting

Date: 03 September 2024

Venue: MS Teams

Time: 10H00-13H00

PROPOSED AGENDA

Chairperson: Mr. EM Matseba

Item	Responsibility
1. Opening	Chairperson
2. Welcome	Chairperson
3. Attendance and Apologies	All
4. Approval of the proposed Agenda	All
5. Minutes of the previous meeting	All
6. Matters arising from the minutes of the previous meeting	All
7. Presentations:	
7.1. Water Quality – Corobrick	Ms Martha Monoke
7.2 Water Quality – Sibanye Stillwater	Mr Divan Van Niekerk
7.3 Water Use Licence Application – Far West Rand Gold Recoveries	Ms Thuli Phakathi
8. Catchment Issues	
8.1. Licence status	DWS
8.2. Local Government/Mining Pollution incidents	DWS
8.3. Update Report from Stakeholders	Mines, Industries and Local Government
8.4. Water Quality Results Reporting	DWS

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province

DMRE reference number: GP30/5/1/1/2/000073 BP/BAR

DWS reference number: WU37611

Meeting Minutes: Department of Water and Sanitation - Site Visit

Date:	Thursday, 12 September 2024
Time:	10:00-11:00
Venue:	Libanon TSF Site, Cnr Bridges Avenue and Cedar Lane, Westonaria

List of attendees:

Organisation	Name of attendee	Designation
Department of Water and Sanitation (DWS)	Ms Basani Nkuna	Environmental Officer (Case Officer)
DWS	Ms Portia Chawane	Environmental Officer
DWS	Ms Zanele Nyamande	Specialised Production: Section 21(c) & (i)
Ergo Mining (Pty) Ltd	Ms Anja Esterhuizen	Applicant
Kongiwe Environmental (Pty) Ltd	Ms Phumla Mngwengwe	Environmental Consultant
Kongiwe Environmental (Pty) Ltd	Ms Thuli Phakathi	Stakeholder Engagement Consultant
Kongiwe Environmental (Pty) Ltd	Mr Ripfumelo Macevele	Junior Environmental Consultant

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.*

1. **Welcome and Introductions**
   - Ms Mngwengwe welcomed the attendees
   - The attendees introduced themselves

2. **Meeting Agenda:**
   - Purpose of the Site Visit
   - Introductions
   - Project Background
   - Project Location
   - Current Status of the Site
   - Project Description
   - Specialist Studies
   - The Way Forward
   - Questions & Answers

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Kongiwe Environmental made a presentation to the Department of Water and Sanitation Officials. This presentation is attached as Appendix A.

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3. Discussion

STAKEHOLDER	COMMENT	RESPONSE
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane requested that the water use map be updated to include the authorised pipelines so that it is clear where they connect with the proposed pipelines.	Kongiwe noted the comment.
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane asked why the proposed pipeline was not included in the initial (now authorised) pipeline plan. She requested clarification on whether there was an initial strategy for the authorised pipeline to not connect to the TSF. She suggested that this issue should be investigated.	Ms Esterhuizen indicated that she was uncertain and that she had taken note of the comment.
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane inquired about the Stormwater Management Plan (SWMP).	Ms Mngwengwe indicated that a specialist has been appointed to undertake the SWMP.
Ms Mngwengwe, Kongiwe	Ms Mngwengwe indicated that based on the specialist findings, numerous artificial wet areas were identified within the project area. These include an artificial seep an artificial canal and an attenuation pond. Furthermore, no natural wetlands or rivers were identified within 500 m of the Proposed Project area. She made specific reference to the disturbed area located southwest of the TSF and explained that even though it is found to be a wet area, it was previously a waste rock dump (WRD). She explained that the specialist rated the Proposed Project as “no risk” to all these artificial wetlands, hence Section 21 (c) and (i) water uses are not triggered.	Ms Zanele Nyamende indicated that a wetland being artificial does not necessarily exempt the applicant from applying for Section 21 (c) and (i) water uses. She explained that even though a wetland is artificial, it may have ecological functions. She expressed a desire to review the report in detail after the site investigation. Ms Nyamende indicated that she will do further investigations on the "Disturbed Area" where Sibanye's WRD was. Ms Nyamende noted that reeds are growing within the “Disturbed Area” indicating wetland features and therefore, this might mean that the WRD was placed on a wetland. She stated that if it was originally a wetland, then this will trigger a section 21 (c) and (i) activity.

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STAKEHOLDER	COMMENT	RESPONSE
		She explained that even though the seep is artificial, it is still a fully functioning wetland and therefore the specialist must reassess the impacts on this artificial seep and confirm sensitivity. -She further explained that the artificial seep does not emanate from the TSF as stated in the wetland report but is suspected to be forming from a leak from Sibanye's biodam.
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane commented that "Attenuation Pond" is not the correct term to use as the water contained in the facility is from underground mine water.	Kongiwe noted this.
Ms Mngwengwe, Kongiwe	Ms Mngwengwe indicated that two activities have been identified to trigger a section 21 (g) water use as follows: - dust suppression during the reclamation process; and - disposal of slurry into lined catchment paddock during power cuts.	Ms Chawane advised that if Municipal water is used for dust suppression, then there will be no requirement to apply for Section 21 (g), but if process water is used, then the Section 21 (g) water use is triggered.
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane asked whether process water or water sourced from the Municipality/ will be used for dust suppression.	Ms Anja Esterhuizen indicated that this will be confirmed and communicated with the DWS.
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane sought clarity on how the sewage will be managed on-site. She also asked whether process water or water sourced from the Municipality/ will be used for dust suppression.	Ms Mngwengwe explained that she was uncertain, however, she would seek clarity on the points raised and noted the comment. Ms Anja Esterhuizen indicated that this will be confirmed and communicated with the DWS.

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STAKEHOLDER	COMMENT	RESPONSE
Ms Portia Chawane, Environmental Officer - DWS	Ms Chawane inquired about Groundwater monitoring.	Ms Esterhuizen indicated that Sibanye has the report, and it would be requested from them for the final submission of this IWULA.
Ms Portia Chawane, Environmental Officer - DWS	Ms. Chawane pointed out that the TSF is located in a dolomitic area.	The Project Team acknowledged and noted the comment.
DWS officials	The officials expressed concern regarding some activities happening on the Libanon TSF, especially while there seemed to be no stormwater management in place.	Ms Anja Esterhuizen explained that the activities are not related to the Far West God Recoveries Proposed Project.
Ms Zanele Nyamande, Specialised Production: Section (c) & (i) - DWS	Ms Nyamande asked that the Wetland Report be updated (if deemed necessary) and then provided to her before submitting Phase 1, as she would like to provide input on which wetlands trigger section 21 (c) and (i).	Kongiwe noted the comment. *Post-meeting note:* *The Aquatic Biodiversity Compliance Statement was submitted to the DWS on 22 October 2024.*

4. Closing

COMMENT	RESPONSE
The Kongiwe project team thanked the attendees for their time and input.	The attendees thanked Kongiwe for the site visit.

The site visit adjourned at 12:50 am.

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Appendix A

Presentation

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Appendix C9: Comments and Response Report

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Environmental Management Programme Report and Water Use Licence Application for the Reclamation of the Libanon Tailings Storage Facility in the Rand West City Local Municipality, Gauteng Province
Final Scoping Report
DMRP reference number: GP30/5/1/1/2/000073 BP/BAR
DWS reference number: WU37611

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Comments and Responses Report:

Draft Environmental Impact Assessment Report

1 Directly Affected Landowners

1.1 Department of Public Works and Infrastructure

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Frieda Khoza, Property Manager, Department of Public Works and Infrastructure	MS Teams Online Meeting	Thursday, 18 July 2024	Ms Khoza stated that the presentation was clear and straight to the point. She added that she was fine with the project and would be happy to assist if Kongiwe requires anything from their side.	Ms Wilreker explained to Ms Khoza that the purpose of the meeting was to make the Department of Public Works and Infrastructure aware of the project as the directly affected landowners. Additionally, she stated that if there is anything needed during the project, Kongiwe will notify them.	N/A
Ms Gerlinde Wilreker Project Manager, Kongiwe Environmental (Pty) Ltd	MS Teams Online Meeting	Thursday, 18 July 2024	Ms Wilreker stated that if a landowner's consent is requested for the Water Use Licence it would be communicated with the DPWI.	Ms Khoza stated that they will be happy to assist if Kongiwe required anything from the DPWI side.	N/A

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1.2 Sibanye Stillwater

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Mr Greg Ovens, Project Manager, FWGR	MS Teams Online Meeting	Monday, 22 July 2024	After Ms Wilreker's presentation, Mr Ovens provided clarity to the Sibanye-Stillwater team, explaining that the project is a continuation of the larger West Rand Tailings Reclamation Project (WRTRP).	The Sibanye team noted the explanation.	Section 2.4
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Govender suggested that Mr Ovens adopt a blanket approach for reclaiming the tailing dams, rather than addressing each TSF individually. He emphasised that this approach could streamline the process, particularly in relation to the water use license issue. Mr Govender highlighted a disconnect regarding the authorisation of the central tailing's storage facility. He sought clarification on this authorisation within the context of the current discussion, arguing that a holistic approach to authorisation would simplify the process. By consolidating the work into a single package for the application, it would be easier for consultants to manage and for stakeholders to review.	Mr Ovens explained the rationale behind the decision to split the projects. He stated that FWGR owns four remaining assets: Libanon, Kloof 1, Venterspost North and Venterspost South. Due to the urgent need to commence construction activities at Libanon as soon as authorization is granted, the projects were divided. Ideally, FWGR would have submitted a single application covering all four TSFs, but it opted against this to avoid the risk of delaying other projects if one of the applications faced an appeal. The remaining applications are expected to be filed within the next two months.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			From a compliance perspective, Mr Govender noted that managing a single comprehensive document is more efficient than handling multiple documents for individual projects. This approach would also facilitate the streamlining of compliance reports and annual reporting, making it significantly easier to manage.		
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Govender stated that he accepted Mr. Ovens' rationale for splitting the facility, noting that the delay of one project would affect the operation of the others.	Mr Ovens noted that.	N/A
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Govender stated that the IWULA for the Libanon project needs to complement the authorization granted for the TSF. He emphasized that any 21(g) activities arising from this are yet to be submitted. The application must not duplicate those covered by the existing RTSF authorization. Furthermore, he noted that the design of the IWULA will be critical.	Mr Ovens explained that the design of the IWULA is intended to be independent of the existing WRTRP authorization. He stated that it will be a separate application that adheres to appropriate engineering requirements as it is intended for a pollution paddock. Ms Wilreker added that the project is still in the pre-application stage for the water use licence. The final water uses are yet to be identified and will be specifically for the activities at Libanon and there are	Section 2.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
				no activities related to the RTSF that are included in this application.	
Mr Bashan Govender, Manager Environmental Compliance, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Govender stated that in the previous week, they had a very constructive meeting with the Department of Water and Sanitation (DWS) team, which included the legal services team, Portia and Hellen. During the meeting, they addressed past issues. He noted that one of the factors discussed was that Sibanye had been resisting certain issues that could not be contested and lacked a solid basis for their arguments. He emphasized the importance of remaining open-minded to all advice from DWS and highlighted the need to preserve this relationship. Further, he stated that maintaining a positive relationship with DWS will be crucial for expediting authorization.	Mr Ovens added that every application they submit currently complies with the legislation and does not challenge it. Consequently, FWGR has successfully obtained water use licences in the past 18 months.	N/A
Mr Stephan Botes, Unit Manager: Mineral Right, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Botes inquired whether it would be possible to provide a consolidated depiction of the TSF's and an update on their status with respect to all Environmental Authorizations (EAs) and other relevant approvals.	Mr Ovens stated that the team can provide Mr. Botes with a detailed overview showing which TSF FWGR owns and which ones it does not.	N/A
Ms Evelyn Mekgwe, Superintendent	MS Teams Online Meeting	Monday, 22 July 2024	Ms Mekgwe requested clarity regarding the pending IWULA and pending Part 2 amendments, specifically concerning the	Mr Ovens provided an overview of the West Rand retreatment projects, and the authorization processes	Section 2.4

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Environmental Compliance Projects, Sibanye-Stillwater Ltd			removal of facilities that have been sold to DRDGOLD/FWGR. She mentioned that these facilities include Kloof and Driefontein, which were sold to DRDGOLD/FWGR and have a positive IWUL or EA dated back to 2018. She asked whether the authorizations were granted to Sibanye-Stillwater or FWGR and sought information on what was included in those authorizations.	involved in transferring these rights from Sibanye to FWGR, starting in 2018. He explained that the West Rand tailings retreatment project includes four mining right areas previously owned by Sibanye: Driefontein, Kloof, Ezulwini, and Cook, which together comprised the Greater West Rand Retreatment Project. Environmental Authorizations (EAs) for these areas were issued in 2018. Following this, DRDGOLD and Sibanye completed a transaction in 2018 involving the purchase of several TSFs: Driefontein 5 TSF, Driefontein 3 TSF, and Driefontein 4 TSF. The authorization for reclaiming these three TSFs was also issued in 2018. DRDGOLD purchased the DP2 tailings facility, and FWGR acquired the rights to dispose of tailings at Driefontein 4. Both the plant and deposition rights were included in the regional Driefontein EA. Mr Ovens added that the Regional Tailings Storage Facility (RTSF), which falls under the Kloof mining right, has a separate EA that was approved and successfully transferred to DRDGOLD in August 2022. This EA was initially issued to Sibanye in 2018 and was subsequently transferred to FWGR.	

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
				Mr Ovens stated that the water use license for the WRTRP was subsequently transferred to FWGR from Sibanye. Furthermore, activities associated with managing DP2, including pipelines and shaft abstractions at Driefontein Shaft 10, as well as deposition at Driefontein 4, are licenced within the Driefontein water use license. Consequently, FWGR has applied for a new water use licence to assume responsibility for these water use licences. He further clarified that the current application pertains to the reclamation of the Libanon TSF, which was not included in the West Rand tailings retreatment projects. Although it was mentioned as part of the West Rand tailings retreatment, it will be reprocessed and disposed of at the RTSF. Mr Ovens also stated that he will develop a flowchart to illustrate how the various authorizations are interconnected, showing which areas are covered by each authorization.	
Ms Evelyn Mekgwe, Superintendent Environmental Compliance	MS Teams Online Meeting	Monday, 22 July 2024	Ms Mekgwe asked where the Driefontein TSF 3 and 5 stand in relation to the current application, considering that TSF 4 has already been transferred. She also inquired whether the	Ms Wilreker stated that Driefontein TSF 3 and TSF 5 have been excluded from the current licence application.	Section 2.4

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Projects, Sibanye-Stillwater Ltd			Libanon facility is included under Kloof 1 or if it is being removed.	Mr Ovens added that approval for TSF 3 and TSF 5 has already been obtained. These facilities have been transferred to FWGR, and the necessary authorizations are in place.	
Ms Evelyn Mekgwe, Superintendent Environmental Compliance Projects, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Ms Mekgwe recommended that a table or flow diagram would be a quick reference tool.	Mr Ovens stated that he can only provide information based on what he has. He cannot comment on the status of Sibanye's licences, as he is unaware of whether the submitted application amendments have been approved.	N/A
Ms Evelyn Mekgwe, Superintendent Environmental Compliance Projects, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Ms Mekgwe stated that Sibanye is still in the application process, and the licences have not yet been granted.	Mr Ovens noted the comment.	N/A
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Botes stated that, with the addition of new personnel in the environmental sector on their team, a flow chart from FWGR is required to depict the TSFs owned by FWGR. This chart must include explanations of the status of each TSF regarding permitting and authorization. He further stated that this will provide their	Ms Wilreker noted the suggestion.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			environmental team with a comprehensive overview of the situation.		
Mr Greg Ovens, Project Manager, FWGR	MS Teams Online Meeting	Monday, 22 July 2024	Mr Ovens provided a detailed explanation of the Libanon reclamation process, as outlined in the presentation.		Section 2.6
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Botes requested to be briefed on the details discussed in the meeting, as he joined while the meeting was already in progress.	Ms Wilreker explained that, since the dam is situated on Sibanye-Stillwater land, the National Environmental Management Act (NEMA) requires consultation with landowners and other directly and indirectly affected parties. As a landowner, Sibanye is considered a directly affected party. Mr Ovens added that the reclamation activities planned for Libanon trigger NEMA-listed activities not covered by the West Rand tailings retreatment authorization. Consequently, certain activities related to the successful reclamation of the Libanon TSF need to be authorised.	Section 7 Section 2.5
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Botes inquired about the time frames and what actions are required on their side.	Mr Ovens stated that Kongiwe Environmental is consulting with all interested and affected parties, with Sibanye being one of the directly affected parties as the landowner. Mr Ovens stated that the discussions are still ongoing regarding access to infrastructure for the proposed Libanon project, such as water from the shafts and	Section 7 Section 1.4.1

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
				power agreements. These matters are managed by engineers directly in coordination with other engineering teams and area managers. Mr Ovens stated that Kongiwe Environmental is responsible for addressing environmental and water use-related aspects and obtaining the necessary authorizations. Actual operations and ongoing site requirements are managed by the responsible entities at Sibanye. Ms Wilreker added that during the water use licence application process, landowner consent is required. She further stated that if the project site still falls under Sibanye by the time the water use licence activities are advanced, Kongiwe Environmental will need landowner consent from Sibanye for water use authorization.	
Mr Stephan Botes, Unit Manager - Mineral Rights, Sibanye-Stillwater Ltd	MS Teams Online Meeting	Monday, 22 July 2024	Mr Botes stated that Mr Govender and Ms Mekgwe need to provide input on any concerns, as they have done in the session. He also mentioned that, based on the explanation provided, he understood the context of the presentation and requested that the presentation be sent to them.	Ms Wilreker explained that the Environmental Impact Assessment (EIA) is a lengthy process, and the application is still in the early scoping phase. Consultations will continue throughout the EIA process, and Sibanye will be involved at every stage. She also stated that the presentation, along with the meeting minutes, will be sent to them.	Section 1.4.3 Section 7 Appendix C

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Mr Greg Ovens, Project Manager, FWGR	MS Teams Online Meeting	Monday, 22 July 2024	Mr Ovens asked whether the agreement FWGR has with Sibanye to return the project land to wilderness standards is still in effect or if it is aligned with the proposed rehabilitation plan.	Mr Govender stated that the approach will align with the closure objectives led by Tharina. He further noted that returning the land to its natural state would be sufficient, as it does not preclude its use for other activities, which will be addressed through town planning. Ideally, achieving its native state would be preferred. Mr Ovens stated that he will need to discuss with Tharina and Mpho the potential for proposed developments on the project site after reclamation. This will help avoid the costs and efforts involved in grassing the area if it will subsequently need to be ploughed for future development.	Section 2.6.3
Ms Gerlinde Wilreker, Project Manager (EAP), Kongiwe Environmental	MS Teams Online Meeting	Monday, 22 July 2024	Ms Wilreker stated that Kongiwe will include this approach on the EIA report.	Mr Ovens stated that for the EIA report, Kongiwe must include that the site will be returned to its natural wilderness or grassland environment, and that any financial provisions required will be provided. Additionally, if the closure plan changes during the reclamation process or if new development requirements are uncovered, FWGR will adjust accordingly	Section 2.6.3

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1.3 Rand West City Local Municipality (RWLM)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Gerlinde Wilreker, Project Manager, Kongiwe Environmental (Pty) Ltd	MS Teams Online Meeting	Thursday, 23 July 2024	After providing the presentation, Ms Wilreker asked the attendees if they had any queries and comments regarding the project.	Mr Bekwa stated that the Rand West Local Municipality will provide feedback after reviewing the presentation and submit any comments in writing.	N/A
Mr Vuyani Bewa, Executive Director: Economic Development, Human Settlement and Planning, Rand West Local Municipality	MS Teams Online Meeting	Thursday, 23 July 2024	Mr Bewa requested that the presentation be sent to the local municipality for further review and comments.	Ms Wilreker Stated that the presentation, the Background Information Document (BID), and the non-technical summary report will be sent to Mr Bewa.	Appendix C
Mr Moses Mokwana, Waste Management, Rand West Local Municipality	MS Teams Online Meeting	Thursday, 23 July 2024	Mr Mokwana stated that the Waste Management Department will also review the scoping report and provide comments, as the project is located next to their landfill site and all the operations will affect it.	Ms Wilreker thanked Mr Mokwana for raising that point.	Section 2.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Gerlinde Wilreker, Project Manager, Kongiwe Environmental (Pty) Ltd	MS Teams Online Meeting	Thursday, 23 July 2024	After providing the presentation, Ms Wilreker asked the attendees if they had any queries and comments regarding the project.	Mr Bekwa stated that the Rand West Local Municipality will provide feedback after reviewing the presentation and submit any comments in writing.	N/A

2 Indirectly Affected Landowner

2.1 Transnet

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Mr Banzi Mlungu, Transnet Freight Rail	Email Corresponded	Monday, 01 July 2024	Transnet is not affected.	Kongiwe noted the comment.	N/A
Ms Carol Gore, Transnet Property Technician, JHB Mr Thembinkosi Memela, Transnet	Email Corresponded	Monday, 22 July 2024	The proposed project does not affect TRF and the stamped letter is attached. (Westonaria area).	Kongiwe noted the comment.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Property Technician, JHB					

3 Organs of State

3.1 South African National Roads Agency Limited (SANRAL)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Ria Barkhuizen, Statutory Control Administrator: Northern Region	Email Corresponded	Monday, 15 July 2024	The South African National Roads Agency SOC Limited (SANRAL) has no objection to the above-mentioned application as no roads or interchanges under the jurisdiction of SANRAL are affected. Please note that no direct access to the N12 will be permitted.	This noted.	N/A

3.2 Rand Water

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Mr Noel Dzhivhuho, Civil Engineering, Rand Water	Email Corresponded	Thursday, 4 July 2024	Good day,	The kmz shapefile and the locality map were resubmitted.	Figure 2.1 Appendix B1

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			The boundary for the proposal is not clear, please update the locality map with an additional closer view and include kmz shapefile and resubmit.		

3.3 South African Heritage Resources Agency (SAHRA)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Nokusho Ngobeni, Heritage Officer - SAHRA	Email Corresponded	Friday, 05 July 2024	Good day, Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: bhttp://sahra.org.za/sahris/. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions. Please create an application on SAHRIS for each EA application and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process, and the assessment must comply with	This is noted.	Section 10.3

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			section 38(3) of the NHRA. If a case already exists on SAHRIS regarding the development, please upload the documents to that case using the "Make an additional submission to an existing case" in the application selector wizard https://sahris.org.za/form/application-selector. Please ensure that all documents produced as part of the EA process are submitted as part of the application.		
Ms Nokusho Ngobeni, Heritage Officer, SAHRA	Email Corresponded	Monday, 08 July 2024	Good day, Please note that an assessment of the impact to heritage resources is required in terms of section 24(4)b(iii) of NEMA.	This is noted.	Section 10.3
Ms Nokusho Ngobeni, Heritage Officer, SAHRA	Email Corresponded		Good day, Please note that all development applications are processed via our online portal, the South African Heritage Resources Information System (SAHRIS) found at the following link: http://sahra.org.za/sahris/. We do not accept emailed, posted, hardcopy, faxed, website links or DropBox links as official submissions. 2 Please create an application on SAHRIS for each EA application and upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage	Good day, We take note of your email. Please note that the reclamation of the Libanon TSF forms part of the greater West Rand Tailings Retreatment Project (WRTRP). A Heritage Impact Assessment was undertaken for this in 2016. The HIA covered the Libanon TSF in its scope. No sites of heritage significance were identified. Comments on the HIA have been received by SAHRA. Therefore, a Section 38 Application is deemed not applicable for the Libanon project as	Section 2.6.1

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			resources must form part of the process and the assessment must comply with section 38(3) of the NHRA. If a case already exists on SAHRIS regarding the development, please upload the documents to that case using the "Make an additional submission to an existing case" in the application selector wizard https://sahris.org.za/form/application-selector. Please ensure that all documents produced as part of the EA process are submitted as part of the application.	it has already been undertaken for the greater WTRP project. Please find attached the correspondence. A chance finds procedure will be in place should any heritage artifacts be encountered.	

3.4 Eskom (National Transmission Company South Africa SOC Ltd (NTCSA)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Mr John Geeringh, Senior Consultant Environmental Management Grid Planning: Land and Rights - NTCSA	Email Corresponded	Friday, 19 July 2024	Please send me a KMZ file of the proposed development. Please find attached Eskom requirements for work at or near Eskom infrastructure and servitudes. **The attachment details with the requirements from Eskom when working at or near infrastructure and servitudes:** TO WHOM IT MAY CONCERN Eskom requirements for work in or near Eskom servitudes.	Good day Mr Geeringh Thank you for your response. We take note of Eskom's requirements and have passed them on to the applicant. Find attached the kmz for the project as requested.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			1. Eskom's rights and services must be acknowledged and respected at all times. 2. Eskom shall at all times retain unobstructed access to and egress from its servitudes. 3. Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals. 4. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer. 5. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand. 6. The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.		

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			7. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction. 8. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment. 9. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for		

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager Note: Where and electrical outage is required, at least fourteen work days are required to arrange it. 10. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with. 11. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom. 12. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by *Regulation 15* of the *Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).* 13. Equipment shall be regarded electrically live and therefore dangerous at all times. 14. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and		

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			Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area. 15. Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant. 16. It is required of the developer to familiarise himself with all safety hazards related to Electrical plant. Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude		

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3.5 Gauteng Department of Health (DoH)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Sentle Mofokeng, Chief Environmental Health Practitioner, West Rand District Health Services	Email Corresponded	Monday, 26 August 2024	**Gauteng Department of Health**: **The West Rand Health District** is responsible for provision of health services conducted an environmental health impact assessment for the proposed water use licence application for reclamation of the Libanon tailing storage facility in the Rand West City Local Municipality. Kindly receive attached report with recommendation for your attention and further management. **PURPOSE:** To comment on the proposed application for water use licence received for the reclamation and reprocessing of the gold residue of Libanon tailings storage facility in the Rand West City Local Municipality, Gauteng Province and to provide elements to be considered and implement effective mitigation strategies. **BACKGROUND:**	Good day Sentle, Thank you very much, we have received your EHIA report. The recommendations are noted and will be included in the EIA/EMPr.	Section 8 Section 9 Section 2.2.5 Appendix D

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			Environmental health impacts assessment is a process that identifies and predict the health impacts before, during & after the implementation of an activity and recommend preventive or control measures. These are the overall effects, direct or indirect, of a policy, plan, program, or project on the health of a population. Anything that alters the determinant of health, consequently, will have an impact on health and the environment. Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, biological, social, and psychosocial factors in the environment. It is also related to the theory and practice of assessing, correcting, controlling, and preventing those factors in the environment that can potentially affect the health of present and future generations. An Environmental Health Practitioner from West Rand Health District visited the proposed site on the 25th of July 2024.		

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			FINDINGS: The proposed site is situated approximately 2 km west of Westonaria, in the Rand West City Local Municipality. **COMMENTS/ RECOMMENDATIONS:** • **Air Quality**: Ensure that control measures are in place to mitigate the potential impact on air quality in the surrounding areas, due to increase in dust emissions during the activities. • **Water Quality**: Evaluate potential impacts on local water sources, including surface water bodies and groundwater, assessing risks of contamination and measures to control water contamination. • **Noise and Vibration**: Monitoring of impacts and developing of control measures to minimize disturbances resulting from noise and vibration. • **Waste Management**: Monitoring of liquid and solid waste generated during the activities, including tailings deposition, and ensure proper		

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			containment and disposal to prevent environmental contamination. • **Biological Environment**: The Project can have an impact on local flora and fauna due to changes in land use, potential habitat destruction, and contamination from mining activities. It's important to identify and mitigate potential threats to biodiversity. • **Cumulative Effects**: Ensure that cumulative effects of the proposed activity and future activities are approved and controlled. • **Mitigation Measures:** Ensure mitigation measures to prevent water, air, and land pollution throughout the development are in place, and continuous monitoring is done. • **Health and safety**: Ensure that health and safety measures are in place throughout the reclamation process.		

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			• All requirements set by the Local Authority and other relevant departments should be complied to. • Ensure all interested and affected parties involved are considered in the application.		

3.6 Department of Water and Sanitation (DWS)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Basini Lerato Nkuna, Environmental Officer, Department of Water and Sanitation (DWS)	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna thanked Ms Mngwengwe for the presentation and requested clarification on what the purple line represents. She inquired whether the purple line represents the Tailings Storage Facility (TSF) or delineates a wetland.	Ms Mngwengwe confirmed that the purple line represents the TSF.	Section 2.2.1 IWWMP
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna asked what the dotted blue line represents.	Ms Mngwengwe stated that the blue line represents the 500m buffer. She further explained that the line indicates a specialist buffer used to determine what lies within the 500m radius from the project site, but it is not a regulated area.	Section 2.2.1 IWWMP

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Mr Bradly Thornton, Project Director, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Mr Thornton added that the light blue line can be interpreted as an area of interest or study. He explained that this area, buffered by half a kilometre, is used to identify any wetlands surrounding the TSF or the project area. He emphasised that this is not a regulated area but rather a designated study area.	Ms Nkuna stated that she understood Mr Thornton's explanation.	Section 2.2.1 IWWMP
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna pointed out that the whole study area is within the 500m buffer zone of the wetlands. Even though the wetlands are artificial, she mentioned that this activity might still fall under the Section 21(c) and (i) water uses regulations because it is within 500m of these wetlands.	Ms Mngwengwe noted this.	Section 2.2.1 IWWMP
Ms Phumla Mngwengwe, WULA Consultant, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Mngwengwe inquired whether Section 21(c) and (i) regulations would still apply if a specialist finding shows that there is no risk from the project activities and the sensitivity is low, which would subsequently make a risk matrix for General Authorisation (GA) unnecessary.	Ms Nkuna confirmed that Section 21(c) and (i) regulations still apply to a GA. She stated that a risk matrix should be provided to demonstrate that the risk is low.	Section 2.2.1 IWWMP
Mr Greg Ovens, Project Manager, Far West Gold Recoveries (FWGR)	Microsoft Teams Online Meeting	Monday, 19 August 2024	Mr Greg Ovens explained that the artificial wetlands are actually historical mine infrastructure. The upper area was used as a return water dam, while the other area was used as a waste rock dump and was never removed. He further stated that, since none of these features are natural and lack	Ms Nkuna noted this	Appendix D1

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			ecological function, the specialist's justification is that they do not have an impact. He suggested writing a motivation letter for the Department's consideration to explain this context.		
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether all these old mine dumps were not rehabilitated and asked how they resulted in artificial wetlands. She expressed her belief that they were supposed to be rehabilitated to prevent the current issues.	Mr Ovens stated that the areas should have been rehabilitated but were not. He explained that part of the current project involves removing this pollution point source (TSF) to prevent any further environmental impacts.	Section 1, Section 8.5.2, Section 8.6.2
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether the scope of the project includes the rehabilitation of those areas.	Mr Ovens stated that the scope of the project includes the rehabilitation of the mine footprint and the areas outside that are not owned by Far West Gold Recoveries (FWGR) and are owned by Sibanye-Stillwater.	Section 2.4.8
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired about the number of properties affected by this activity. She noted that even if the damage was caused by Sibanye-Stillwater, any activity within 500m of the project site might still have an impact. She emphasised that if the specialist asserts there is no impact, this must be reflected in the report and the risk assessment matrix (RAM). She highlighted that, according to the National Water Act (NWA) and Regulations, any activity within 500m of a watercourse triggers a Section 21(c) and (i) water use. She stated that	The project team noted this.	Section 1.5, Section 9.4 IWWMP,

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			supporting documents will be needed to confirm that the damage at the site was caused by previous mining activities, that the land was not rehabilitated, and that Sibanye - Stillwater is either required to rehabilitate the site or is in the process of doing so.		
Ms Xolelwa Gloria Bhele, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Bhele inquired whether there is an existing licence for the water uses and if this project constitutes additional water uses. She also asked whether Kloof will be the source of water for the project.	Mr Ovens explained that this project is linked to the licence issued by Mr Victor for the West Rand Tailings Retreatment Project (WRTRP). He noted that the WRTRP did not include Section 21(g), which is required for the Libanon Project. He further explained that the licence covered all the pipelines needed for the Libanon TSF. He further explained that it was only in 2016 when they realised that they needed to apply for a Section 21(g) water use in relation to the pollution paddocks, and that is why the additional water use will be added.	Section 2.2 IWWMP
Ms Xolelwa Gloria Bhele, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Bhele acknowledged Mr Ovens' explanation and mentioned that she wanted to connect the dots, as it appears that the deposition will be directed to the regional tailings storage facility (RTSF).	Mr Ovens explained that this activity is part of the same project. However, with this specific activity, they learned from the relationship they have with the DWS that they need to apply for a Section 21(g) water use for the pollution control paddock linked to the pump station.	Section 2.2.1 IWWMP

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	Microsoft Teams Online Meeting	Monday, 19 August 2024			
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether FWGR is adding this activity to the existing licence or if this is a separate application on its own.	Mr Ovens stated that this is a new application because it involves a new water use; it is not an amendment to the existing licence.	Section 2.2.1 IWWMP
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether FWGR intends to consolidate this application with the existing licence or keep them separate.	Mr Ovens explained that their intention is to keep this application separate and proceed with the specific processes required for this project, such as public participation, without the delays that might arise from combining it with other licences.	N/A
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired about the number of properties affected by this activity.	Ms Mngwengwe confirmed that this activity affects only one property.	Section 1.5
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether the affected property is owned by FWGR.	Mr Ovens stated that the property is owned by Sibanye-Stillwater.	Section 1.5
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether the artificial wetland needs to be included in this application. She stated that they will engage with the DWS specialist regarding it triggering a Section 21 (c) and (i) water use, she stated that a report explaining why the	Ms Mngwengwe stated that for stormwater management, there are paddocks on the TSF and berms around the TSF to separate clean water from dirty water. Additionally, the lined catchment paddocks will assist with managing stormwater.	IWWMP

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			wetlands should not be included will be required. She stated that from her observation, any activity within 500m of the wetland triggers a Section 21 (c) and (i) water use. She asked whether FWGR plans to construct a stormwater management system for this project and if so, where the stormwater will be discharged.		
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired about the discharge point for all the collected stormwaters.	Mr Ovens explained that the stormwater is redirected back to the pump station and utilised in the process. He confirmed that no dirty stormwater leaves the site. Additionally, the pollution paddocks behind the pump station are used to manage all overflow stormwater.	Section 3.3
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna requested clarification on whether FWGR has a dam within the system to collect the stormwater or if the water is being disposed of in a nearby artificial wetland or river.	Mr Ovens confirmed that no water is being discharged. He explained that the system is closed, but behind the pump station there is a pollution paddock designed to contain any excess stormwater that overflows from the pump station and cannot be managed in the process. Therefore, no dirty stormwater leaves the site or is directed to the artificial wetlands.	Section 3.3
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired where the clear water is discharged after the separation process.	Mr Ovens explained that there is a berm around the pump station that diverts clean water and prevents any contamination. He further stated that it would	Section 8.7.9.1

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				be easier to explain this process in detail during a site visit.	
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired about the location of the berm and requested that Mr Ovens clarify the associated processes. She also asked whether the pollution paddocks were authorised. If they were not, she advised that they should be included in this application.	Mr Ovens explained the entire process regarding the paddocks by illustrating on the map where both the proposed paddocks and berms are situated.	Section 8.7 Appendix D2
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna noted Mr Ovens' explanation and mentioned that a site visit would provide a better understanding of the layout.	Mr Oven noted this.	N/A
Mr Bradly Thornton, Project Director, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Mr Thornton explained in detail the methodology for separating clean water from dirty water using berms and pollution paddocks, and how overflow stormwater is managed. He further highlighted that the artificial wetlands will not be used as part of this process.	Ms Nkuna noted this.	Section 8.7 Appendix D2
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired whether the overhead cables would be replaced by a substation, or if FWGR would rely on Eskom for power, or if they have other sources for power connection.	Mr Ovens stated that the site was previously a shaft area of Sibanye- Stillwater, with power available for operations and substations and transformers located there. He further noted that they are finalizing their power off-take arrangements but emphasized that this does not trigger any	Section 2.4.5

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				Environmental Authorization (EA) requirements, as there are no identified water resources.	
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired about the planned route of the cables, the source of the power connection, and the destination of the transported power. She also requested that FWGR provide a consent letter from the entity operating the substation they will connect to, as well as confirmation that the substation has the capacity to accommodate the project.	Mr Ovens explained that all the power stations near the site are owned by Sibanye-Stillwater. He noted that there is an existing agreement for use and access, which was included as part of the transaction when they purchased the tailings dam.	N/A
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna inquired if any officials from the DWS team had additional questions.	Ms Bhele confirmed that she has no further questions, as this project is similar to other FWGR TSF Projects that FWGR. However, she expressed a greater interest in seeing this project on site.	N/A
Ms Thabelo Tshipate, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Tshipate inquired about the source of water for dust suppression.	Mr Ovens stated that the water for dust suppression will come from Kloof Shaft 10#.	Section 2.4.6
Ms Thabelo Tshipate, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Tshipate supported Ms Nkuna's suggestion of a wetland buffer and advised that it must be maintained for the artificial wetlands, extending from the edge of the wetlands to the TSF. She also requested clarification on the disposal of clean stormwater.	Mr Ovens explained that Mr Thornton had provided a clear illustration of the clean water disposal method. He also explained that they will provide the DWS with a detailed stormwater management plan. Additionally, he mentioned that there is a	Section 8.7.9 IWWMP

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				berm around the TSF to separate clean and dirty water. Mr Ovens reiterated that the artificial wetlands identified by the specialist are old mining infrastructure, including a return water dam and an old rock dump. He emphasized that FWGR's intention is not to avoid applying for Section 21(c) and (i) water uses, but rather to provide clarity on the current conditions at the site.	
Ms Phumla Mngwengwe, WULA Consultant, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Mngwengwe sought advice from DWS officials on whether to begin Phase 1 of the e-WULAAS immediately using the specialist findings or to wait for the site visit to confirm the findings before starting phase 1 e-WULAAS.	Ms Nkuna stated that Phase 1 can be opened before the site visit, as the site visit is part of Phase 2 e-WULAAS. However, she advised against commencing Phase 1 activities of the e-WULAAS before the site visit. She further said that she is willing to open Phase 1 of the e-WULAAS for Kongiwe, but water uses must not be uploaded until everything is confirmed by DWS officials and the specialist.	Section 2.2.1
Ms Basini Lerato Nkuna, Environmental Officer, DWS	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Nkuna highlighted that Phase 1 of the e-WULAAS can be challenging in situations where it is unclear whether the application falls under a GA or a full Water Use Licence Application. The site visit provides the necessary clarity to resolve any uncertainties.	Ms Mngwengwe noted this.	Section 2.2.1 IWWMP

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Mr Bradly Thornton, Project Director, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Mr Thornton sought clarification regarding the application of Section 21(c) and (i) water uses on artificial wetlands. He noted that recent advice indicated that artificial wetlands do not trigger Section 21 (c) and (i) activities. He requested clarification on the DWS's position concerning artificial wetlands: do they trigger Section 21 (c) and (i)? Ms Mngwengwe also sought clarification on the advice they received, which stated that artificial wetlands do not trigger Section 21 (c) and (i) unless they are found to have ecological importance. She further requested guidance on how to undertake such applications.	Ms Tshipate explained that wetlands are considered wetlands regardless of whether they are artificial or natural. Therefore, any activity taking place within a regulated area triggers Section 21 (c) and (i) water use, unless proof is provided that verifies the activity will not affect the wetland. The RAM and wetland assessment report will need to be submitted as proof. She further stated that during the site visit, a specialist will be present to advise Kongiwe accordingly.	Section 2.2.1 IWWMP
Mr Bradly Thornton, Project Director, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Mr Thornton requested the DWS Case Officer to open Phase 1 of the e-WULAAS so that Kongiwe can begin populating the information, given the urgency of the project.	Ms Nkuna confirmed that Phase of the 1 e-WULAAS will be opened for Kongiwe and requested for Kongiwe to not return the document after adding the water uses and administrative details. Instead, the document should remain open until the site visit is completed.	N/A
Ms Phumla Mngwengwe, WULA	Microsoft Teams Online Meeting	Monday, 19 August 2024	Ms Mngwengwe inquired about the possible date for the site visit from Ms Nkuna.	Ms Nkuna indicated that the site visit is provisionally scheduled for September 2024. She will first check the availability of DWS' specialists	N/A

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Consultant, Kongiwe				and then inform Kongiwe of the date so that planning can commence. ***Post-meeting note:*** ***The site visit was on the 12th of September 2024***	
Mr Bradly Thornton, Project Director, Kongiwe	Microsoft Teams Online Meeting	Monday, 19 August 2024	Mr Thornton highlighted that the project is extremely urgent and requested that Ms Nkuna inform Kongiwe of their first available date in September. Kongiwe will then adjust their schedule to accommodate that date.	Ms Nkuna acknowledged the urgency and promised to keep in touch with Kongiwe regarding the availability date.	N/A
Mr Mogale Matseba, Control Environmental Officer, Department of Water and Sanitation (DWS)	Microsoft Teams Online Meeting	Tuesday, 03 September 2024	Mr Matseba thanked Ms Wilreker for her presentation and request clarification regarding the current status of Kloof 10. Additionally, he asked Ms Wilreker to provide information about the other authorized plants.	Ms Wilreker explained that Kloof 10 is responsible for pumping water, and some of this water will be directed to the Libanon project for processing purposes. She clarified that this is the only activity currently taking place at Kloof 10. Regarding other authorized plants, Ms Wilreker stated that currently, only the Driefontein No. 2 plant is authorized. However, there may be additional plants constructed in the future. At present, the Driefontein No. 2 plant is the processing plant in use.	Section 3.5
Mr Mogale Matseba, Control	Microsoft Teams Online Meeting	Tuesday, 03 September 2024	Mr Matseba expressed concern, noting that it appears that Sibanye Stillwater may be serving as the water service provider for Far West Gold	Mr Van Niekerk confirmed that they are indeed the water service provider for FWGR. He further explained that, since FWGR is a subsidiary of	Section 2.4.8

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Environmental Officer, DWS			Recoveries (FWGR) based on the explanation provided. He requested confirmation from Mr Van Niekerk who represented Sibanye Stillwater in the forum.	Sibanye Still-water, they are essentially reallocating water to their other internal operations.	
Mr Mogale Matseba, Control Environmental Officer, DWS	Microsoft Teams Online Meeting	Tuesday, 03 September 2024	Mr Matseba noted that Sibanye Still-water is aware of the water services provider conditions in accordance with the Water Services Act. He emphasized that water from Kloof has specific management conditions and cannot be redirected to other locations without the necessary permissions. He enquired if FWGR is currently engaging in the process of acquiring a water use license.	Ms Wilreker agreed that FWGR is currently in the process of acquiring a water use license for Libanon project. It was confirmed that FWGR have a WUL for the use of the water from Kloof #10 shaft.	Section 2.2.1 IWWMP
Mr Mogale Matseba, Control Environmental Officer, DWS	Microsoft Teams Online Meeting	Tuesday, 03 September 2024	Mr Matseba stated that they will provide comments on the water use application document if other officials from the Department of Water and Sanitation (DWS) have not yet done so.	Ms Wilreker stated that any comments or questions from attendees should be sent to stakeholders@kongiwe.co.za, and they will respond accordingly. She further stated that they are currently in consultation with the DWS. They already had a pre-application meeting with them, and they will conduct a site visit the following week. Any further comments from the department will be addressed in due course. Ms Wilreker added that the Integrated Water and Waste Management Plan (IWWMP), along with the	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
				specialist report and the Environmental Impact Assessment (EIA), will also be made available during the EIA phase.	
Mr Ayanda Mtetwa, Environmental Officer, DWS	Microsoft Teams Online Meeting	Tuesday, 03 September 2024	Mr Mtetwa inquired about the anticipated end land use plan following the reclamation of the Libanon Tailings Storage Facility (TSF).	Ms Wilreker stated that the current proposed end land use plan by Sibanye Still-water as the landowner's of the site is wilderness	Section 2.4.8
Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane requested that the water use map be updated to include the authorised pipelines so that it is clear where they connect with the proposed pipelines.	Kongiwe noted the comment.	Appendix B IWWMP
Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane asked why the proposed pipeline was not included in the initial (now authorised) pipeline plan. She requested clarification on whether there was an initial strategy for the authorised pipeline to not connect to the TSF. She suggested that this issue should be investigated.	Ms Esterhuizen indicated that she was uncertain and that she had taken note of the comment.	N/A
Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane inquired about the Stormwater Management Plan (SWMP).	Ms Mngwengwe indicated that a specialist has been appointed to undertake the SWMP.	Section 8.7.9
Ms Mngwengwe, Kongiwe	Site Visit	Thursday, 12 September 2024	Ms Mngwengwe indicated that based on the specialist findings, numerous artificial wet areas were identified within the project area. These include an artificial seep an artificial canal and an	Ms Zanele Nyamende indicated that a wetland being artificial does not necessarily exempt the applicant from applying for Section 21 (c) and (i) water uses. She explained that even though a	Appendix D1 IWWMP

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			attenuation pond. Furthermore, no natural wetlands or rivers were identified within 500 m of the Proposed Project area. She made specific reference to the disturbed area located southwest of the TSF and explained that even though it is found to be a wet area, it was previously a waste rock dump (WRD). She explained that the specialist rated the Proposed Project as “no risk” to all these artificial wetlands, hence Section 21 (c) and (i) water uses are not triggered.	wetland is artificial, it may have ecological functions. She expressed a desire to review the report in detail after the site investigation. Ms Nyamende indicated that she will do further investigations on the "Disturbed Area" where Sibanye's WRD was. Ms Nyamende noted that reeds are growing within the “Disturbed Area” indicating wetland features and therefore, this might mean that the WRD was placed on a wetland. She stated that if it was originally a wetland, then this will trigger a section 21 (c) and (i) activity. She explained that even though the seep is artificial, it is still a fully functioning wetland and therefore the specialist must reassess the impacts on this artificial seep and confirm sensitivity. -She further explained that the artificial seep does not emanate from the TSF as stated in the wetland report but is suspected to be forming from a leak from Sibanye’s biodam.	

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Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane commented that "Attenuation Pond" is not the correct term to use as the water contained in the facility is from underground mine water.	Kongiwe noted this.	N/A
Ms Mngwengwe, Kongiwe	Site Visit	Thursday, 12 September 2024	Ms Mngwengwe indicated that two activities have been identified to trigger a section 21 (g) water use as follows: - dust suppression during the reclamation process; and - disposal of slurry into lined catchment paddock during power cuts.	Ms Chawane advised that if Municipal water is used for dust suppression, then there will be no requirement to apply for Section 21 (g), but if process water is used, then the Section 21 (g) water use is triggered.	IWWMP
Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane asked whether process water or water sourced from the Municipality/ will be used for dust suppression.	Ms Anja Esterhuizen indicated that this will be confirmed and communicated with the DWS.	N/A
Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane sought clarity on how the sewage will be managed on-site. She also asked whether process water or water sourced from the Municipality/ will be used for dust suppression.	Ms Mngwengwe explained that she was uncertain, however, she would seek clarity on the points raised and noted the comment. Ms Anja Esterhuizen indicated that this will be confirmed and communicated with the DWS.	Section 9.2.1.1
Ms Portia Chawane,	Site Visit	Thursday, 12 September 2024	Ms Chawane inquired about Groundwater monitoring.	Ms Esterhuizen indicated that Sibanye has the report, and it would be requested from them for the final submission of this IWULA.	Appendix D3

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Environmental Officer - DWS					
Ms Portia Chawane, Environmental Officer - DWS	Site Visit	Thursday, 12 September 2024	Ms Chawane pointed out that the TSF is located in a dolomitic area.	The Project Team acknowledged and noted the comment.	Section 8.3.7
DWS officials	Site Visit	Thursday, 12 September 2024	The officials expressed concern regarding some activities happening on the Libanon TSF, especially while there seemed to be no stormwater management in place.	Ms Anja Esterhuizen explained that the activities are not related to the Far West God Recoveries Proposed Project.	N/A
Ms Zanele Nyamande, Specialised Production: Section (c) & (i) - DWS	Site Visit	Thursday, 12 September 2024	Ms Nyamande asked that the Wetland Report be updated (if deemed necessary) and then provided to her before submitting Phase 1, as she would like to provide input on which wetlands trigger section 21 (c) and (i).	Kongiwe noted the comment. ***Post-meeting note:*** ***The Aquatic Biodiversity Compliance Statement was submitted to the DWS on 22 October 2024.***	Appendix D1

4 West Rand District Municipality

4.1 Department of Health and Social Development

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Susan Stoffberg, Environmental Manager, West Rand District Municipality	Email Corresponded	Tuesday, 03 September 2024	**The West Rand District Municipality submitted the following comments:** **Department of Health and Social Development: West Rand District Municipality** • The developer should comply with the National Dust Control Regulations that were promulgated on 1 November 2013 during the construction phase of the project. Submit a detailed Dust Management Plan. • The site is situated within the Ecological Support Areas (ESA). The land use management guidelines are applicable to ESA in terms of the West Rand Bioregional Plan, published in Government Gazette 390, need to be consulted and the proposed land use needs to be aligned accordingly; • No borehole water is allowed to be used for any purpose other than schedule 1 (Permissible Uses) as defined in the National Water Act. Should the borehole water be used for any other purpose than Schedule 1	Good day Ms Stoffberg Thank you for your comments. These will be considered, and the recommendations addressed in the EIA/EMPr.	Appendix D IWWMP Section 2.2 Section 2.4.4 Section 9.2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			uses, the applicant must apply for a Water Use Licence in terms of the said act; • No new boreholes are allowed to be drilled without consent from the Department of Water and Sanitation; • The applicant must apply for all Section 21 Water Uses as defined in the National Water Act with DWS. Copies of all WULAs, as well as Water Use Licences issued in the future must be submitted to this Office for compliance monitoring and auditing purposes; • The principles of Green Infrastructure and Sustainable Urban Drainage (SUD) must be implemented for all storm water runoff areas; • Ensure compliance with the provisions contained under the National Environmental Management: Biodiversity Act (Alien and Invasive Species Regulations, 2014) regarding alien invasive species on the subject site: o Eradicate all Listed Invasive Species (Category 1a), if present o Control all Listed Invasive Species (Category 1b), if present;		

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			○ Apply for a permit for all Listed Invasive Species (Category 2), if present ○ Apply for exemption for all Listed Invasive Species (Category 3), if present; • Water conservation must be actively promoted through water-saving technologies: ○ "Water-wise" gardens with endemic and indigenous plants; ○ Water harvesting, re-use and other water conservation initiatives; ○ The applicant must comply with the provisions contained under the National Environmental Management: Biodiversity Act (Alien and Invasive Species Regulations, 2014) regarding alien invasive species on the subject site. • Onsite Package Plants that cannot guaranteed a final effluent discharge that 100% complies with the special phosphate standard of 1mg/litre are not supported; • Should the Applicant opt for a Package Plant, a WUL needs to be issued first before any construction thereof is allowed;		

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			• Detailed geotechnical assessments should be submitted. • Land affected by dolomites, assessments and/or investigations need to be undertaken in line with SANS 1936-1; SANS 1936-2; SANS 1936-3; SANS 1936-4; and SANS 633, by an experienced and qualified geologist who is registered by the Council for Geosciences. • All infrastructure and construction must comply with "The Guidelines for Consultants: Appropriate Development of Infrastructure on Dolomite" from the Department of Public Works. • All surfacing for driveways and parking areas must be permeable on slopes less than 5 %; • All waste streams generated must be managed per the hierarchy of waste management principles and disposal at an authorised landfill site must be the last option. Proof of recyclable waste must be kept on-site and made available on request. • The activities should be in line with the proposals contained in the Spatial Development Framework of the		

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			Rand West City Local Municipality and the Gauteng Environmental Management Framework. • In the event of actions that may result in significant environmental damage, an emergency response and contingency plan must be in place to limit the extent of environmental damage. • Building plans for new structures or alterations should be submitted to Rand West City Local Municipality and approved before construction. • The development shall not cause any nuisance or disturbance to neighbours, including noise levels not in excess of 7 decibels above the ambient noise level measured at any point on the property boundary.		

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5 Environmental Non-Governmental Organisations (NGOs)

5.1 Federation for a Sustainable Environment (FSE)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Mariette Liefferink, CEO Federation for a Sustainable Environment	Email Corresponded	Wednesday, 17 July 2024	Dear Vanessa, I thank you sincerely for the reminder and telephonic discussion. Since the project involves the reclamation of the Libanon TSF, beneficiation, transport of the residue by pipeline and finally the deposition of the residue on the approved Regional Tailings Storage Facility, may I recommend that project affected parties within the Libanon TSF zone of influence, pipeline route and the Regional Tailings Storage Facility's zone of influence also be notified of the project? My recommendation is actuated by recent allegations by farmers within the RTSF's zone of influence that they were not consulted on the construction and authorisation of the RTSF. Although the documentary evidence was adduced by Digby Wells Environmental and Greg Ovens that the farmers were consulted, in order to obviate similar concerns being raised in future, it may be	**Mr Greg Ovens's (Applicant) response:** Thank you for your email and suggestion Mariette, your involvement in FWGR projects is appreciated. The Libanon TSF has always been one of the assets (dumps) which would have been reclaimed as part of the West Rand Tailings Retreatment Project (WRTRP), which would have been disposed of onto the RTSF. This dump is not a new resource which is going to increase the impact/size of the RTSF to the surrounding farmers, who have already been consulted in this regard in detail. The pipelines to be used are existing authorized pipeline routes all approved as part of the WRTRP or the Pipeline Optimization Project. I am not going to be able to provide names and contact details of the farmers due to legal constraints based on the sharing of personal information. What I propose to do during the next engagement with the farmers (Hopefully first week of August) is to mention this	Section 7

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			advisable to also notify the farmers within the Cardoville area, that is within the RTSF's zone of influence. If the Applicant is agreeable, Greg will be in the position to provide you with a list of the farmers and their contact details. I take the liberty to copy Greg on this email. I have attempted to download the Scoping and EIA Reports from your website, but the website is under construction. I shall again attempt on the weekend to download the Reports. I shall much appreciate an opportunity to discuss the above project virtually. Kindly advise whether this will be possible. In anticipation, thank you sincerely.	project and provide the details of the stakeholder registration at Kongiwe, then interested persons can register if they wish to be involved with the Libanon project.	
Ms Mariette Liefferink, CEO Federation for a Sustainable Environment	Email Corresponded	Wednesday, 17 July 2024	Dear Greg, I thank sincerely you for the clarification. I am in agreement with your advice.	Dear Mariette, Thanks for the email. The report can be downloaded from https://kongiwe.com/projects/ or http://www.kongiwe.com/publicationsview/public-documents/. Please let us know if you are having any issues.	Section 7

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
				We have arranged an online meeting with you as requested.	
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink stated that she had reviewed the non-technical report and noted that the presentation emphasized what was covered in the report. She referenced a paper prepared by the Council for Geoscience and the Department of Minerals and Energy (2008) titled South Africa's Challenges to Mine Closure. The paper discusses regional mining and closure strategies and assumes that FWGR will apply for closure once the Libanon TSF is reclaimed. She mentioned that since the reclamation is expected to take 12 years, it will require a rehabilitation plan to achieve a sustainable end land use. Ms Liefferink further highlighted that the paper indicates that past TSF reclamation activities have revealed several cases where re-mining was incomplete, often due to lack of funds or the heterogeneity of the TSF.	The certification of registration, FWGR has its own Certificate of Registration (COR) that includes the Libanon TSF, and this is not related to Sibanye Stillwater. He further noted that before any activities commence on their sites, a public safety assessment is undertaken. While the necessary regulations required under the National Nuclear Regulator (NNR) have not yet been fully performed, they are in the process of being carried out. This addresses the requirements concerning NNR regulations. The full process, including surveys and all necessary actions to meet NNR requirements, are being implemented. The NNR are a commenting authority on this application. **Land Rehabilitation:** Mr Ovens expressed his intention to take Ms Liefferink to the Driefontein 5 tailings facility, where they are finalizing the footprint rehabilitation of the site. He highlighted that at that facility, they are performing concurrent rehabilitation of the footprint, known as "floor roll-up." The area has been grassed, and the land	Section 2.4.8 Section 2.5

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			Ms Liefferink inquired whether FWGR plans on re-mining the entire TSF, even if some sections are not economically profitable. She noted also that the paper suggests that if the applicant does not process the entire TSF, the reprocessing could result in creating two contaminated sites. The paper advised that granting rights and authorizations for reprocessing individual residue deposits may need to be reviewed to ensure that value extraction from a portion of a site includes reinvestment into the rehabilitation of the entire mining area. This approach aligns with what the FSE would recommend, emphasizing that benefits should be ploughed back into the entire area, not just the footprint of the remaining TSF. Regarding radioactivity, Ms Liefferink inquired whether there is a need to apply for a certificate of registration under the National Nuclear Regulatory Act or if Sibanye Stillwater currently holds such a certification. She mentioned that according to the Geoscience paper, radiometric surveys of previous reprocessed mining residue	has been restored to its correct topography. Driefontein 5 serves as a good example of their rehabilitation efforts. **Closure:** Mr Ovens explained that Sibanye is the landowner of the properties, while FWGR owns the removable assets. The agreement between them stipulates that the land where the TSF is located needs to be returned to its natural wilderness state. The same plan is currently being developed for Driefontein 3 and Libanon in the future. **Mining Uneconomical Items:** Mr Ovens acknowledged that dealing with uneconomical materials is always challenging. They have included these materials in their concurrent mining process to avoid leaving suboptimal material behind. Non-viable material is transported to nearby TSF for construction purposes. **Libanon site:**	

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			deposits have sometimes shown elevated levels of residual radioactivity in the soil, making these areas unsuitable for unrestricted development.	Mr Ovens further noted that the rock material found at the Libanon TSF will be removed by Sibanye, as FWGR does not have the infrastructure to handle rock—only slurry material. The goal for the Libanon TSF is to maintain the wilderness footprint. If there are changes in the spatial development framework within the municipality or in the closure plan related to Sibanye, FWGR will update and adjust its plans accordingly.	
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink inquired about other minerals that will be mined, as mentioned in the presentation. She asked if the applicant plans to re-mine and reclaim both gold and additional minerals.	Mr Ovens stated that their process includes the extraction silver and copper, which are associated minerals as byproducts of the gold extraction. However, uranium is not part of the minerals FWGR plans to extract from this dump.	Section 2.4.9
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink inquired whether there is a specific reason FWGR is not extracting uranium, or if it is simply no longer profitable.	Mr Ovens stated that the concentration of uranium within Libanon TSF is low. High uranium concentrations are found at the Cook TSF, and the assets associated with Rand Uranium, which are part of Sibanye's assets. The residue of uranium is minimal in the Libanon TSF.	N/A
Ms Mariette Liefferink, Chief Executive Officer, Federation for	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink stated that after the reclamation assessment, an application for a closure certificate will be required. Regulation 56 of the MPRDA regulations requires that land be rehabilitated as closely as practicable to its	Ms Wilreker acknowledged the report, noting that Sibanye has outlined its requirements for rehabilitation. She emphasized that while FWGR must adhere to these requirements, they should also consider Ms Liefferink's advice on what constitutes	Section 2.4.8

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Sustainable Environment			natural state or to a pre-determined or agreed-upon standard or land use that conforms to the principles of sustainable development. According to the scoping report, the predetermined land use is designated as wilderness status. Ms Liefferink expressed concerns about this designation, emphasizing that any future land use must adhere to sustainable development principles, including the provision of sustainable livelihood opportunities. She referenced the work of Carin Bosman and Professor Louis Kotze from North-West University, which suggested that closure and rehabilitation objectives should include, from a generic perspective, the following immediate harm to human health or safety must be eliminated; ground and surface water must be suitable for current and future use. Additionally, risks to vegetation must be eliminated, and soil must be suitable for current and future land use. Ms Liefferink noted that Isabel Weiersbye of Wits University concurs with these principles and argues that measures such as sloping,	sustainable land use. Ms Wilreker suggested that this issue could be further discussed between FWGR and Sibanye to explore possibilities for improved end land use.	

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			grassing, wilderness status, revegetation, woodlands, and stockpiling material are insufficient for effective remediation and mine closure. She highlighted these concerns based on observations that, after a TSF has been reclaimed, the land often becomes sterile and lacks sustainable livelihood opportunities. Therefore, she stressed that the land should be rehabilitated to a predetermined and agreed standard or land use, that is, that future land use should be agreed upon with interested and affected parties, particularly the neighbouring communities who may be impacted.		
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Wilreker asked Mr Ovens about FWGR's position regarding the end land use. She further suggested that he should consult Tharina, who leads closure projects at Sibanye Stillwater.	Mr Ovens stated that FWGR is in a challenging position as a smaller player focused on removing the mine dam. He mentioned that, to his knowledge, Sibanye has planned various projects, such as farming initiatives and solar plants, as part of their closure strategy. However, he is not fully informed about the specific plans for the Libanon area. Mr Ovens acknowledged Ms Liefferink's valid concerns and committed to consulting with Tharina (Sibanye Stillwater), who leads the closure efforts, to determine the regional closure plans for that area. He assured that	Section 2.4.8

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				FWGR will ensure alignment with these plans, whether the area is designated as wilderness or requires grassing and other rehabilitative measures.	
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink mentioned that she is part of of Prof. Elize van Eeden and Tharina's engagement team as an associate researcher at North-West University, focusing on tourism as a sustainable future land use for the Far West Rand and West Rand. She is also well-acquainted with the Bokamoso Barona project. She suggested that it would be beneficial to include in the application, detailed proposals for future land use and assess whether they align with the principles of sustainable development and sustainable livelihood opportunities. She noted that simply designating the area as wilderness is too generic.	Mr Ovens acknowledged Ms Liefferink's opinion and agreed to further engage on the matter, promising to return with additional information. He suggested that they can leave the discussion as it stands for now and aim to provide more detailed information during the EIA phase, at which point they can discuss it further.	Section 2.4.8
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink sought to confirm whether her assumptions were correct regarding the need for authorization. She inquired if the following still requires authorization: • The 600mm pipeline for process water from Kloof Shaft 10	Mr Ovens confirmed that some of the elements are already authorized. Specifically, the pipeline routes addressed in the Pipeline Optimization Project, which Ms Liefferink was involved in, were managed through Digby Wells Environmental. The Environmental Authorization application for this project has been submitted to the DMRP and is expected to receive a record of decision within about a month, hopefully with	Section 2.4

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			• The 550mm pipeline connecting to the slurry pipeline at Driefontein 2 plant • The 11 kV overhead powerline • The administration buildings • The access road • The contractor's yard She asked whether her understanding was accurate or if some of these elements were already authorized or existing.	a positive outcome. The project will use these optimized pipeline routes. If the authorizations are not favourable, alternative existing pipelines authorized under the regional West Rand tailing retreatment projects could be used, although they are less economical and efficient. Regarding the other infrastructure, Mr Ovens stated that there are NEMA-listed activities that are triggered, which is why they are undertaking this process. However, not all infrastructure such as the powerlines, necessarily trigger specific authorizations but are included as part of the project scope and describe the activities on the site.	
Ms Gerlinde Wilreker, Project Manager (EAP), Kongiwe Environmental (Pty) Ltd	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Wilreker noted that the powerlines do not meet the threshold for listed activities; however, their description is included to provide a comprehensive overview of all expected infrastructure on site. She mentioned that there are existing roads around the TSF, which are relevant from an access perspective. The intention of including all these details is to ensure stakeholders are fully informed about the activities and infrastructure on the site.	Ms Liefferink noted the comment.	Section 2.4

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Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink referred to Prof. Frank Winde's desktop assessment titled "Risk for basement structures of buildings of Standard Bank and Absa in Central Johannesburg to be affected by rising mine water levels in the Central Rand" in which he pointed out that when reclaiming an existing tailings storage facility, the associated contribution to ingress is likely to be considerable as old tailings are hydraulically mined using high-pressure water cannons. This introduces large volumes of additional water into highly disturbed areas. She assumed that the water used to produce the slurry might be of poor quality, potentially increasing acid mine drainage. She asked whether this issue would be assessed during the specialist study.	Ms Wilreker confirmed that the issue will be addressed as part of the groundwater modelling process that will be conducted.	Appendix D3
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink commended Kongiwe for including a glossary in the document to facilitate understanding of the terminology. She acknowledged Kongiwe's commitment to complying with the POPIA Act and informed them that they may use the FSE's and her information. However, she emphasized the importance of documenting criticisms to provide evidence of active participation in the	Ms Wilreker explained that in the comments and response report, would have the details of the dates of consultations, the types of consultations, and all comments raised, emails received are reviewed, and their content is incorporated into the comments and response report. This report is then submitted to the DMRP. While POPIA allows for this process, the documents released to the public will not include email addresses or personal contact information. Instead,	Appendix C

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			process, especially for interested and affected parties who have not contributed. She requested that her name, contact details, and those of FSE be included in the report.	without disclosing personal details, the Comments Consultation and Response Report (CRR) will list all consultations with different parties, including their names and affiliations.	
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink inquired about the distance between the regional storage facility and the Libanon facility. She clarified that she is asking because Mr Ovens mentioned that excess water would be pumped from the regional tailing's storage facility for use in the Libanon reclamation, which is why she needs to know the distance.	Mr Ovens stated that the distance is approximately 27 kilometres.	N/A
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink asked to confirm if the lifespan of the reclamation is 12 years.	Mr Ovens confirmed that the 12-year timeframe includes the entire process from initiation to closure. The actual reclamation work may only take a portion of those 12 years.	Section 2.2
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink stated that she assumes all those pipelines will be authorised within that 12-year timeframe.	Mr Ovens agreed with Ms Liefferink.	Section 2.4

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink extended an invitation to anyone interested in visiting Sand Dump 20, which is part of Sibanye Stillwater's reclamation operations. She noted that the dump has been under reclamation for 20 years and is still not complete. This extended period highlights the challenges of rehabilitating such a footprint, particularly because the area was historically a wetland. The visit could provide valuable insights into both the reclamation process and the challenges associated with using the footprint.	Mr Ovens acknowledged that Sand Dam 20 presents significant challenges due to its location and past mismanagement. He expressed hope that the visit would offer insights into different reclamation scenarios. He noted that their current mine TSFs are situated in different locations from Dump 20, none are in wetlands, streams, or areas with substantial runoff, which complicates reclamation. He mentioned that Ms Liefferink would observe the advantages of the topography at Driefontein 5, where the slope of the land facilitates reclamation, contrasting with the difficulties faced at Sand Dam 20.	N/A
Ms Mariette Liefferink, Chief Executive Officer, Federation for Sustainable Environment	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink requested ongoing engagement with interested and affected parties throughout the project. She noted that the West Rand Treatment Project, which was authorized in 2017, experienced time lapses that led to concerns and grievances. She urged that the applicant and its consultants must ensure that the interested and affected parties are kept informed throughout the entire process.	The project team agreed to keep interested and affected parties informed throughout the process. Mr Ovens emphasized that they are learning from past mistakes and are committed to improving communication moving forward.	Section 7 Appendix C
Ms Mariette Liefferink, Chief	MS Teams Online Meeting	Thursday, 01 August 2024	Ms Liefferink pointed out that institutional memory can be an issue when it is lost, as this	Ovens agreed with Ms Liefferink.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Executive Officer, Federation for Sustainable Environment			can lead to significant problems. She emphasized the importance of maintaining thorough records and documentation within institutions to avoid setbacks and ensure continuity.		

6 Key Stakeholders and Interested and Affected Parties (I&APs)

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Mr Jeremiah Matsobane Ramokgoatedi, Merafong Dolomite Risks CS Group Coordinator	Written comments	Friday, 12 July 2024	**Mr Ramokgoatedi stated the following via the Kongiwe Stakeholder Registration and Comment Form**: 1. Protecting human lives and the environment must be incorporated in all reclamation aspects. 2. Create local employment opportunities.		Section 8.11 Section 9.3.6 Appendix D
Mr Sinethemba Ngwiqi, Ward Officer, Rand West City Local Municipality	Written comments	Wednesday, 24 July 2024	The project should provide opportunities for skill acquisition and personal growth and people who must be considered for recruitment workers and SMME's first preference should be given to		Section 8.11.8 Section 9.3.6

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			people who reside in Libanon and nearby areas will follow.		
Mr Lazarus Molebatsi, Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26	Written Comments	Thursday, July 25, 2024	**Mr Molebatsi stated the following via the Kongiwe Stakeholder Registration and Comment Form:** 1. The Global Industry Standard on Tailings Management should form point of reference for all processes. 2. Safety First Guideline for responsible Mine Tailings Management.		Appendix E
Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation	MS Teams Online Meeting	Wednesday, 24 July 2024	Ms Bhele inquired about the source of water that will be used for this project.	Ms Wilreker stated that the water will be sourced from Kloof shaft 10 and pumped back to the Regional Tailing Storage Facility (RTSF).	Section 2.4
Ms Xolelwa Bhele, Environmental Officer Specialised	MS Teams Online Meeting	Wednesday, 24 July 2024	Ms Bhele asked if the water use licence application had started yet and if it has, who is the assessor for this application?	Ms Wilreker stated that Kongiwe has started the eWULA process. It is in the pre-application phase and has received a reference number (WU37611). However, a case officer has not been assigned yet.	Section 2.2.1

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Production, Department of Water and Sanitation					
Ms Xolelwa Bhele, Environmental Officer Specialised Production, Department of Water and Sanitation	MS Teams Online Meeting	Wednesday, 24 July 2024	Ms Bhele asked if Kongiwe would be interested in presenting this project to the forum on the 3rd of September 2024.	Ms Wilreker said that Kongiwe would be interested in presenting this project at the forum on 3rd September 2024.	Appendix C
Mrs Londolani Mutshekwa, Mine Water Management, Department of Water and Sanitation	MS Teams Online Meeting	Wednesday, 24 July 2024	Mrs Mutshekwa inquired about the lifespan of the project and if there was going to be a deposition within the mine void of the project.	Ms Wilreker stated that the lifespan of the project will be 12 years. She further indicated that the slurry that would be processed at the plant would be deposited on the authorised Driefontein RTSF.	Section 2.4
Mrs Londolani Mutshekwa, Mine Water Management, Department of	MS Teams Online Meeting	Wednesday, 24 July 2024	Mrs Mutshekwa asked if the Libanon TSF was existing or new.	Ms Wilreker stated that it is an existing Tailings Storage Facility.	Section 2

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Water and Sanitation					
Mr Anele Saba, Ward Councillor, Ward 25, Rand West City Local Municipality	Open Day	Saturday, 27 July 2024	Mr Saba welcomed Kongiwe and all the attendees. He stated that he would share the information with the community after Gerlinde Wilreker's presentation on the proposed Reclamation of the Libanon Tailings Storage Facility. Mr Saba noted that he had encountered similar projects before, including one proposed by an Australian company and expressed satisfaction that the project is now moving forward, with hopes of generating job opportunities. However, he raised concerns about dust and beneficiation: 1. **Dust:** Mr Saba inquired about the environmental impact study related to dust. He mentioned that, due to the impacts of dust, previously, a hostel was demolished as part of the Sibanye closure. Currently, there are two communities and farmers residing near the Libanon TSF who might be affected by dust during the project operation. He requested information on the measures that	Mr Ovens reported that, to his knowledge, the Australian company is still interested in the tailings on the Randfontein side towards Soweto. The tailings on the Libanon Rand West side are owned by Far West Gold Recoveries (FWGR), which it acquired from Sibanye. He mentioned that the removal of these tailings dams TSFs) is part of the mine closure process, intended to address their environmental and social impacts and return the land to its natural state, given that no further development is planned for the area. He expressed that the purpose of the project is to address both social and environmental impacts, as well as to extract economic benefits, particularly gold, to support the continuation of the business. In terms of beneficiation, Mr. Ovens stated that FWGR currently employs about 180 people, including members from West Rand communities. He noted that if the TSFs are not removed, these employees could lose their jobs. Mr Ovens explained that the proposed project is a continuation of an existing tailings retreatment operation. The process involves replacing one TSF with	Section 8.11 Section 9.3.6 Appendix D

Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			will be implemented to manage dust throughout the project. 2. **Beneficiation:** Mr Saba indicated that given that mine closure impacts the Libanon community, He questioned the beneficiation approach concerning job opportunities. He further wanted to understand how the project will address job creation and other benefits for the local community.	another, with the same team moving from one TSF to the next. While it will continue to provide jobs for those currently working on the TSFs, there will also be smaller job opportunities as operations shift to different areas. Ms Wilreker added that a specialist will be consulted to provide recommendations on air quality. One of the recommendations is to keep the area of disturbance as small as possible and to use water to minimize dust. Mr Ovens further stated that dust monitors will be installed in and around the TSFs to measure dust levels. The project will adhere to dust control regulations established by the Department for Environmental Affairs, ensuring that dust emissions do not exceed acceptable levels. Although silicosis is not a significant issue in surface mining, any problems that arise will be addressed through a claims process available to the community.	
Mr Anele Saba, Ward Councillor, Ward 25, Rand West City Local Municipality	Open Day	Saturday, 27 July 2024	Mr Saba expressed dissatisfaction with the current approach to community benefits, noting that community members, who are directly affected by the tailings, are also among those who are unemployed. He emphasized that FWGR needs to ensure that the local community is	The project team noted the concern.	Section 8.11 Section 9.3.6

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			actively involved in and employed through the project. He further stated there should be a clear strategy to demonstrate that residents are given opportunities to participate in and benefit from this project.		
Mr Anele Saba, Ward Councillor, Ward 25, Rand West City Local Municipality	Open Day	Saturday, 27 July 2024	Mr Molebatsi suggested that community engagements should involve all members of the community. He emphasized that projects should be discussed in the Sibanye Community Engagement Forum to ensure broad participation. He also noted that he did not receive an invitation to the current engagement, highlighting a need for improved communication and inclusivity in such meetings.	Mr Saba stated that Kongiwe's approach was appropriate. He said that the ward councillors present at the meeting represent each ward and will be responsible for disseminating the information to their respective communities.	Section 7 Appendix C
Mr Lazarus Molebatsi, Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26	Open Day	Saturday, 27 July 2024	Mr Molebatsi mentioned that FWGR is not represented in their forums and noted that Sibanye should have informed them about these forums.	Mr Ovens thanked Mr Molebatsi for raising the issue and clarified that FWGR is not affiliated with Sibanye. He emphasized that the public participation process is ongoing and that Kongiwe is still in the early stages. He gave the assurance that there will be further consultations and that other community members not currently present will be considered. Mr Ovens offered to engage with Sibanye and convey the community's concerns to them.	N/A
Mr Lazarus Molebatsi,	Open Day	Saturday, 27 July 2024	Ms Stefane stated that the beneficiaries from Ward 25 would be directly affected by the mine	The project team noted the comment.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26			operations and emphasized that representatives from outside of Ward 25 should not be speaking on behalf of Ward 25.		
Ms Thandokazi Stefane, PR Councillor Ward 25, Rand West City Local Municipality	Open Day	Saturday, 27 July 2024	Mr Ratsoeu raised concerns about the environmental, social, political, and health impacts of the mining operations that took place over the past 30 years. He highlighted that the community has not seen significant benefits from these projects and criticized the Department of Mineral Resources and Petroleum (DMRP) for its lack of action on compliance issues. He noted that people are suffering from silicosis and expressed widespread dissatisfaction with the mining impacts. Mr Ratsoeu emphasized that the community is exhausted by the situation and needs concrete action rather than just discussion.	Mr Ovens stated that FWGR entered the mining business only recently in 2018, and therefore he cannot address past mining issues. However, he expressed a willingness to work collaboratively with the community moving forward.	Section 8.11 Section 9
Mr Ramadibeng Father Ratsoeu, Dep Admin, Community Engagement	Open Day	Saturday, 27 July 2024	Mr Ngwiqi thanked Kongiwe for informing them about the project and expressed satisfaction with the willingness to address the environmental impact of dust.	Mr Ovens noted the comment.	Section 8.11 Section 9.2 Section 9.3.5

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Forum (Sibanye Stillwater), Ward 32			He emphasized the importance of ensuring that residents receive job opportunities. While he is not opposed to FWGR bringing in its skilled workers, he raised concerns about potential conflicts if the community sees unfamiliar faces. He stressed that the initial beneficiaries should be from the Ward 25 community. Mr Ngwiqi also highlighted that different forums may present various viewpoints, which could potentially delay the project. He urged FWGR to find ways to empower the local community by providing them with skills transfer that would make the community members employable both during and after the project's lifespan.		
Mr Sinethemba Ngwiqi, Ward Officer, Ward 25, Rand West City Local Municipality	Open Day	Saturday, 27 July 2024	Mr Saba revisited the purpose of the project and advised attendees to look carefully at Kongiwe's presentation and address any differences after the meeting. He stated that they have reviewed and commented on the presentation and are satisfied with the rehabilitation approach, specifically the goal of restoring the natural topography for future development. He indicated that they would relay this information to their respective	The project team noted the comment.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
			ward communities and encourage participation in future meetings. He stated that they plan to discuss internally and return with proposed solutions. He mentioned that the next meeting of the proposed project would be to address the beneficiation from the project.		
Mr Lazarus Molebatsi, Convener, Community Engagement Forum (Sibanye Stillwater), Ward 26	Open Day	Saturday, 27 July 2024	Mr Molebatsi clarified that his concerns were not specifically about this project but rather about mine TSFs in general, with the aim of enforcing compliance among mining companies. His primary concern is safety. He suggested that FWGR should align their safety standards with global standards. For the next meeting, Mr Molebatsi requested the following: 1. Third-Party Audit 2. Multilateral Agencies: Inclusion of relevant multilateral agencies and Benchmark Foundation on board to ensure comprehensive oversight. 3. FSC	The project team noted the comment.	Section 7
Ms Gerlinde Wilreker, Project	Open Day	Saturday, 27 July 2024	Ms Wilreker requested that attendees distribute the non-technical report to their communities.	All attendees noted.	N/A

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Stakeholder	Consultation Method	Date of Comments Received	Issues Raised	Response to issues as mandated by the Applicant	Section Reference in the Report
Manager, Kongiwe Environmental (Pty) Ltd			She asked that any comments or queries be forwarded to stakeholder@kongiwe.com, where they will be recorded on the Comments and Response Report (CRR).		
Ms Mukondeleli Makoya	Email Correspondence	Friday, 30 August 2024	Kindly register Mukondeleli Makoya as an interested and affected party for the above-mentioned project. Kindest Regards,	Dear Ms Makoya Thank you for your email, we have registered you on the Libanon Project as a I&AP. Kind Regards	Section 7
Mr David Mayaba, Ward Committee Member: Ward 25	Email Correspondence	Thursday, 24 October 2024	Good day all, Hope this find you well, we are requesting a meeting on the above matter as a delegation that was selected by the community of Venterspost. Your response to us will be highly appreciated Regards	Dear David Mayaba Thank you for your email. We will set up a meeting as requested with the Venterspost delegation during the EIA Phase public consultation. Please note this will only be in early 2025. We will liaise with you for a suitable date.	Section 7

Appendix D
Wetland Impact Assessment Report

THE AQUATIC BIODIVERSITY COMPLIANCE STATEMENT FOR THE PROPOSED FWGR LIBANON RECLAMATION PROJECT

Gauteng Province, South Africa

07/08/2024

Prepared by:

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Report Name	**THE AQUATIC BIODIVERSITY COMPLIANCE STATEMENT FOR THE PROPOSED FWGR LIBANON RECLAMATION PROJECT**
Specialist Theme	Aquatic Biodiversity Theme
Project Reference	FWGR – Libanon Reclamation Project
Report Version	07/08/2024
Environmental Assessment Practitioner	KONGIWE
Fieldwork & Report Writer	Divan van Rooyen (SACNASP 151272) 
Reviewer	Rowan Buhrmann (SACNASP Pr Sci Nat 136853) 
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to complete an Aquatic Biodiversity compliance statement for the proposed FWGR Libanon Reclamation Project, located approximately 2 km west of the town of Westonaria, in the Rand West City Local Municipality, Gauteng, South Africa. The proposed FWGR Libanon Reclamation Project was given a 500 m buffer and is referred to as the Project Area of Influence (PAOI; Figure 1-1). In addition, a map highlighting the project components are shown in Figure 1-2.

This assessment has been completed in accordance with the requirements of the published General Notice (GN) 4167 by the Department of Water and Sanitation (DWS) (previously GN 509 of 2016 and GN 3139 of 2023). The said notice was published in the Government Gazette (no. 49833) under Section 39 of the National Water Act (Act no. 36 of 1998) in December 2023, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 4167 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a General Authorisation (GA), as opposed to a full Water Use Licence Application (WULA). A water use (or potential) qualifies for a GA under GN 4167 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM), provided the identified risks are all considered a low risk, and the applicant is listed under Appendix D1 or Appendix D2 of the same notice. This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020): “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, when applying for Environmental Authorisation” (Reporting Criteria). The National Web based Environmental Screening Tool has characterised the aquatic theme sensitivity as “Low” for the Project Footprint (Figure 1-3). Figure 1-3 is a map created to show the screening tool of the FWGR Libanon Reclamation Project. Section 3.4 confirms the site sensitivity.

The purpose of conducting the specialist study is to provide relevant input into the overall Environmental Authorisation application process, with a focus on the proposed project activities and their associated impacts. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Registered Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making as to the ecological viability of the proposed project.

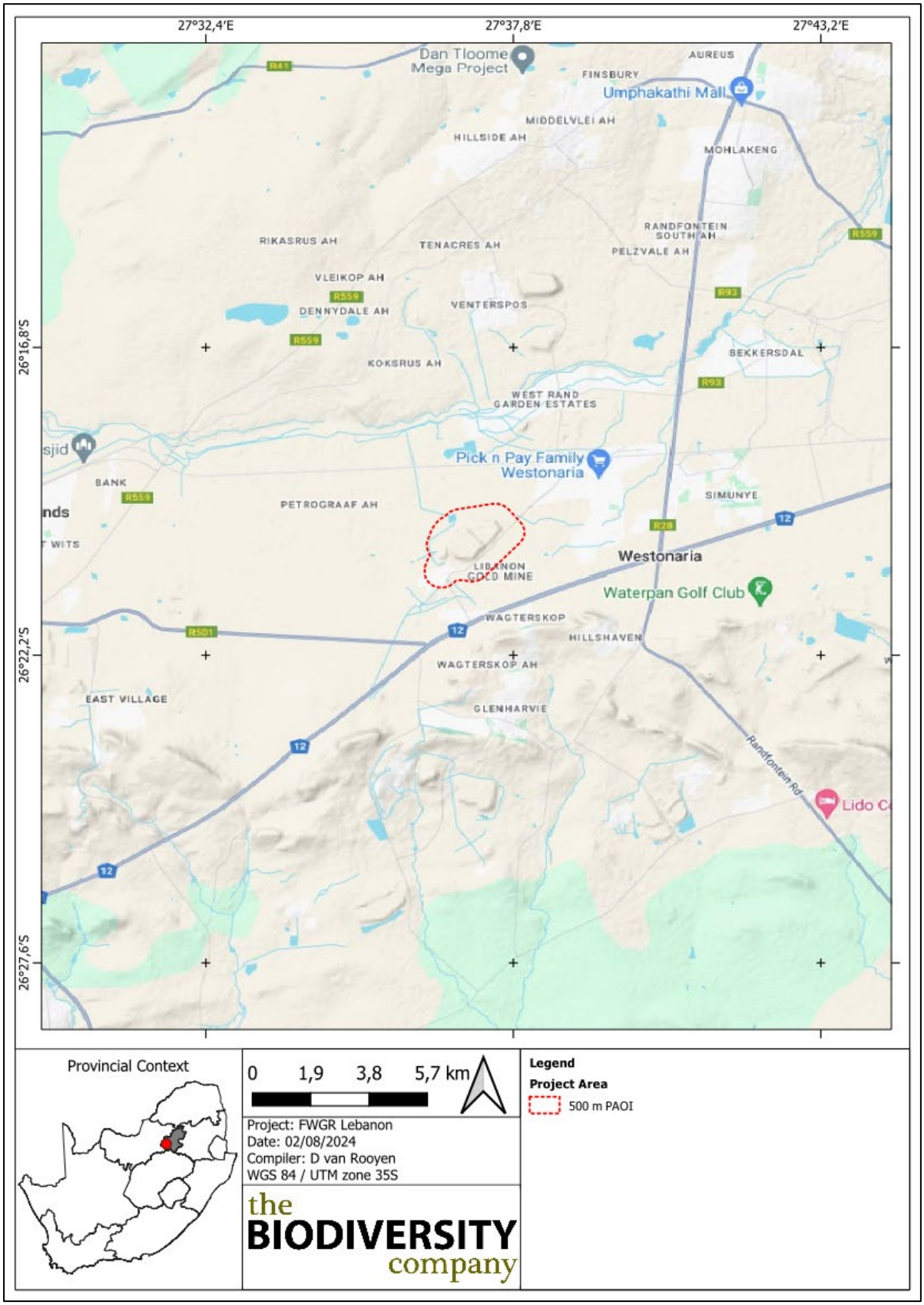


Figure 1-1 The Project Area of Influence in proximity to the nearby towns

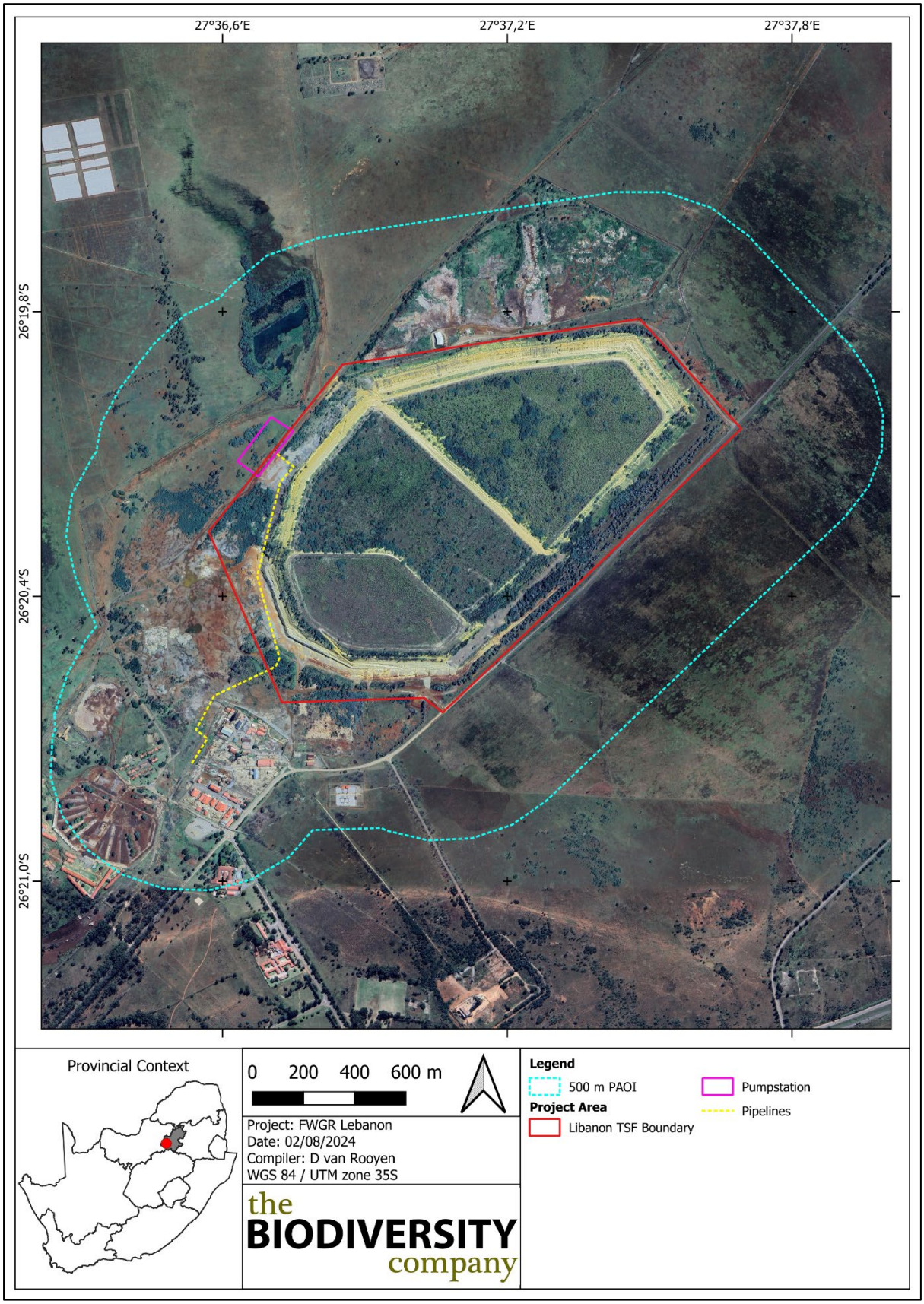
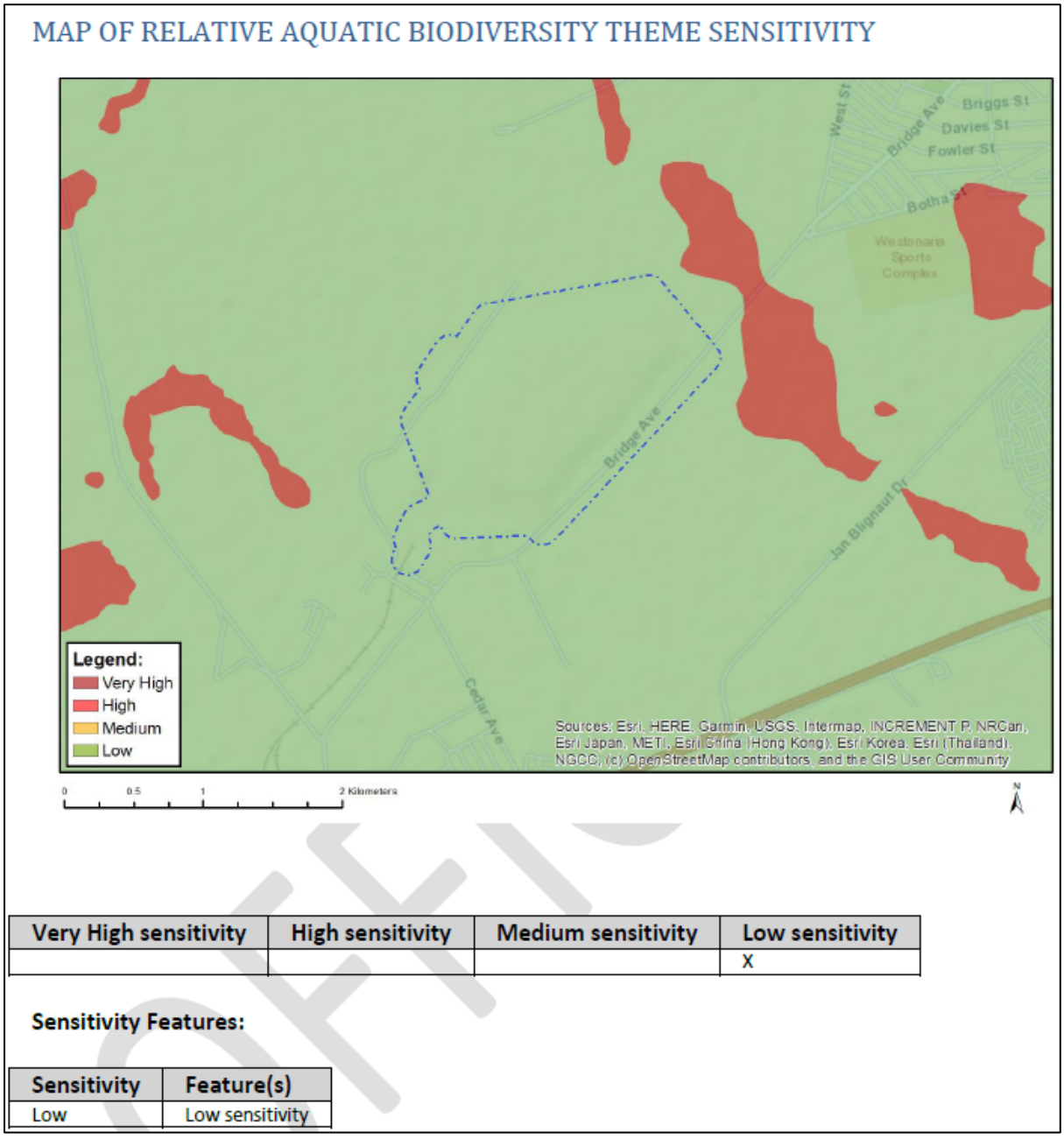


Figure 1-2 Map of Project Components for FWGR Libanon Reclamation Project



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

Figure 1-3 The aquatic biodiversity theme sensitivity for the FWGR Libanon Reclamation Project

1.2 Project Description

Far West Gold Recoveries (Proprietary) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSF are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto the Regional Tailings Storage Facility (RTSF) (Kongiwe, 2024).

FWGR plans to reclaim and reprocess gold residues from the Libanon TSF, with slurry processed at the Driefontein No. 2 Plant and or other gold plants located in the Kloof area. The necessary infrastructure includes pump stations, process water from Kloof Shaft 10#, pollution control paddocks, access roads, laydown areas, and powerlines. The TSF is located about 2 km west of Westonaria in the Rand West City Local Municipality. Existing pipelines and roads will be used, with new 4m wide

gravel roads constructed where necessary. The reclamation will require 3kVA of electricity from Eskom and potable water from Rand Water Board or the Municipality. The project is expected to last approximately 12 years, pumping an estimated 600,000 tons/month of slurry to the Plant for beneficiation (Kongiwe, 2024).

The reclamation method will employ top-down hydraulic reclamation, using high-pressure water cannons to create a slurry from the tailings, which will then be processed for gold extraction to the plant. Once reclamation is complete, the area will be assessed for contamination, with necessary remediation followed by land levelling and returning the land to its original topography. This project aims to remove a pollution source, aiding in the rehabilitation of the mining legacy in the area (Kongiwe, 2024).

1.3 Legislative Framework

In line with the protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity, as per Government Notice 320 published in terms of NEMA, dated 20 March 2020: “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, when applying for Environmental Authorisation” – the following has been assumed:

An applicant intending to undertake an activity identified in the scope of this protocol on a site identified on the screening tool as being of:

“Low Sensitivity” for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.

Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” aquatic biodiversity sensitivity, and it is found to be of a “low” sensitivity, an Aquatic Biodiversity Compliance Statement must be submitted.

An Aquatic Biodiversity Compliance Statement must contain the information as presented in Table 1-1 below.

Table 1-1 Aquatic Biodiversity Compliance Statement information requirements as per the relevant protocol, including the location of the information within this report

Information to be Included (as per GN 320, 20 March 2020)	Report Section
contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae	7
a signed statement of independence by the specialist	7.1
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment	2 / 3.3
a baseline profile description of biodiversity and ecosystems of the site	3.3
the methodology used to verify the sensitivities of the aquatic biodiversity features on the site including the equipment and modelling used where relevant;	2
where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr	N/A
a description of the assumptions made as well as any uncertainties or gaps in knowledge or data	2.9
any conditions to which this statement is subjected	N/A

A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

2 Methodology

A site visit was conducted on 5th of August 2024, which is considered a suitable (dry) season to undertake a freshwater assessment.

2.1 Identification and Mapping

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 2-1. The outer edges of the wetland areas were identified by considering the following four specific indicators:

The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;

The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.

The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);

The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation; and

The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

Vegetation is used as the primary wetland indicator. However, in practice the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

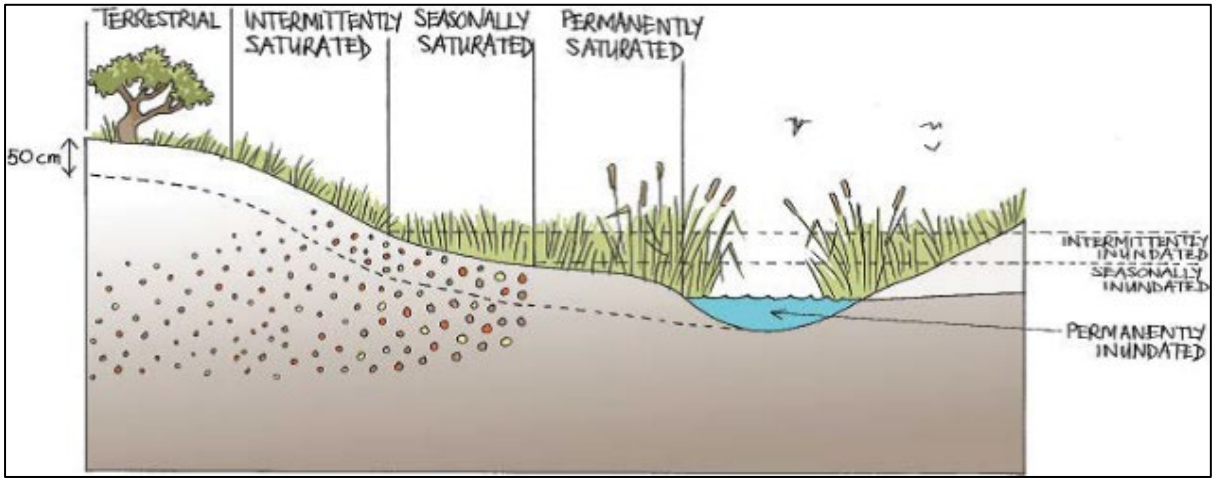


Figure 2-1 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al. 2013)

The DWAF (2005) manual separates the classification of watercourses into three (3) separate types of channels or sections defined by their position relative to the zone of saturation in the riparian area. The classification system separates channels into:

those that do not have baseflow ('A' Sections);

those that sometimes have baseflow ('B' Sections) or non-perennial; or

those that always have baseflow ('C' Sections) or perennial.

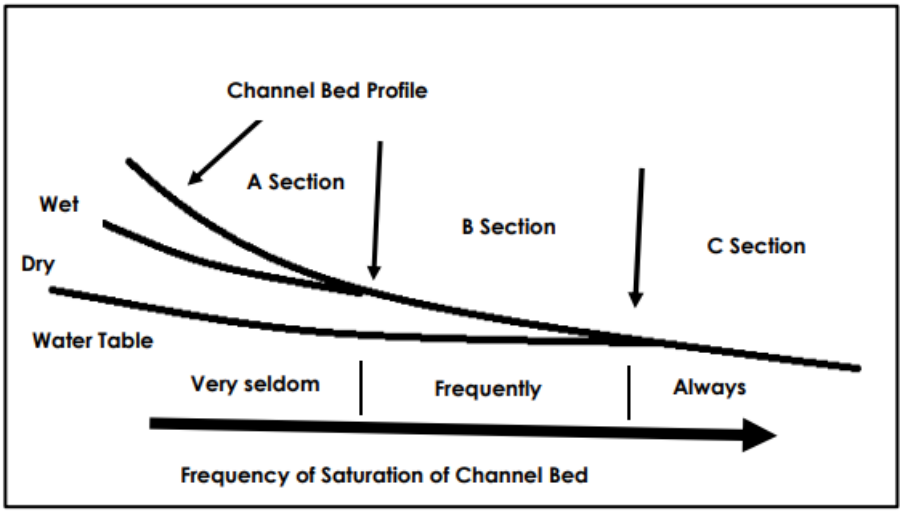


Figure 2-2 The watercourse classifications (DWAF, 2005)

2.2 Ecological Classification and Description

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) will be considered for this study. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, and then also includes structural features at the lower levels of classification (Ollis *et al*., 2013).

2.3 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands as well as humans. Eco Services serves as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze *et al*. 2008). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 2-1).

Table 2-1 Classes for determining the likely extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

2.4 Present Ecological Status

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 Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 2-2.

Table 2-2 The Present Ecological Status categories (Macfarlane, et al., 2008)

Impact Category	Description	Impact Score Range	PES
None	Unmodified, natural	0 to 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.	1.0 to 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.	2.0 to 3.9	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	Seriously Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	E
Critical	Critical Modification. The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	F

2.5 Importance and Sensitivity

The importance and sensitivity of water resources is determined to establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category as listed in Table 2-3.

Table 2-3 Description of Importance and Sensitivity categories

IS Category	Range of Mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	**A**
High	2.1 to 3.0	**B**
Moderate	1.1 to 2.0	**C**
Low Marginal	< 1.0	**D**

2.6 Recommended Ecological Category and Recommended Management Objective

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) was determined based on the results obtained from the PES and ecological IS of the assessed wetlands, with the objective of recommending how a water resource should be managed. This is achieved by either maintaining or improving the ecological integrity of the wetland in order to ensure continued ecological functionality (DWA, 1999).

Table 2-4 Recommended Ecological Category (REC) and Recommended management objectives (RMO) scores

			Ecological Importance and Sensitivity			
			Very High	*High*	*Moderate*	*Low*
PES	*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

2.7 Buffer Requirements

The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane *et al*., 2014) was used to determine the appropriate buffer zone for the proposed activity.

2.8 Risk Assessment

The Department of Water and Sanitation (DWS) risk matrix assesses impacts in terms of consequence and likelihood. The significance (product of the likelihood and consequence) of the impact is then rated according to Table 2-5.

Table 2-5 Significance ratings (DWS, 2016)

Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s)impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

2.9 Limitations

The following limitations should be noted for the assessment:

The assessment area was based on the spatial file provided by the client and any alterations to the development area may affect the results;

No functional assessment was undertaken due to all watercourses being artificial;

The GPS used for delineations is accurate to within five meters. Therefore, the delineation plotted digitally may be offset by at least five meters to either side; and

The seasonality of the site survey is not considered to be a limiting factor for this project.

3 Receiving Environment

3.1 South African Inventory of Inland Aquatic Ecosystems

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) wetland dataset is a recent outcome of the National Biodiversity Assessment (NBA, 2018) and, was a collaborative project by the South African National Biodiversity Institute (SANBI) and the Council for Scientific and Industrial

Research (CSIR). The SAIIAE dataset provides further insight into wetland occurrences and extents building on the information from the NFEPA, as well as other datasets. One wetland system was identified within the 500 m regulated area of the FWGR Libanon Phase 2 Expansion project (see Figure 3-1). This wetland was identified as a Unchannelled valley-bottom (UVB) wetland. Furthermore, the project components (TSF, pipeline or pumpstation) does not traverse any of the identified SAIIAE systems.

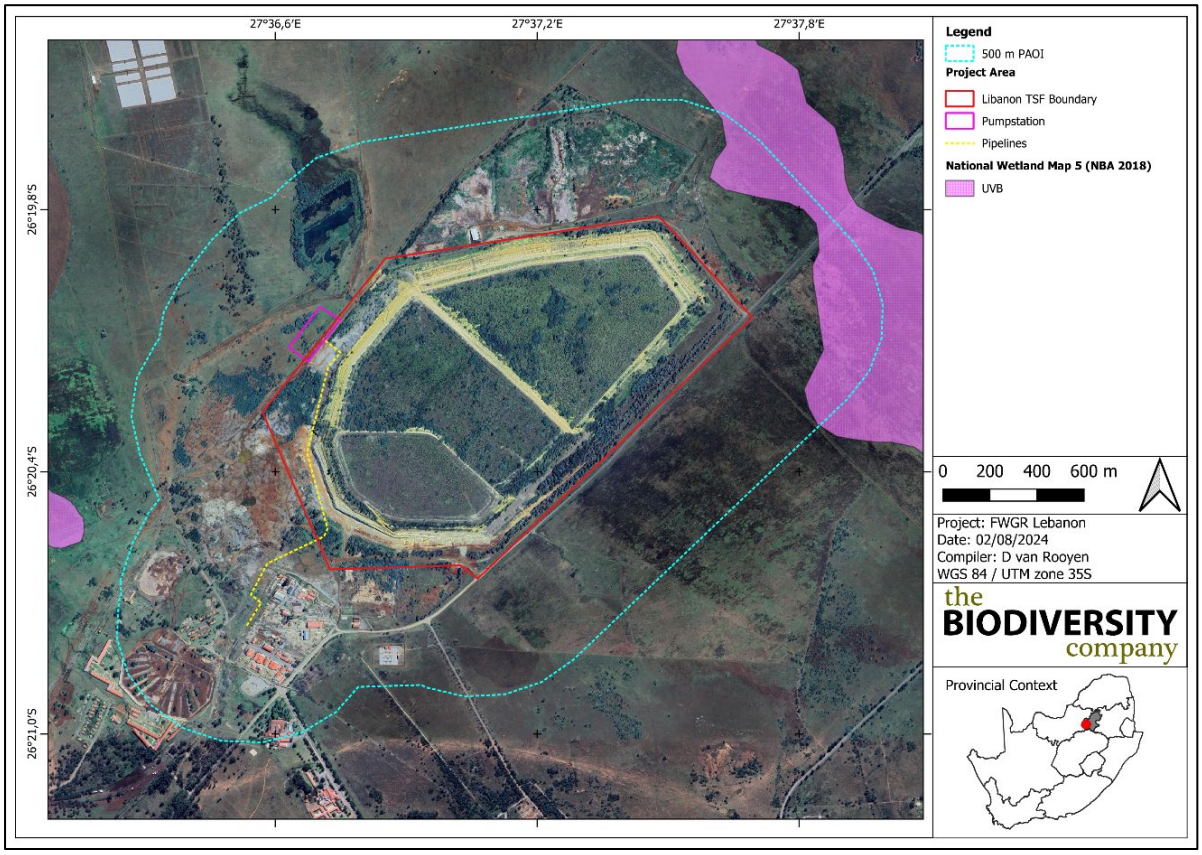


Figure 3-1 South African Inventory of Inland Aquatic Ecosystems for the FWGR Libanon Reclamation Project

3.2 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach to the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the National Water Act (Act 36 of 1998) (NWA). This directly applies to the NWA, which feeds into Catchment Management Strategies, water resource classification, reserve determination, and the setting and monitoring of resource quality objectives (Nel *et al*., 2011). The NFEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the biodiversity goals of the National Environment Management Biodiversity Act (NEM:BA) (Act 10 of 2004), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act (Nel *et al*., 2011). Multiple NFEPA wetland systems (UVB and seep wetlands) are located within the 500 m regulated area of the FWGR Libanon Reclamation Project (see Figure 3-2). In addition, the boundary of the Libanon TSF traverse two small seep wetlands. Furthermore, these wetlands are all classified as artificial, unclassified wetlands. All artificial wetlands were classified with a condition within the "Z3 – Less than 25% natural land cover remaining" category, as per the dataset.

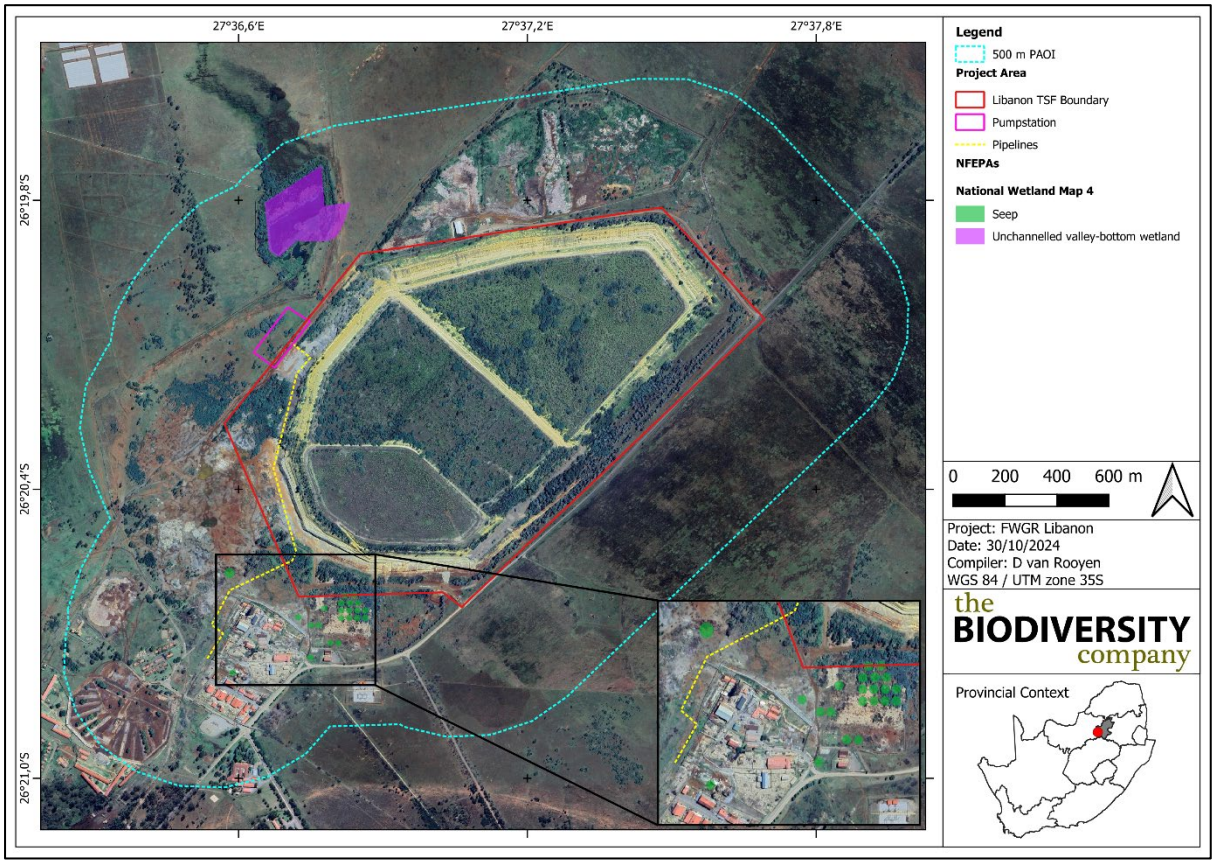


Figure 3-2 NFEPA Wetlands in the FWGR Libanon Reclamation Project

3.3 Survey Results

The water resources were delineated in accordance with the DWAF (2005) guidelines. A site visit was conducted on the 5th of August 2024, this would constitute a dry season survey. The development area was traversed on foot, with numerous checks being undertaken to identify any soil wetness indicators, and to determine the local soil forms.

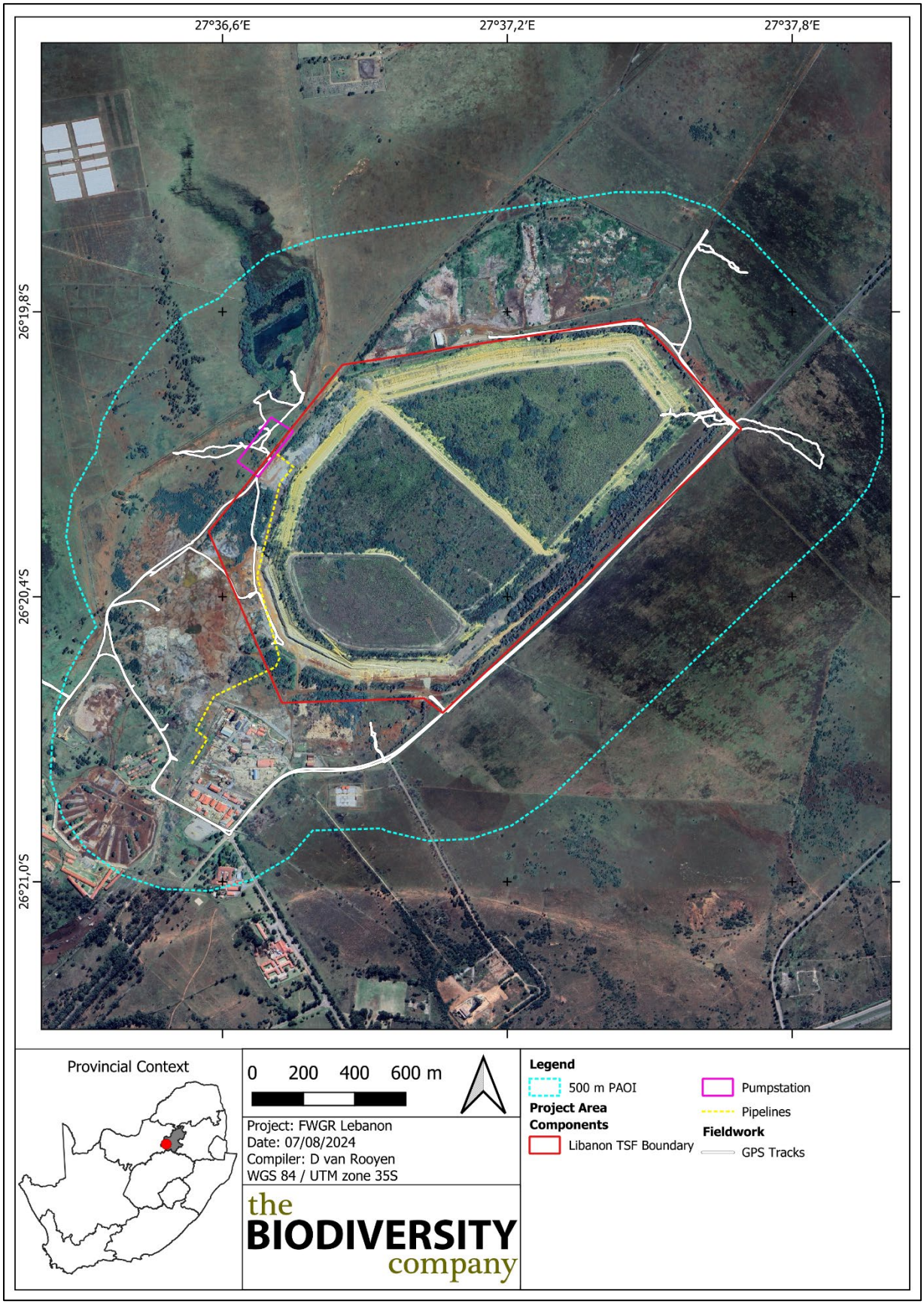


Figure 3-3 GPS tracks

During the site visit numerous artificial wet areas, which were created by mining infrastructure, were identified within the project area of influence. These include artificial seepage from biodam, canal and aboveground pipeline, disturbed areas with hydrophyte vegetation, artificial channels, an artificial canal, and a biodam (Figure 3-4 & Figure 3-6; Table 3-1). Furthermore, no natural wetlands or rivers were identified within the 500 m PAOI and does not coincide with what the desktop datasets (SAIIAE and NFEPA) have identified. However, the Department of Water and Sanitation (DWS) has requested that the SAIIAE and NFEPA wetlands be included as part of the assessment. As a result, they have been labelled as HGM 1 (Unchannelled valley-bottom - UVB) and HGM 2 (Seep) in Figure 3-6. Both HGM units have been classified as artificial systems within the SAIIAE and NFEPA datasets. It is the opinion of the specialist that the systems requested to be included in the assessment are not present.

Importantly, the project components (TSF, pipeline and pumpstation) do not traverse any natural watercourses, ensuring minimal disruption to the natural hydrological environment. The DWS has requested that functional assessments be done for the UVB and the seep wetlands. The delineated seepage areas are artificial systems, which are typically downslope of dams and formed due to dam seepage and overflow. These artificial areas are indicative of water movement through and beneath these artificial containment systems. These seepage areas would cease to exist and become relic wetlands with the removal of these dams. Despite their limited functioning, no further assessment has been undertaken for them.

The seep systems within the project area requested by the DWS to be included, as identified by the NFEPA wetland spatial datasets (Figure 3-2), were historically reservoirs, as evidenced by Google Earth Historic Imagery from 11/03/2003 (Figure 3-5). This imagery shows that these areas were once reservoirs, which have since been decommissioned. Current imagery reveals that these reservoirs have been transformed into seep systems, indicating that they are all artificial in nature.

Table 3-1 Description of the delineated areas.

Delineated Areas	Descriptions
Biodam	A biodam is a type of dam that integrates biological elements or ecosystems into its structure and operation. The concept aims to achieve various environmental benefits, including habitat creation, water quality improvement, and enhanced aesthetic and recreational values. Biodams often incorporate features like green roofs, vegetated spillways, or planted embankments, and are designed to work in harmony with the surrounding ecosystem. The aim is to mitigate the environmental impact of traditional dam structures by promoting ecological balance and biodiversity.
Artificial Canal	An artificial canal constructed from active mining areas to an attenuation pond serves as a conduit for transporting excess water, often laden with sediments and potential pollutants, from the mining site to the pond.
Artificial channels	These channels are essential components of stormwater management systems, designed to mitigate flooding and manage runoff in urban, suburban, and rural areas.
Artificial Seepage from biodam, mining canal and pipeline	Artificial seepage refers to the intentional or accidental movement of water through soil or rock, induced by human activities. This can occur in various contexts, such as: Irrigation, Dam and Reservoir Management, Land Reclamation and Drainages, Artificial Recharge of Aquifers and Mining Activities.
Disturbed Area	A disturbed area, previously mined, now supports hydrophytes but lacks wetland status, indicating partial ecological recovery without full wetland characteristics.
HGM 1 - UVB	Unchannelled valley bottom wetlands are typically found on valley floors where the landscape does not allow high energy flows.
HGM 2 - Seep	A typical hillslope seep is located within slopes. Isolated hillslope seeps are characterised by colluvial movement of material. These systems are fed by very diffuse sub-surface flows which seep out at very slow rates, ultimately ensuring that no direct surface water connects this wetland with other water courses within the valleys.



Figure 3-4 ***Photographical examples of the different water resources found within the 500 m regulated area, A & B) Hydrophytes found in disturbed areas, C) Artificial Canal, D & E) Artificial Channel, F) Biodam and G) Artificial Seepage from mining canal.***



Figure 3-5 ***Google Earth Historic Imagery from 11/03/2003 highlighting the reservoirs that has been labelled as Seep wetlands from the NFEPA spatial dataset***

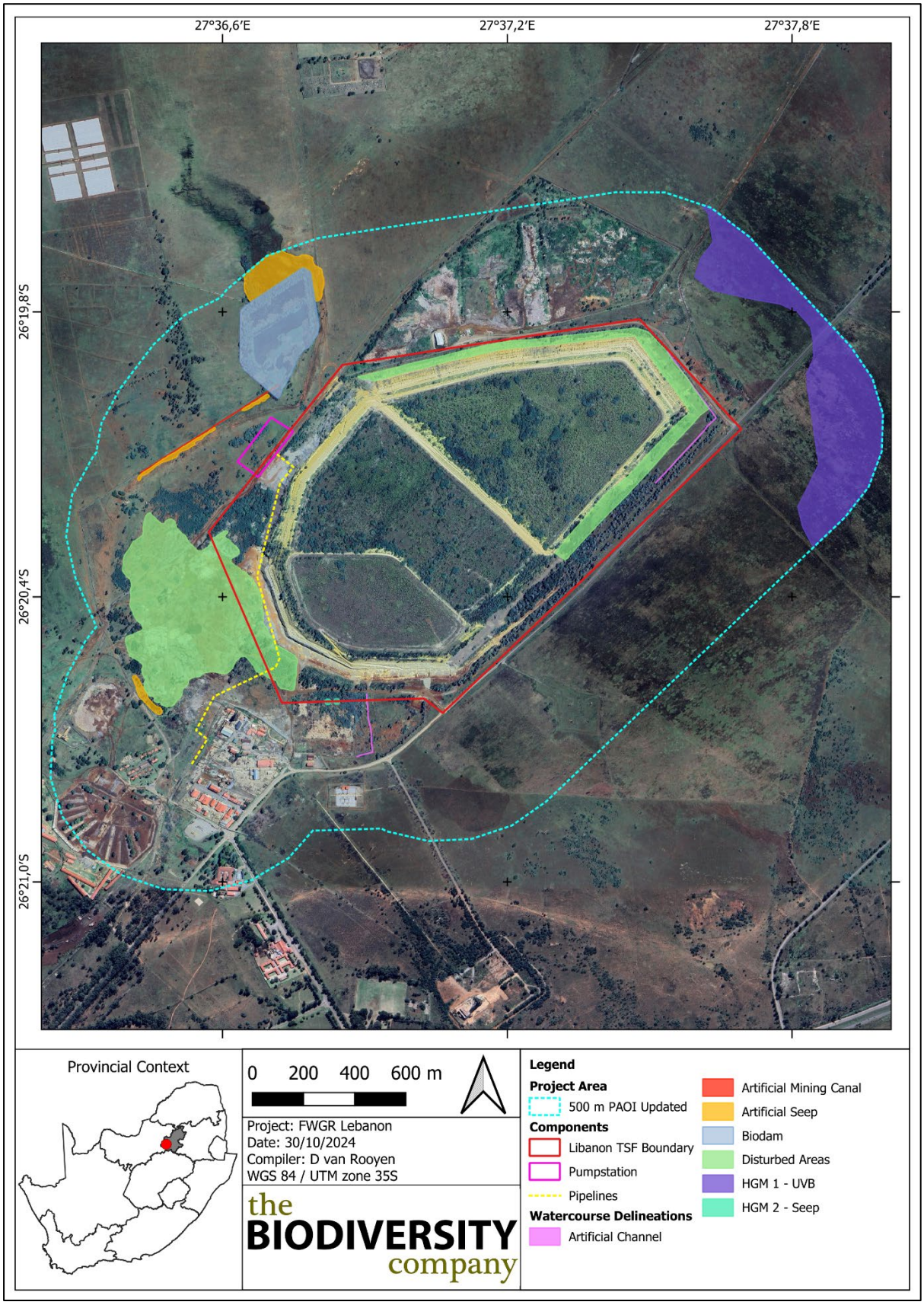


Figure 3-6 The delineated systems of the FWGR Libanon Reclamation Project

The DWAF (2005) manual separates the classification of watercourses into three (3) separate types of channels or sections defined by their position relative to the zone of saturation in the riparian area. The classification system separates channels into:

- those that do not have baseflow ('A' Sections);
- those that sometimes have baseflow ('B' Sections) or non-perennial; or
- those that always have baseflow ('C' Sections) or perennial.

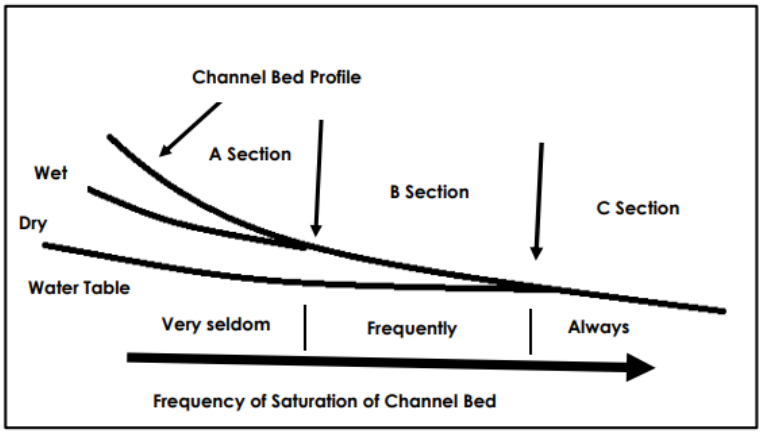


Figure 3-7 The watercourse classifications (DWAF, 2005)

3.3.1 Functional Assessment

Following the functional assessment using the WET-EcoServices (Kotze *et al*. 2008) method, PES, Ecological Importance and Sensitivity (EIS) and the Recommended Ecological Category and Recommended Management Category, the following can be summarised (Table 3-2):

The UVB and seep wetlands within the project area provide Low Ecosystem Services;

The integrity of both systems has been Critically Modified (Class F), indicating extensive loss of natural habitat and ecosystem function;

The Ecological Importance and Sensitivity of these wetlands were determined to be Low/Marginal (Class D); and

The recommended ecological category for both systems is to maintain a seriously/critically modified state (Class E/F).

Table 3-2 Ecological characteristics of the freshwater features within the Libanon PAOI

Aspect	Present Ecological State	Ecological Importance and Sensitivity (EIS)	REC – RMO
HGM 1 – UVB	F – Critically Modified	Low/Marginal	E/F: Maintain
HGM 2 – Seep	F – Critically Modified	Low/Marginal	E/F: Maintain

3.3.2 Buffer Requirements

The "*Buffer zone guidelines for wetlands, rivers and estuaries*" (Macfarlane *et al.,* 2014) was used to determine the appropriate wetland buffer zone for the proposed project.

Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land-use on another. A buffer zone has been prescribed for this project to serve as a "barrier" between the proposed development and the wetland systems. This buffer area would only be applicable

to wetland areas that will not be lost or where infrastructure is required to traverse a system due to the project.

The wetland buffer zone tool was used to calculate the appropriate buffer required for the proposed project. The model shows that the largest risk posed by the project during the construction phase is that of “increased sediment inputs and turbidity”. During the operational phase, the flow patterns being altered (increase flood peaks); increased sediment inputs; and altered water quality are high risks. These risks are based on what could threaten the wetlands and what buffer would be required at a desktop level. A post-mitigation buffer of 15 m is recommended for the wetlands (Table 3-3).

Table 3-3 Post-mitigation buffer requirement

	Required Buffer after mitigation measures have been applied
Valley Bottom	**15 m**
Seep	**15 m**

3.4 Ecological Sensitivity

The National Web based Environmental Screening Tool has characterised the aquatic theme sensitivity of the development footprint as “Low” sensitivity while the larger regulated area (500 m) traverse “Very High” sensitivity (due to SAIIAE wetland).

Table 3-4 provides a comparison between the Environmental Screening Tool and the specialist determined Site Ecological Importance (SEI) of the project. The specialist-assigned sensitivity ratings are based largely on the SEI process.

Table 3-4 Summary of the Screening Tool Sensitivity versus the Specialist assigned Site Ecological Importance (SEI) for the Field Survey Area of the Project Area

Screening Tool Theme	Screening Tool	System	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Aquatic Biodiversity Theme	Very High	Agricultural land	Low	Disputed – The entire area flagged as a wetland is active grazing pastures with no signs of wetlands indicators. The proposed activities are not anticipated to significantly modify the hydrological characteristics of the entire area; therefore a “Low” sensitivity has been assigned for these areas in relation to freshwater biodiversity.
	Low	Artificial watercourses	Low	Validated - Due to being artificially created, this area is regards as degraded due to removal of vegetation and excavations. Furthermore, the artificial watercourses provide no ecological function. Therefore, these watercourses were assigned a “Low” sensitivity
	Low	Remaining area	Low	Validated – No natural surface water features were identified within the rest of the project area of influence.

4 Impact Assessment

4.1 Current Impacts to Freshwater Biodiversity

The assessed wetlands exhibit impacts at local scale. These impacts result from present and historical land use relating to agricultural practices, developing in or in near proximity to wetlands and mining activities which have transformed the wetland habitats and has altered their natural hydrological regime and vegetation composition. The list below refers to the present-day local impacts observed within the assessed wetland areas:

Wetland disturbance from grazing activities and other agricultural practises (crop fields);

Altered hydrological inputs resulting from changes to the surrounding landscape;

Altered geomorphology from historical agricultural practices;

Loss of wetland vegetation from continual disturbances, historical land use and the establishment of alien invasive flora species in some approaches of the wetlands; and

Wetland degradation from mining activities.

4.2 Risk Assessment

This assessment has been completed in accordance with the requirements of the published General Notice (GN) 4167 by the Department of Water and Sanitation (DWS) (previously GN 509 of 2016 and GN 3139 of 2023). The said notice was published in the Government Gazette (no. 49833) under Section 39 of the National Water Act (Act no. 36 of 1998) in December 2023, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 4167 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a General Authorisation (GA), as opposed to a full Water Use Licence Application (WULA). A water use (or potential) qualifies for a GA under GN 4167 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM), provided the identified risks are all considered a low risk, and the applicant is listed under Appendix D1 or Appendix D2 of the same notice. This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation.

The assessment considered the anticipated direct and indirect risks to the wetland systems as a result of the proposed development (Table 4-1). The mitigation hierarchy as discussed by the Department of Environmental Affairs (2013) will be considered for this component of the assessment (Figure 4-1). In accordance with the mitigation hierarchy, the preferred mitigatory measure is to avoid impacts by considering alternate options in project location, sitting, scale, layout, technology and implementing project/activity phasing to avoid impacts.

Under the assumption that the proposed activities will be designed such that the wetland will be avoided, the pre- and post- mitigation risks were therefore determined to be “Low” in relation to the proposed development. It should be noted that even if avoided, some direct as well as indirect impacts are potential, therefore the focus will be on minimising impacts to the watercourses and wetlands.

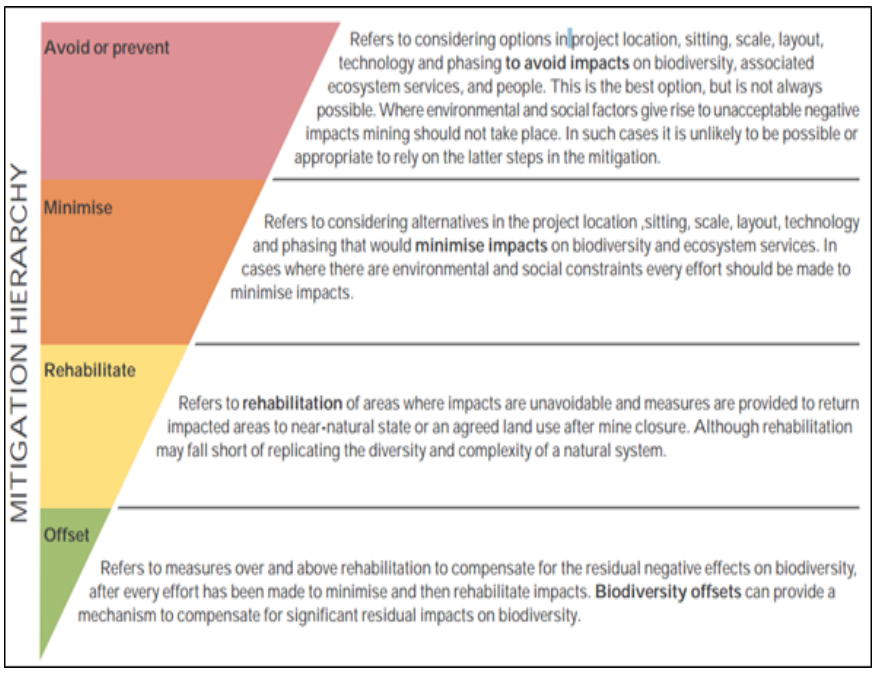


Figure 4-1 The mitigation hierarchy as described by the DEA (2013)

Table 4-1 Mitigated DWS Risk Assessment Matrix for wetlands in relation to the proposed development

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	Site clearing and preparation.	Disturbance and degradation of wetland vegetation	**12,6**	**L**	High
		Increased bare surfaces, runoff and potential for erosion	**8,4**	**L**	High
		Introduction and spread of alien and invasive vegetation	**16,2**	**L**	High
	Excavation, levelling and installation of the structures.	Increased sediment loads to downstream reaches	**8,4**	**L**	High
		Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as Contamination and eutrophication of wetland systems with human sewerage and litter.	**18**	**L**	High
	Routine operation and maintenance of the structures	Degradation of wetland vegetation.	**15,6**	**L**	High
		Proliferation of alien and invasive species	**16,2**	**L**	High
OPERATIONAL	Routine operation and maintenance of the structures	Degradation of wetland vegetation.	**13,2**	**L**	High
		Proliferation of alien and invasive species	**10,8**	**L**	High
DECOMMISSIONING	Removal of the structures	Degradation of wetland vegetation and proliferation of alien and invasive species	**10,8**	**L**	High
		Increased bare surfaces, runoff and potential for erosion	**12,6**	**L**	High

4.3 Mitigation Measures:

In light of the expected impacts from proposed activities the following mitigation measures have been proposed to lower the intensity of the impacts on the ecological integrity of the wetlands.

The focus of mitigation measures should be to reduce the significance of potential environmental impacts associated with the proposed development and thereby to:

Prevent the unnecessary destruction and fragmentation of the vegetation community of the wetland areas; and

Limit the construction area to the defined project areas and only impact those areas where it is unavoidable to do so otherwise.

4.3.1 Development Specific Mitigation

The following pipeline development specific mitigation measures are provided:

- Adherence to the buffer areas. These should be visibly demarcated to avoid encroachment into these areas;
- Silt traps and sediment trapping berms must be in place around drainage lines around the construction site to prevent the movement of contaminated or sediment laden runoff from entering the wetlands;
- Erosion prevention and sediment control measures (wetland and drainage line) are imperative and need to be implemented throughout the entire project footprint area of the proposed development, access roads and temporary laydown / storage sites. Temporary erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching; and
- All removed soil and material must not be stockpiled within the watercourse and buffers. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.

4.3.2 Erosion and sedimentation of watercourses

The alteration of surface topography and hydrology for the project infrastructure will inevitably be accompanied by an increase in erosion and sedimentation as rainwater erodes and washes exposed soils (active working and exposed areas) into the watercourses. This is a key consideration for the project due to the current levels of exposed soils within watercourses.

Mitigation:

Loose soils are particularly prone to loss due to wind or water. It is therefore preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;

Practice good soil management across the construction footprint;

Avoid the creation of concentrated flow paths wherever possible;

Signs of erosion must be addressed immediately to prevent further erosion of the area to prevent head cut erosion from forming;

Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching;

Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;

Relandscape to gentler gradients and re-vegetate all cleared areas, which includes the areas adjacent to the proposed infrastructure, as soon as possible to limit erosion potential. Sandbags and geotextiles should be used to assist until vegetation has established in these reworked areas;

Stem any head cut/ erosion gulley as it occurs by bulldozing, filling, re-contouring to gentler gradients and re-vegetating; and

The rehabilitation of watercourse banks must take place following construction. Key areas where erosion has occurred should be rehabilitated through bank reprofiling to gentler gradients and the revegetation of the wetland periphery areas.

4.3.3 General Mitigation Measures

The following general mitigation measures are provided in addition to the aforementioned mitigation:

It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces;

The wetland areas outside of the specific project site area must be avoided where possible;

The project should be relocated to outside of the wetland buffer zones, which would significantly reduce potential impacts to the said systems;

The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access;

Laydown yards, camps and storage areas must be beyond the wetland areas. Where possible, the construction of the road and crossings must take place from the existing paths;

Prevent uncontrolled access of vehicles through the watercourses that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;

All chemicals and toxicants to be used for the construction must be stored outside the watercourse areas and their respective buffers and in a bunded area;

All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site in a designated area;

All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”;

Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel within the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);

Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems;

The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;

All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the watercourse buffers. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;

Mixing of concrete must under no circumstances take place within the drainage or wetland systems. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished;

No dumping of construction material on-site may take place;

All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and

Consideration should be given to implementing an alien invasive plant management plan post construction to control any current invaded areas and prevent the growth of alien invasive species on cleared areas.

5 Conclusions

The development area was traversed on foot, with numerous checks being undertaken to identify any soil wetness indicators, and to determine the local soil forms.

During the site visit, several artificial watercourses, established as a result of mining infrastructure, were identified within the PAOI. These include artificial seep wetlands, channels, a mining canal, and a biodam. Notably, no natural wetlands or rivers were found within the 500 m PAOI, which contradicts the desktop datasets from SAIIAE and NFEPA. Despite this discrepancy, DWS has requested the inclusion of the SAIIAE and NFEPA wetlands in the assessment. Consequently, these have been designated as HGM units: HGM 1 (UVB) and HGM 2 (Seep), both classified as artificial systems within the datasets.

The delineated seepage areas, typically located downslope of dams, are artificial, formed due to dam seepage and overflow. These areas exemplify water movement through and beneath these containment systems and would cease to exist, reverting to relic wetlands, upon dam removal. Although their functionality is limited, no further assessment has been conducted.

Historical Google Earth imagery from 11/03/2003 confirms that these seep systems were originally reservoirs, which have since been decommissioned and transformed into artificial seep systems. Importantly, the project's components, including the TSF, pipeline, and pump station, do not intersect any natural watercourses, thereby minimizing disruption to the natural hydrological environment. The DWS has requested functional assessments for the UVB and seep wetlands. The functional assessments were be summarised as:

Aspect	Present Ecological State	Ecological Importance and Sensitivity (EIS)	REC – RMO
HGM 1 – UVB	F – Critically Modified	Low/Marginal	E/F: Maintain
HGM 2 – Seep	F – Critically Modified	Low/Marginal	E/F: Maintain

5.1 Ecological Sensitivity

Screening Tool Theme	Screening Tool	System	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Aquatic Biodiversity Theme	Very High	Agricultural land	Low	Disputed – The entire area flagged as a wetland is active grazing pastures with no signs of wetlands indicators. The proposed activities are not anticipated to significantly modify the hydrological characteristics of the entire area; therefore a “Low” sensitivity has been assigned for these areas in relation to freshwater biodiversity.
	Low	Artificial watercourses	Low	Validated - Due to being artificially created, this area is regards as degraded due to removal of vegetation and excavations. Furthermore, the artificial watercourses provide no ecological function. Therefore, these watercourses were assigned a “Low” sensitivity
	Low	Remaining area	Low	Validated – No natural surface water features were identified within the rest of the project area of influence.

5.2 Risk Statement

The risk assessment was completed in accordance with the requirements of GN 4167 by the DWS in terms of Section 21(c) & (i) water uses. The overall residual risks were determined to be low.

5.3 Specialist Statement

Due to the proposed project area being comprised of only artificial watercourses, the proposed project area will have an insignificant impact on the aquatic biodiversity of the area. The proposed development will not alter the integrity of the two HGM units (Class F), and maintenance of this category is recommended for the project. Therefore, the proposed development can be favourably considered for authorisation.

6 References

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7 Appendix Items

7.1 Appendix A – Specialist Declaration of Independence

I, Divan van Rooyen, 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 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 71 and is punishable in terms of Section 24F of the Act.



Divan van Rooyen

Freshwater Ecologist

The Biodiversity Company

August 2024

I, Rowan Buhrmann, 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 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 71 and is punishable in terms of Section 24F of the Act.



Rowan Buhrmann

Ecologist

The Biodiversity Company

August 2024

7.2 Appendix B – Specialist CVs

Divan van Rooyen

Ph.D. Environmental Science

Can Sci Nat (151272)

Cell: +27 83 265 8776
Email: divan@thebiodiversitycompany.com
Identity Number: 9312205072085
Date of birth: 20 December 1993



Profile Summary

Working experience throughout Southern Africa

Specialist experience with mining, WWTW's and construction.

Specialist expertise include wetlands resources, aquatic ecology and ecotoxicology.

Areas of Interest

Mining, Seismic Surveys, Renewable Energy, Bulk Services Infrastructure Development & WWTW's.

Key Experience

- Environmental Impact Assessments (EIA)
- Environmental Management Programmes (EMP)
- Wetland delineations and ecological assessments
- Rehabilitation Plans and Monitoring
- Aquatic biomonitoring

Country Experience

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Proficient

Qualifications

- PhD (North-West University of Potchefstroom) – Environmental Science with Aquatic Ecosystem Health
- MSc (North-West University of Potchefstroom) – Environmental Science (Ecological Remediation and Sustainable Management)
- BSc Honours (North-West University of Potchefstroom) – Environmental Science with Ecological Remediation and Sustainable Management
- BSc Environmental sciences
- Can Sci Nat (151272)

Rowan Buhrmann

MSc Biology (Plant Ecophysiology)

Pr Sci Nat (136853)

Cell: +27 78 558 1124

Email: rowan@thebiodiversitycompany.com

Identity Number: 9111085091086

Date of birth: 08 November 1991



Profile Summary

Working experience throughout KwaZulu-Natal (South Africa).

Experience in Environmental Consulting as an EAP (EIAs and WULA).

Environmental Control Officer (ECO).

Specialist expertise in Climate Change (elevated temperatures) and Botany.

Areas of Interest

Aquatic Ecology and Water Resource Management.

Renewable Energy.

Sustainability and Conservation.

Landscape rehabilitation.

Geographic Information Systems.

Experimental Design.

Key Experience

- Environmental Impact Assessments and Water Use Licence Applications
- Vegetation Assessments
- Wetland delineations and ecological assessments
- Rehabilitation Plans and Monitoring

Countries worked in

South Africa

Nationality

South African

Languages

English – Proficient

Qualifications

- MSc (University of KwaZulu-Natal) – Plant EcoPhysiology.
- BSc Honours (University of KwaZulu-Natal) – Biology
- BSc (University of KwaZulu-Natal) – Biology
- Certificate of Competence: Wetland WET-Health (V2)
- Pr Sci Nat (136853)

Appendix E
Stormwater Management Plan

KONGIWE

Far West Gold Recoveries (Pty) Ltd

FWGR Phase 2 Expansion: Libanon

Stormwater Management Plan

December 2024

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Report Information

Project:	FWGR Phase 2 Expansion: Libanon
Report Title:	Stormwater Management Plan
Client:	Far West Gold Recoveries (Pty) Ltd
Project No:	DRDG#037

Project Approval

Name	Designation	Task	Signature	Date
Hilton Sparks	Professional Engineer	Report compiler		04 December 2024
Gerlinde Wilreker	Kongiwe: Technical Director	Report review		04 December 2024
Bradly Thornton	Kongiwe: CEO	Report approval		04 December 2024

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DECLARATION OF INDEPENDENCE

I, Hilton Sparks declare that:

a) I act as the independent specialist in this application;
b) 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;
c) I declare that there are no circumstances that may compromise my objectivity in performing such work;
d) I have the expertise in conducting the specialist study relevant to this application, including knowledge of the various Acts, regulations and any guidelines that have relevance to the proposed project;
e) I will comply with the Acts, regulations and all other applicable legislation;
f) I have not, and will not engage in, conflicting interests in the undertaking of the activity;
g) 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;
h) All the particulars furnished by me in this form are true and correct; and,
i) I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of Section 24F of the Act.



Hilton David Neville Sparks
Civil Engineer
Pr.Eng (Reg No. 740604)

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SPECIALIST REPORT GUIDELINE

A Specialist Report Checklist Table has been compiled in accordance with the guideline as set out in Appendix 6 of the EIA Regulations. Appendix 6 relays the specific information required as per the guideline is given in the second column of the Table.

Table 1-1 - Specialist Checklist

Specialist Report Guideline: Appendix 6 GNR 982 EIA Regulations 4 December 2014 as amended	
Details to be included in the Report	**Section in Report**
Details of	
Specialist who prepared the report	Section 1.3
Expertise of the specialist	Section 1.3
CV of the specialist	Annexure A
Declaration that the Specialist is Independent in a form as may be specified by the CA	Declaration of Independence
An indication of the Scope of and the Purpose for which the report was prepared	Section 2
An indication of the Quality and Age of base data used for the specialist report	Section 3.3
A Description of existing impacts on the site, cumulative impacts of the proposed development, and levels of acceptable change	Section 5.4
The Duration, Date, and Season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.1
A Description of the Methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
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	Sections 7
An identification of any areas to be avoided including buffers	Section 7
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 4.7
A Description of any Assumptions made and any Uncertainties or Gaps in Knowledge	Section 4
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 7
Any Mitigation Measures for inclusion in the EMPr	Section 5
Any Conditions for inclusion in the Environmental Authorisation	Section 7.7
Any Monitoring Requirements for inclusion in the EMPr or Environmental Authorisation	Section 7.7
As to whether the proposed activity/ activities or portions thereof should be authorised	Section 7
Regarding the acceptability of the proposed activity or activities	Section 7.7

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Specialist Report Guideline: Appendix 6 GNR 982 EIA Regulations 4 December 2014 as amended	
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 7.7
A Description of any Consultation Process that was undertaken during the course of preparing the specialist report	None required
A Summary and copies of any comments received during any consultation process and where applicable all responses thereto	None required
Any other information requested by the CA	None required

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EXECUTIVE SUMMARY

Introduction and Background

Far West Gold Recoveries (Pty) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSFs are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto Driefontein 4 TSF, until such stage as the Regional Tailings Storage Facility (RTSF) construction is completed and the TSF is commissioned.

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised .

The Libanon project will reclaim material at 600 000 tons per month . Required infrastructure will include:

- Pumpstation;
- Process water from Kloof Shaft 10#;
- Pollution paddock;
- Access road;
- Laydown area; and,
- Powerlines.

An Environmental Authorisation (EA) and a Water Use Licence (WUL) are therefore required for the Libanon project to proceed.

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 at the Libanon TSF;
- Delineate the clean and dirty water areas;
- Provide stormwater measures and recommendations for areas that require interventions; and
- Provide conceptual sizing's for the proposed stormwater measures in line with GN R704 regulations.

Baseline Hydrology

The area has a Mean Annual Precipitation (MAP) of 711 mm. Rainfall is highest over the months of October to March, and lowest over the months of April to September.

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The project area has a Storm Rainfall Depth of 126.3 mm for a 24 hour storm duration and a 1 in 50 year return period. The calculated 1 in 50 year peak flow is 3.333 m^3/s for the Libanon East catchment, 0.770 m^3/s for the Libanon West catchment and 1.073 m^3/s for the Libanon TSF catchment.

Conceptual Stormwater Management Plan

A conceptual Stormwater Management Plan (SWMP) was designed for the Libanon TSF area to ensure that clean and dirty water are adequately separated, in accordance with GN R704 regulations. The SWMP was designed to ensure that clean water is diverted away from dirty areas, and that dirty water runoff from the operation is captured, contained and managed.

Conclusions and Recommendations

In conclusion, the most important aspect to prevent negative impacts from a surface water perspective, is to ensure that a sound SWMP is implemented prior to the commencement of pumping activities, in accordance with the conditions stipulated in GN R704. Monitoring and maintenance of stormwater measures is of utmost importance and should be conducted as outlined in this report

The following is recommended:

- The existing berm/channel system around the TSF are reinstated where damaged, and maintained. This system acts as the barrier between the clean and dirty water;
- The “clean” runoff from the high lying areas above the Libanon TSF is deviated away from the Libanon TSF by an earth berm constructed immediately to the south of Bridges Avenue, up to the existing culvert under Bridges Avenue to the east of the Libanon TSF. The existing culvert is in a poor state of repair and will have to be reinstated; and,
- A dolomitic stability investigation be carried out around the Libanon TSF to confirm that the proposed reclamation method and stormwater containment on top of the TSF and in paddocks around the TSF is acceptable and in accordance with SANS 1936, and a dolomitic risk management plan be developed.

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Annexures

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Abbreviations

CA	Competent Authority
CEO	Chief Executive Officer
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management
EMP	Environmental Management Plan
FWGR	Far West Gold Recoveries (Pty) Ltd
HSE	Health Safety and Environmental
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water Waste Management Plan
Kongiwe	Kongiwe Environmental (Pty) Ltd
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No 28 0f 2002)
Mt/a	Million tonnes per annum
NEM:WA	National Environmental Management : Waste Act, 2008 (Act No 59 of 2008)
NEMA	National Environmental Management Act, 1998 (Act No 107 of 1998)
NWA	National Water Act, 1998 (Act No 36 of 1998)
PEP	Project Execution Plan
PPE	Personal Protective Equipment
PPP	Public Participation Process
SoW	Scope of Works
TSF	Tailings Storage Facility
WUL	Water Use Licence
WULA	Water Use Licence Application

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1 INTRODUCTION AND BACKGROUND

Kongiwe Environmental (Pty) Ltd (Kongiwe) was appointed to prepare a stormwater masterplan for the Libanon and associated infrastructure (hereafter referred to as the project). This report provides the surface water study for the Environmental Impact Assessment (EIA) and Water Use Licence Application (WULA) processes.

1.1 Project Description

Far West Gold Recoveries (Pty) Limited (FWGR) was established in 2018 for the reprocessing of Tailings Storage Facilities (TSF) in the West Rand of Gauteng. The TSFs are being reprocessed at present at the Driefontein 2 Plant , with residue material to be disposed onto the Regional Tailings Storage Facility (RTSF).

It is FWGR's intention to reclaim and reprocess the gold residues of Libanon TSF, with the slurry being processed at the Driefontein No. 2 Plant. Pipelines linking the Libanon TSF with the Driefontein No. 2 Plant are already in existence and authorised).

The Libanon project will reclaim material at 600 000 tons per month . Required infrastructure will include:

- Pumpstation;
- Process water from Kloof Shaft 10#;
- Pollution paddock;
- Access road;
- Laydown area; and,
- Powerlines.

An Environmental Authorisation (EA) and a Water Use Licence (WUL) are therefore required for the Libanon project to proceed.

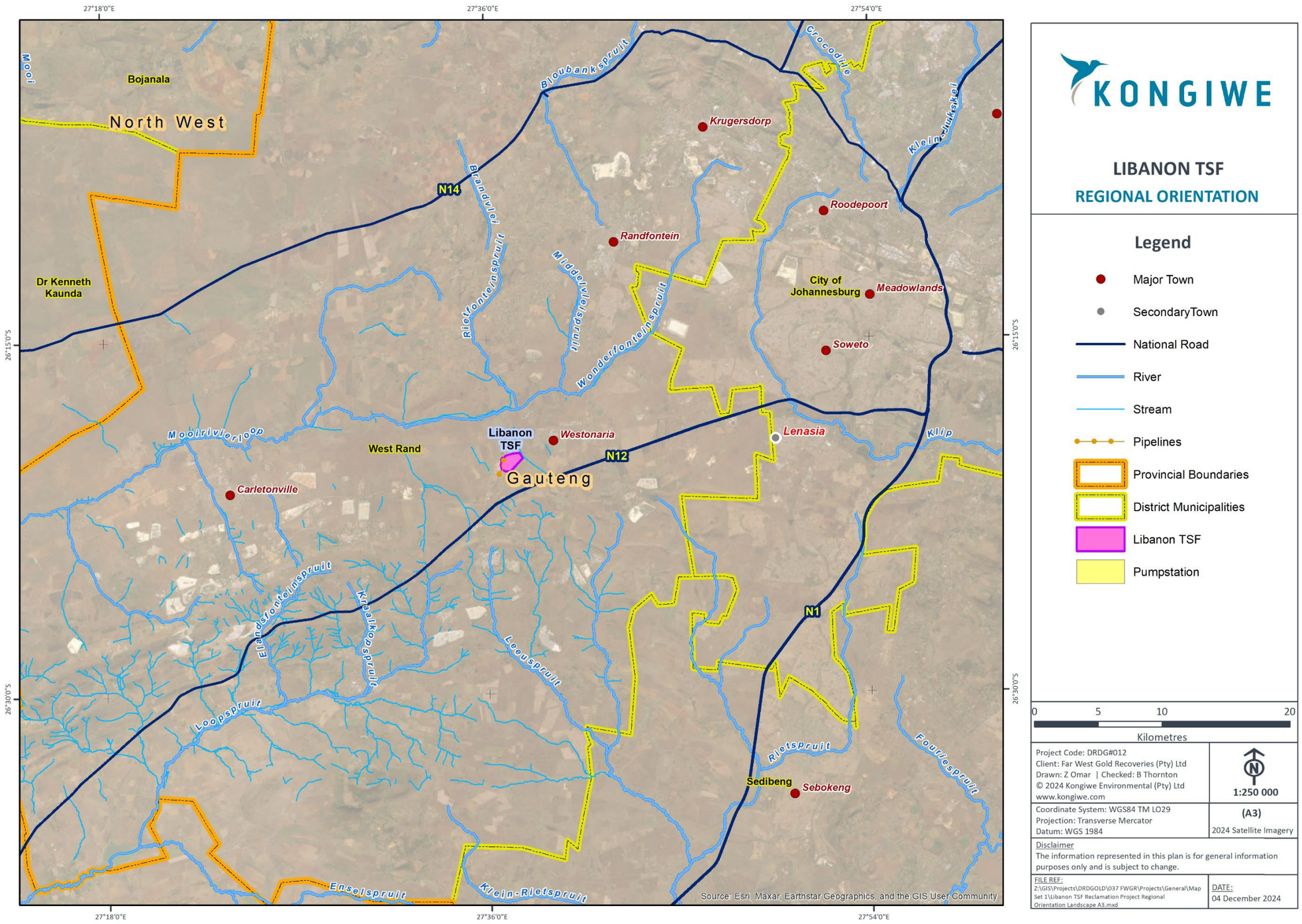
1.1.1 Locality

The Libanon TSF is located approximately 4 km west of Westonaria. Figure 1-1 shows that TSF is located on the Remaining Extent of Libanon or Witkleigat 283 IQ.

1.1.2 Access

Major routes around the mine dump are the N12 which runs 2km to the South of the TSF and Bridges Avenue which runs parallel to the southern edge of the TSF.

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KONGIWE

LIBANON TSF

REGIONAL ORIENTATION

Legend

- Major Town
- SecondaryTown
- National Road
- River
- Stream
- Pipelines
- Provincial Boundaries
- District Municipalities
- Libanon TSF
- Pumpstation

0 5 10 20

Kilometres

Project Code: DRDG#012 Client: Far West Gold Recoveries (Pty) Ltd Drawn: Z Omar | Checked: B Thornton © 2024 Kongiwe Environmental (Pty) Ltd www.kongiwe.com	1:250 000
Coordinate System: WGS84 TM LO29 Projection: Transverse Mercator Datum: WGS 1984	(A3) 2024 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\DRDGOLD\037 FWGR\Projects\General\Map Set 1\Libanon TSF Reclamation Project Regional Orientation Landscape A3.mxd	DATE: 04 December 2024

Figure 1-1 - Location of the project

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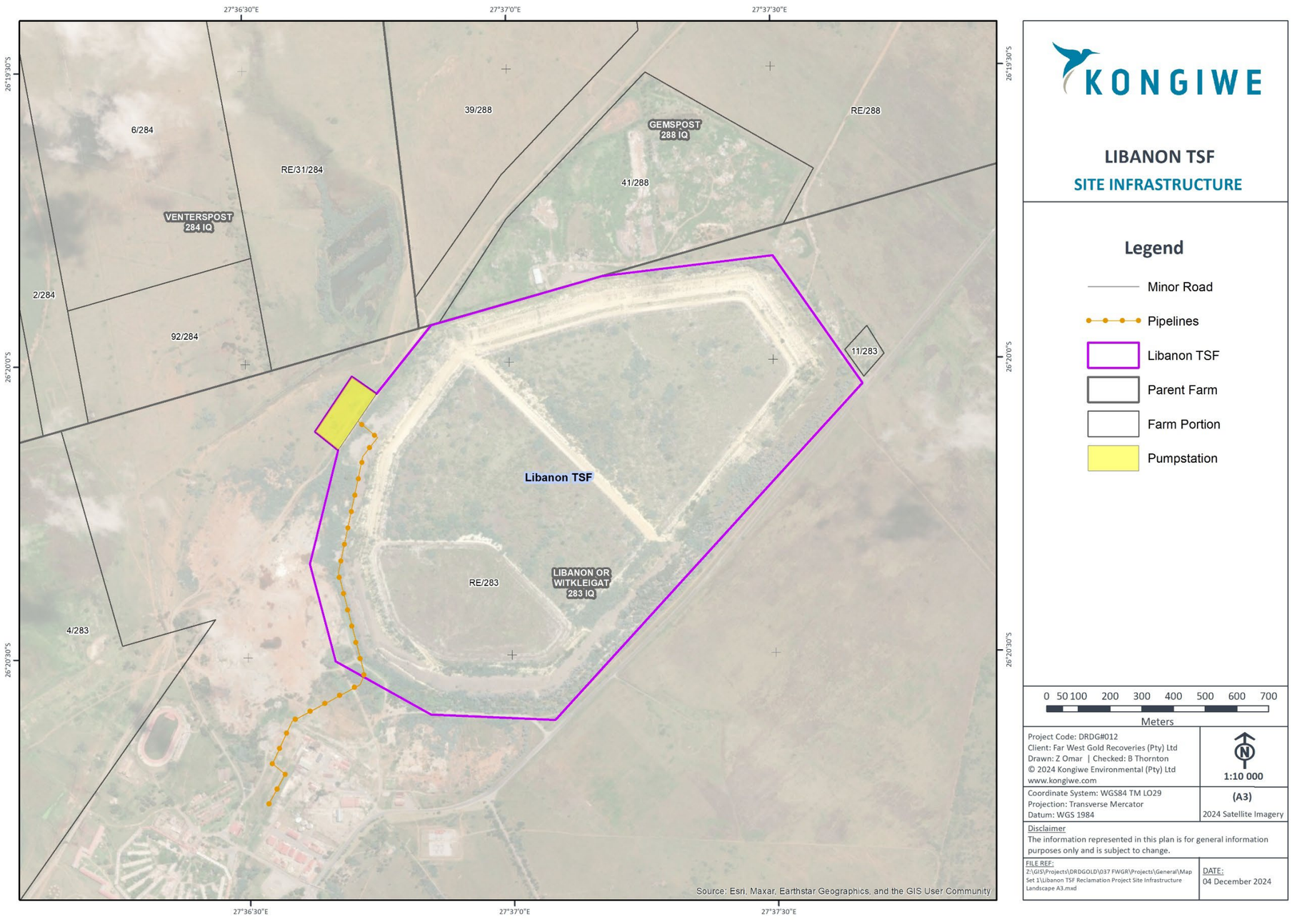


Figure 1-2 - Layout of 7L1 Pump Station

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1.2 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 recurrence 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; and,
  - 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.

1.3 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 (PrEng) (Registration Number 740604) with the Engineering Council of South Africa (ECSA) and as a Professional Construction Project Manager (PrCPM) (Registration Number D/202/2004) with the South African Council for the Project and Construction Management Professions (SACPCMP). 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.

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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 at the Libanon TSF site;
- Delineate the clean and dirty water areas;
- Provide stormwater measures and recommendations for areas that require interventions; and,
- Provide conceptual sizing's for the proposed stormwater measures in line with GN R704 regulations.

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3 METHODOLOGY AND DATA SOURCES

3.1 Site Investigations

A site investigation of the Libanon TSF site was undertaken on 8th May 2024, and a follow up on 9th December 2024.

The purpose of the site investigation was to locate and assess the current stormwater measures, as well as to assess areas where stormwater measures may be required.

This study was undertaken as a once-off study and relies on historical hydrological and climate data for the site; as well as recognized hydrological and water resource databases for South Africa. Data generated during the time of this study is not seasonally bound as average yearly data was applied where required and as scientifically acceptable.

3.2 Elevation Data

Elevation data was obtained from National Geospatial Information Website, the date of the data is 2016.

3.3 Climatic Data

Monthly rainfall between October 1941 – September 2008, was sourced from South African Weather Service (SAWS) station: Blyvooruitzicht (station number: 0474684 W) and was used to describe the seasonal rainfall at Libanon TSF. There are other weather stations located closer to the Libanon TSF, but the records are of short duration. Due to the flat topography of the region, the rainfall does not vary much, and therefore, the Blyvooruitzicht weather station was used to represent the rainfall at the Libanon TSF.

The storm rainfall depths, which are required to calculate the peak flows, were extracted using the Design Rainfall Estimation in South Africa software programme (Smithers and Schulze, 2002). The programme uses the six closest rainfall stations to a user specified coordinate, to calculate the storm rainfall depths for that site. Storm rainfall depths were extracted at Libanon TSF (26° 20’ S, 27° 37’ E).

According to the WR2012 study, Libanon TSF is located within evaporation zone 10A. Symon’s Pan (S-Pan) evaporation was obtained from the DWS Naauwpoort weather station (C2E009) at the Boskop Dam, which is also located within evaporation zone 10A. Monthly evaporation was available for the period of 1969 – 2019. S-Pan evaporation measurements tend to be higher than evaporation from natural open water bodies. To convert S-Pan measurements to open water evaporation, monthly conversion factors were used, which were obtained from the WR90 study.

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3.4 Terminology

The following definitions are relevant to the SWMP. These are provided here for clarity, as they are commonly referred to in this section of the report:

- **Clean area**: This refers to any area at or near a mine or activity, which is not impacted by mining activities, but has the potential to become contaminated if not managed appropriately;
- **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 (i.e. contain polluted water);
- **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. generate polluted water);
- **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; and,
- **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; 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.

3.5 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 storm event; and,
- Appropriate maintenance and management of stormwater related infrastructure should always be ensured.

The above design philosophy is applied as follows:

1. The catchment area upstream of the Libanon TSF extends up to the N12 Highway. The clean water from this catchment currently flows directly onto the TSF. There is a berm/channel system around the TSF (see Figure 3-1) which seperates the clean/dirty water, however the drainage ditch is siltedup and overgrown in places, and the berm breached in sone instances. These berms/channels

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must be reinstated and maintained to divert stormwater away from the Libanon TSF, however this concentrates the runoff at the south eastern and south western corners of the TSF.



Figure 3-1 – Berm/culvert around Libanon TSF

A new earth berm immediately to the south of Bridges Avenue extending over the full length of the Libanon TSF up to the existing culvert crossing Bridges Avenue to the east of the Libanon TSF, is proposed. This berm will deviate all stormwater runoff from the upstream areas to this culvert, which will have to be reinstated as it is in a poor state of repair;

2. Rainfall onto the top of the Libanon TSF will be retained on top of the TSF using earth berms, and the runoff will be allowed to infiltrate and evaporate. This is in line with FWGR's current strategy for the remining of existing TSFs, and has been used at other TSFs located in dolomitic areas;
3. Runoff from the side slopes of the Libanon TSF will be captured, contained and managed in paddocks immediately adjacent to the TSF (see Figure 3-2), and will be allowed to evaporate/infiltrate appropriately. The berm on the outside edge of the paddocks must be reinstated/maintained to ensure that dirty water is contained in the paddocks;



Figure 3-2 – Existing paddocks at toe of Libanon TSF

4. Dirty water will, as far as possible, be recycled and reused;

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5. Clean and dirty water systems must convey/contain runoff from the 50 year storm event, and should not lie within the 100 year floodline or within a horizontal distance of 100 m from any watercourse, whichever is the greater of the two; and
6. Appropriate maintenance and management of stormwater related infrastructure should be ensured at all times.

3.6 Sizing of Stormwater Measures

3.6.1 Peak Flows and Volumes

GN R704 regulations require that clean and dirty water systems are sized so that they do not spill more than once in 50 years.

3.6.1.1 Rational Method

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 flood (m^3/s);
C = Runoff coefficient (dimensionless);
I = Average rainfall intensity over the catchment (mm/hour);
A = Catchment area contributing to the peak flow (km^2); and,
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 Annexure B).

The Rational Method is based on the following assumptions:

- Rainfall has a uniform area distribution across the total contributing catchment;

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- 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; and
- The return period of the peak flow is the same as that of the rainfall intensity.

3.6.2 Channel Sizing's

The Manning's equation was used to calculate the channel sizes required to convey the 1:50 year peak flows. The Manning's equation is provided below:

$$Q = A\frac{1}{n}R^{2/3}S^{1/2}$$

Where:

Q = Peak flow (m^3/s)

A = Cross sectional area of the channel (m^2)

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 3-1.

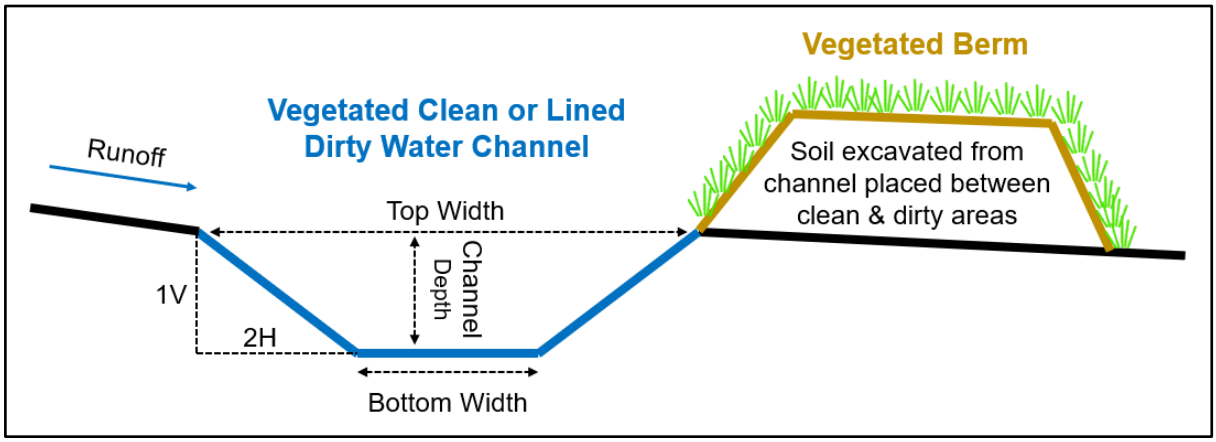


Figure 3-3: Typical proposed design for clean and dirty water channels

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3.7 Developments on Dolomitic Land

Sinkholes and subsidences are mostly caused by water ingress/seepage or a lowering of the ground water table.

Sinkholes are generated by a change in the moisture regime in the soils constituting the arch over the upward migrating void. This change in the state of the soil leads to the arch ravelling and the void moving upward towards ground surface. The void will eventually daylight and manifests as a sinkhole. Often paleo sinkholes are reactivated by groundwater level draw down. Paleo sinkholes are ancient features infilled over time by transported soil material, e.g. wind-blown, aeolian sands. These materials may extend below the original groundwater level. In such instances, lowering of the groundwater level leads to a change in the moisture regime of the soils that re-activates the sinkhole.

Seepage of water most commonly occurs from leaking water bearing services such as sewers, water pipes, stormwater systems etc. The leaking water erodes the soil covering the dolomite rock and carries the material down into the underlying cave systems resulting in the formation of a cavity below ground surface. A sinkhole results when this cavity daylights. Sinkholes and subsidences may occur soon after installation of services because of poor workmanship or use of inferior materials or after a period of time due to continual consolidation of poorly compacted materials. Obviously, as the condition of water bearing services deteriorate with time, the frequency of leaks increases and so does the likelihood of a sinkhole occurring.

The groundwater level drops when boreholes are used to pump water from underground aquifers. The groundwater level can also be lowered when mines pump water out of groundwater compartments to keep their underground workings dry. Groundwater level lowering leads to lowering of porewater pressure, which lowers, ground bearing capacity or draining of subsurface cavities, which may result in sinkhole or subsidence formation.

The dolomitic environment is often characterised by zones of deep weathering and preferential leaching. This process of preferential weathering is particularly well advanced within the shear zones of faults. Subsurface karst valleys up to 200 m in depth may develop in these shear zones.

Spectacular representations of these features are located on the **Far West Rand in the Gauteng Province**. In many of these areas, the groundwater level is located above the bedrock, in residual soils. These residual materials are essentially composed of wad and ferroan soil. The artificial lowering of the groundwater level may produce significant ground movement at the surface. This process manifests as a subsidence at ground surface.

Dolomite Stability Investigations (DSI) are conducted to determine the Inherent Hazard characterisation of dolomite land as well as the Dolomite Area Designations and shall be undertaken under the direction of one or more Competent Persons (geo-professionals). Geotechnical site investigations on dolomite land shall comprise investigations, as relevant, relating to:

a) the identification of hazards that impact upon the development of the land;
b) the determination of the Inherent Hazard; and,

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c) the stability of the dolomite land for various types of development, and the foundations for buildings and structures.

In their report "Technical Report on Moisture Levels of the Kloof 1, Libanon and Venterspost North Tailings Storage Facilities", The RVN Group found the base of the Libanon TSF (from 42 to 54 m below the top surface) to be wet under the present conditions (ie a "dormant" state) (See Figure 3-4). They recommend:

- The authors recommend drilling be completed on all TSFs, obtaining up-to-date data, and commissioning a hydrogeological study;
- Furthermore, the authors recommend that the RC drilling technique is utilized so that wet or watery samples can be recovered and the TSF bases can be intersected and defined;
- The authors recommend that larger TSFs like Libanon and Venterspost North should undergo an initial geotechnical assessment. This assessment can involve a visit to the site by professionals and a desktop study utilizing satellite data.
- The authors recommend that FWGR consider incorporating the latest monitoring technologies for TSFs as a sustainable long-term measure. The authors suggest exploring the technology currently being developed and tested at numerous operational and decommissioned TSFs worldwide.

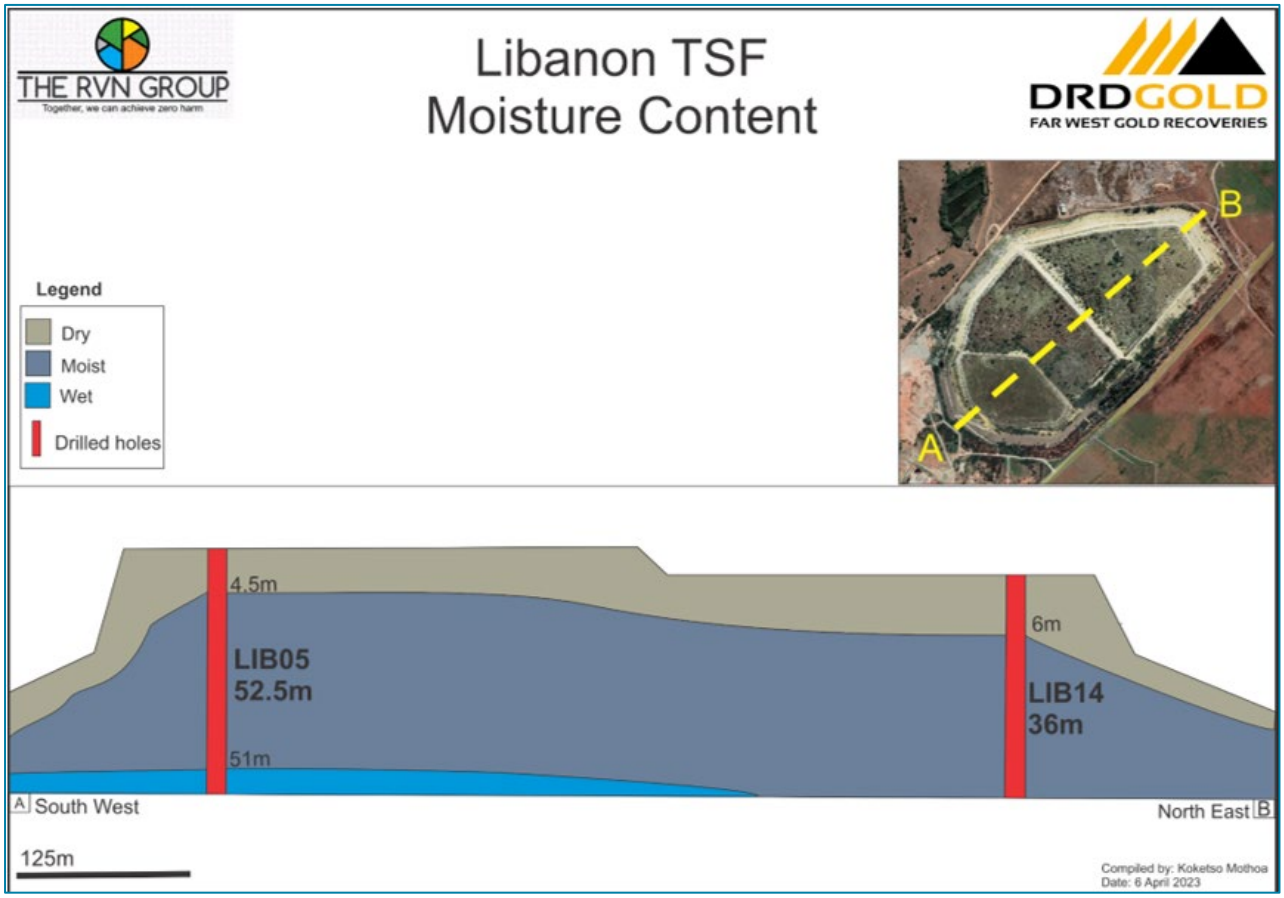


Figure 3-4 – Schematic cross-section through the Libanon TSF

The general requirements for such investigations are described in SANS 1936-2 and comprise the following:

a) Feasibility-level Dolomite Stability Investigation

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   a. The first phase of investigation requires fieldwork to enable the land to be characterized in terms of its stability. This phase of investigation forms the basis of development planning.

b) Design-level Dolomite Stability Investigation
   a. Such investigation, including footprint investigation, where necessary, entails further investigations to provide specific information for design purpose of structures, facilities, infrastructure or bulk services.

c) Investigations during Installation of Services
   a. This investigation is undertaken during the installation of services and entails observations and further investigations as are necessary to confirm the Inherent Hazard characterization of dolomite land or Dolomite Area Designations (or both) determined during the feasibility-level investigation.

The safe development of a site located on dolomite involves:

a) careful geotechnical assessment of the delineated area;
b) appropriate planning and appropriate design of structures and services; as well as,
c) the perpetual management thereof.

In addition, a dolomitic risk management plan must be developed.

3.8 Stormwater Drainage on Dolomitic Land

3.8.1 Concentrated Stormwater

Concentrated stormwater shall not be disposed of other than in natural water courses unless the land upon which it is discharged is:

- not dolomite land; or
- dolomite land categorised as having a Dolomitic Area Designation D1 (refer to SANS 1936-1).

3.8.2 Surface Ponds

Stormwater drainage shall be such that no surface water ponds other than in natural watercourses save for that associated with the attenuation of stormwater for a period not exceeding **6 hours**;

3.8.3 Stormwater retention and attenuation structures

Stormwater retention and attenuation structures should preferably not be constructed on land of Dolomite Area Designation D4 in accordance with SANS 1936. Dolomite Area Designation D4 (Inherent Hazard Classes 5, 6, 7 and 8) may only be considered provided the conditions as prescribed in SANS 1936 are met; and,

3.8.4 Precautionary Measures

Appropriate precautionary measures should be specified for Dolomite Area Designation D3 (Inherent Hazard Classes 1, 2, 3 and 4).

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4 Assumptions and Limitations

The following are assumptions and limitations for the conceptual SWMP:

- The SWMP is based on the project description and infrastructure layout. Should the project description or infrastructure layout change, then the SWMP will need to be revised;
- The capacities calculated for proposed containment facilities, do not include any additional volumes other than the 1:50 year runoff.

5 Hydrological Setting

5.1 Climate

5.1.1 Rainfall

Rainfall data for the area was obtained from the Blyvooruitzicht rainfall station (Station No. 0474684 W). The station is located 4 km south of Carletonville and 14 km west of the Libanon TSF. The mean monthly rainfall is indicated in Figure 3-2. The area has a Mean Annual Precipitation (MAP) of 711 mm. Rainfall is highest over the months of October to March, and lowest over the months of April to September.

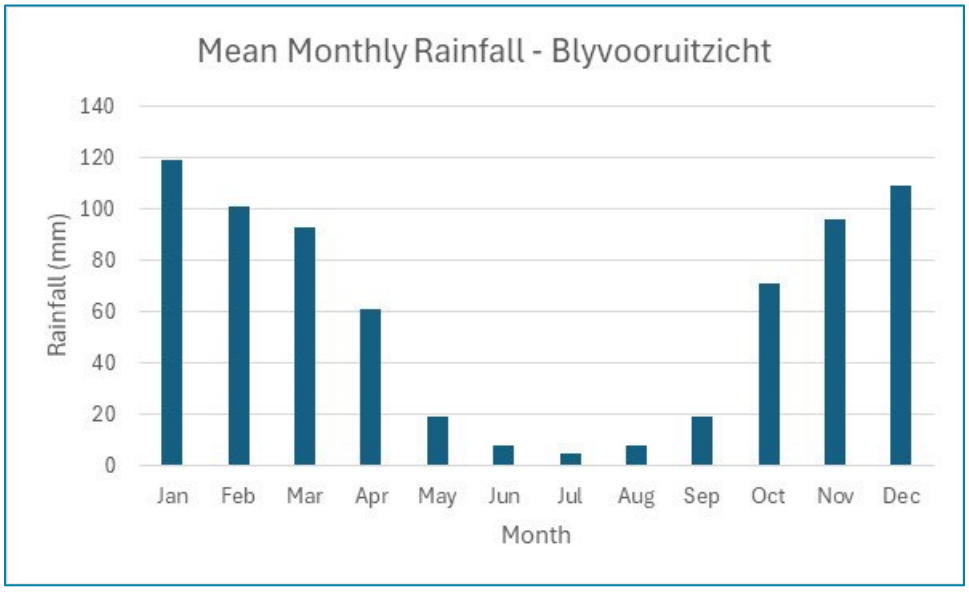


Figure 5-1 - Mean monthly rainfall for the area

5.1.2 Evaporation

According to the WR2012 study, the Libanon area is mostly located within evaporation zone 10A. Symon's Pan (S-Pan) evaporation was obtained from the DWS Naauwpoort weather station (C2E009) at the Boskop Dam, which is also located within evaporation zone 10A. Monthly evaporation was available for the period of 1969 – 2019. S-Pan evaporation measurements tend to be higher than evaporation from natural open water bodies. To convert S-Pan measurements to open water evaporation, monthly conversion factors were used, which were obtained from the WR90 study. The monthly evaporation for the project is indicated in Table 5-1. The open water Mean Annual Evaporation (MAE) is 1 454 mm, which is double the MAP of the

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area. Evaporation is highest over the warmer months of September to March, and lowest over the cooler months of April to August.

Table 5-1 - Evaporation for the area

Month	S-Pan Evaporation	Open Water Evaporation Factor	Open Water Evaporation (mm)
January	190	0.84	159
February	161	0.88	142
March	149	0.88	131
April	116	0.88	102
May	96	0.87	83
June	77	0.85	65
July	86	0.83	71
August	120	0.81	97
September	160	0.81	130
October	187	0.81	152
November	191	0.82	156
December	201	0.83	166
Total	1732		1454

5.1.3 Storm Rainfall Depths

The storm rainfall depths for the centre point of the Libanon TSF were extracted for the catchments from the Design Rainfall Estimation in South Africa software programme (Smithers and Schulze, 2002). The programme uses the six closest rainfall stations to a user specified position to calculate the storm rainfall depths. The storm rainfall depths were extracted at 26° 20’ S and 27° 37’ E. The six closest rainfall stations are indicated in Table 5-2

Table 5-2 – Six closest rainfall stations to the Project

Station Name	Station No.	Distance from Site (km)	Record (Years)	Latitude	Longitude	MAP (mm)	Altitude (mamsl)
Venterspos (Old Homestead)	0475227_W	5.7	43	26°17S	27°38E	655	1 555
Kloof (GM)	0475174_W	8.0	33	26°24S	27°35E	695	1 723
Bank (SAR)	0475019_W	13.1	57	26°18S	27°30E	603	1 530
Leeuwpoort	0475056_W	14.1	64	26°26S	27°32E	644	1 580
Luipaardsvlei	0475404_W	16.6	50	26°14S	27°44E	651	1 603
Eldorado	0475477_W	19.1	47	26°27S	27°45E	590	1 557

The extracted storm rainfall depths for the project are indicated in Table 5-3.

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Table 5-3 - Storm rainfall depths for the area

Storm Duration	Return Period / Storm Rainfall Depth (mm)						
mm/hr/day	1:2 yr	1:5 yr	1:10yr	1:20yr	1:50 yr	1:100 yr	1:200 yr
5 min	8.9	11.8	13.8	15.7	18.2	20.1	22.0
10 min	12.8	17.1	20.0	22.7	26.4	29.1	31.9
15 min	15.9	21.2	24.8	28.2	32.8	36.2	39.6
30 min	20.3	27.1	31.6	36.1	41.8	46.2	50.6
45 min	23.4	31.3	36.5	41.6	48.3	53.3	58.4
1 hr	25.9	34.6	40.4	46.0	53.4	59.0	64.6
1.5 hr	29.9	39.9	46.6	53.1	61.6	68.1	74.5
2 hr	33.1	44.2	51.6	58.8	68.2	75.3	82.5
4 hr	39.4	52.5	61.3	69.8	81.0	89.5	98.0
6 hr	43.5	58.0	67.8	77.2	89.6	98.9	108.3
8 hr	46.7	62.3	72.8	82.9	96.2	106.3	116.4
10 hr	49.4	65.9	76.9	87.6	101.7	112.3	123.0
12 hr	51.7	68.9	80.5	91.7	106.4	117.5	128.7
16 hr	55.5	74.0	86.4	98.5	114.3	126.2	138.2
20 hr	58.7	78.2	91.3	104.1	120.8	133.4	146.1
24 hr	61.4	81.8	95.6	108.9	126.3	139.5	152.8
1 day	53.2	70.9	82.8	94.3	109.5	120.9	132.4
2 day	65.4	87.2	101.9	116.1	134.7	148.8	162.9
3 day	73.9	98.5	115.0	131.0	152.0	167.9	183.9
4 day	80.2	106.9	124.9	142.3	165.1	182.3	199.7
5 day	85.5	114.0	133.1	151.7	176.0	194.4	212.8
6 day	90.1	120.1	140.2	159.8	185.4	204.8	224.2
7 day	94.1	125.5	146.6	167.0	193.8	214.0	234.4

5.2 Topography and Drainage

The elevation of the Libanon area varies from a high of 1 765 metres above mean sea level (mamsl) at the ridge located to the south to a low of 1546 at the Wonderfonteinspruit in the north. The topography of the area is flat, with an average slope of 1.5 %. The only areas where steep slopes occur, are along the sides of the TSFs and in the high lying ridge along the south edge of the area.

The Wonderfonteinspruit and its tributaries are the primary surface water system near the project site, forming part of a broader watershed that ultimately flows into larger water bodies downstream. During peak rainfall events, these watercourses can experience significant flow increases, carrying stormwater runoff from both natural and anthropogenic sources. The proximity of the Libanon TSF to these watercourses necessitates stringent controls to prevent contaminated stormwater from reaching the Wonderfonteinspruit, where it could impact downstream water quality, ecosystems, and local communities. (See Figure 5-4).

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There is a tarred road (Bridges Avenue) located on the southern side of the TSF. This road has no formal stormwater drainage system (see Figure 5-2, although there is an unformed channel draining to a culvert immediately to the east of the TSF, however the inlet to the culvert is completely blocked (see Figure 5-3).



Figure 5-2 – Drainage system on Bridges Avenue



Figure 5-3 – Blocked culvert under Bridges Avenue

5.3 Soils Characteristics and Drainage

Soils in the vicinity of the Libanon TSF are generally composed of a thin layer of sandy or silty material overlying dolomitic bedrock, with low to moderate permeability. This composition poses dual challenges: the soils have limited capacity to absorb large volumes of water during intense storms, contributing to increased runoff, while the dolomitic bedrock below is vulnerable to infiltration if water accumulates or ponds. To prevent destabilization of the ground, it is essential to design drainage systems that route stormwater away from critical areas and toward safe discharge points. (See Figure 5-4).

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Information available indicates that a dolomitic stability investigation has NOT been conducted in the area of the Libanon TSF.

It must also be recorded that in the process of carrying out the groundwater study for this project, one of the boreholes drilled in close proximity to the Libanon TSF encountered a cavity.

5.4 Environmental Sensitivities and Implications for Stormwater Management

Given the site's dolomitic conditions, hydrological characteristics, and proximity to watercourses, the stormwater management strategy must be designed to:

- Limit infiltration to avoid ground subsidence and sinkhole formation;
- Ensure contaminated runoff from the TSF does not reach local watercourses or groundwater systems; and,
- Control erosion and sediment transport to protect the stability of the TSF and the quality of nearby aquatic habitats.

Overall, the presence of dolomite adds a critical layer of complexity to stormwater management for this project, requiring specialized infrastructure and best practices to protect both environmental and structural integrity.

SANS 1936 states the following:

The requirements for **dams**, reservoirs and public swimming pools (including **attenuation dams**) shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:

- a gravity survey over the site at 30 m grid spacing with a minimum of three lines;
- additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
- inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
- investigation of potential paleosinkhole structures wherever they are exposed; and,
- where justified, supplementary geotechnical site investigation.

A proposed site for dams and reservoirs (attenuation dam) should be at least 100 m from the nearest housing or commercial development.

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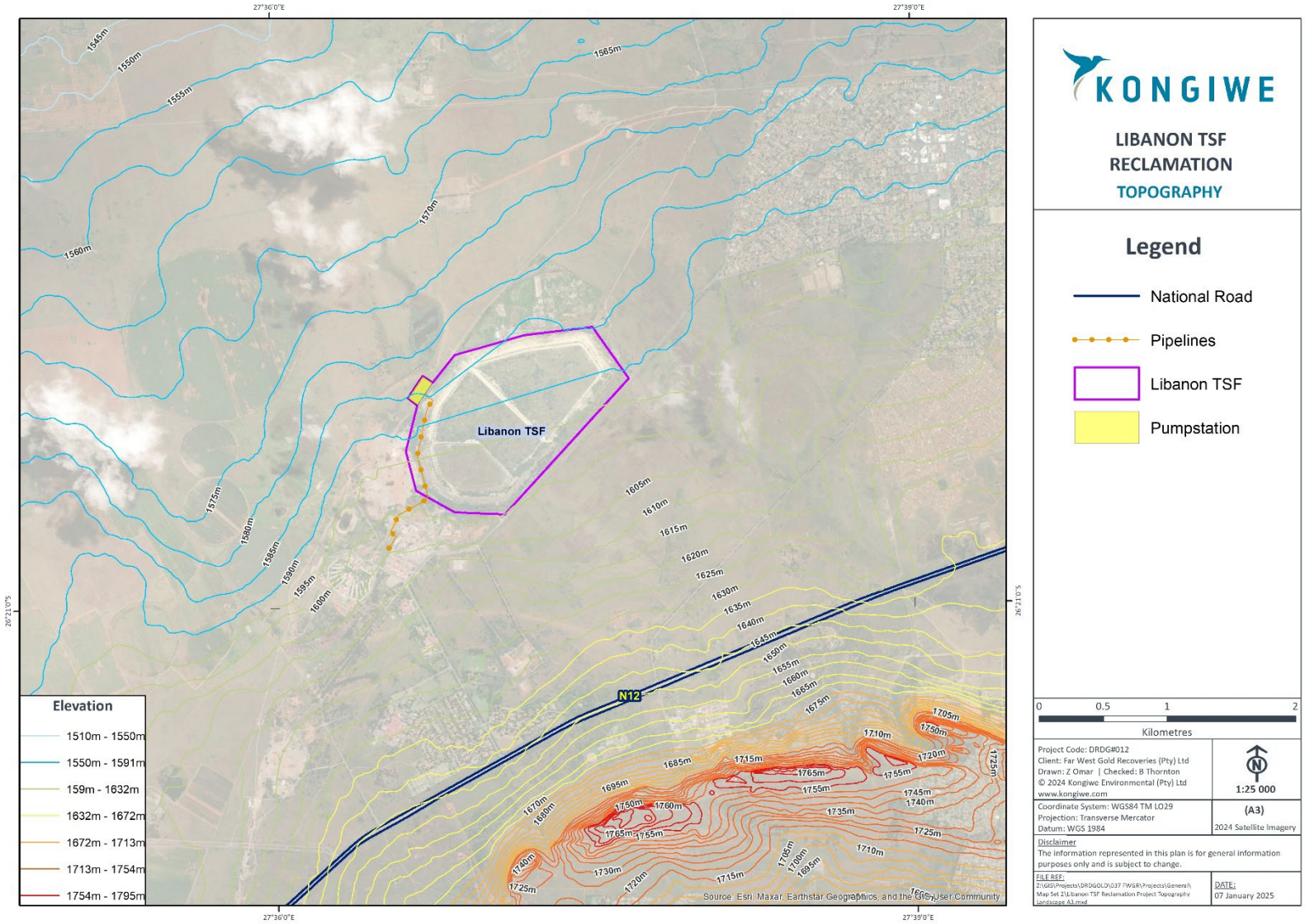


Figure 5-4 - Topography

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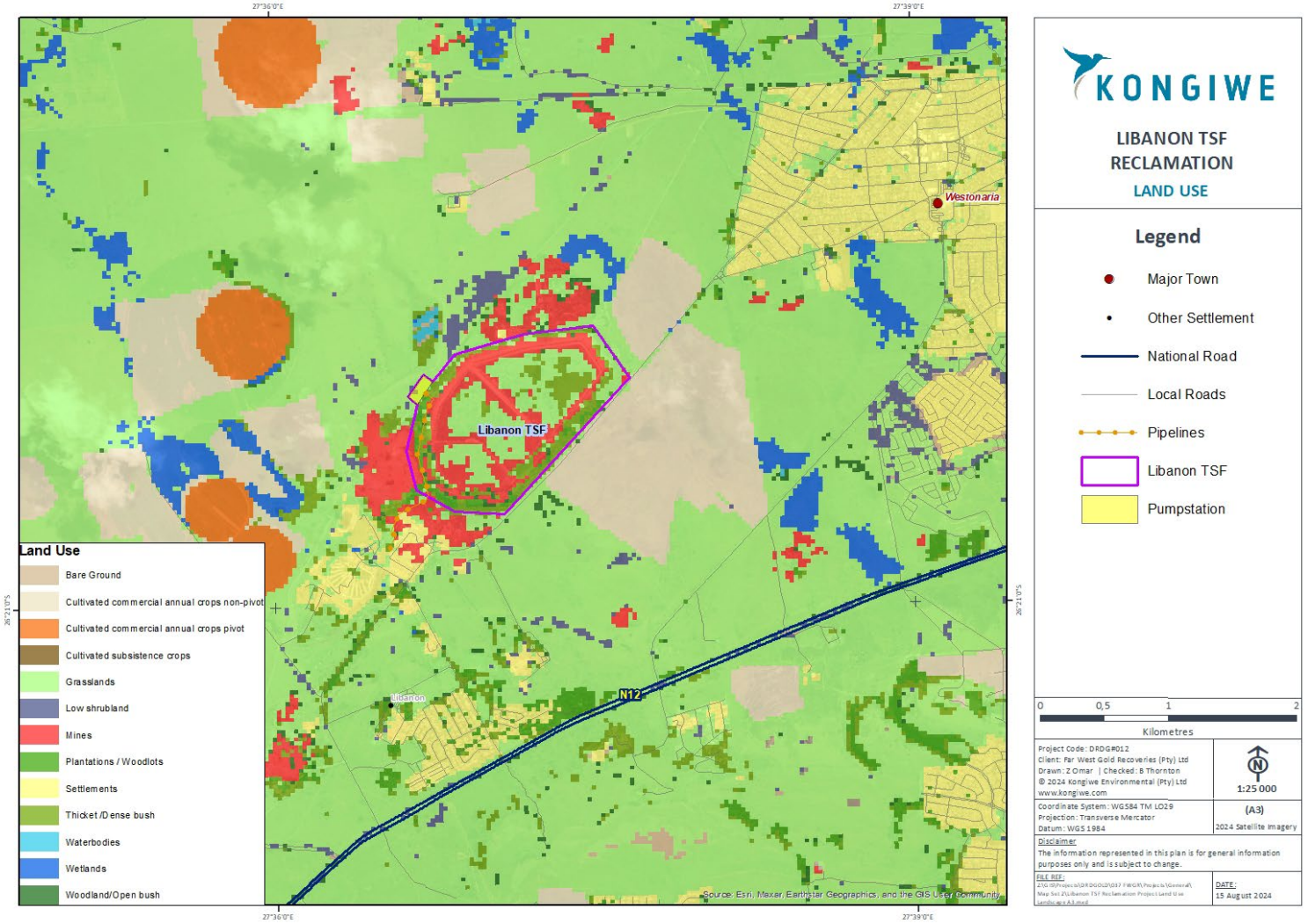


Figure 5-5 – Land Use

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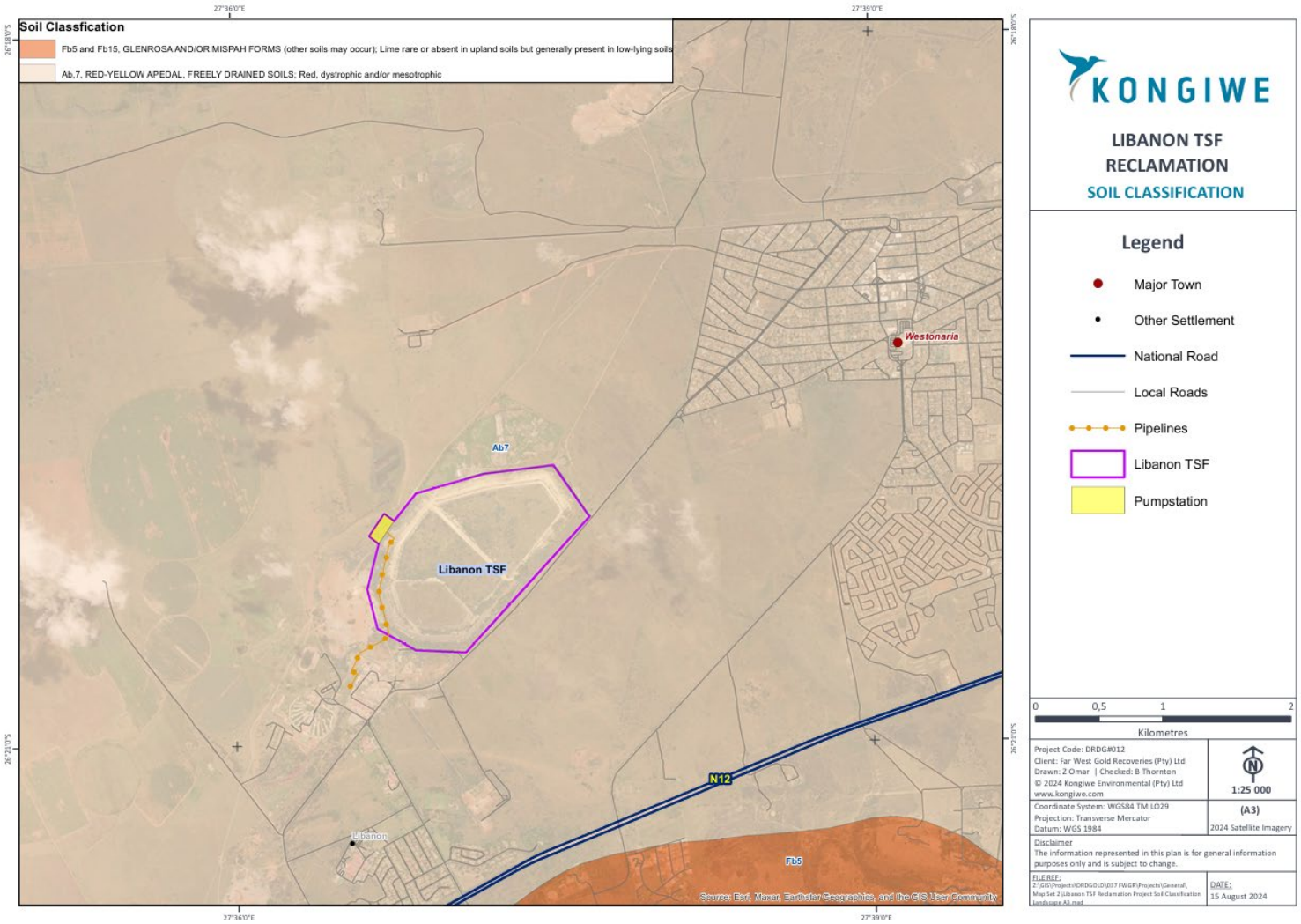


Figure 5-6 - Soils Classification

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6 PROPOSED RECLAMATION METHOD

The proposed method which will be used to remove the TSF is referred to as top-down hydraulic reclamation. This technique uses high-pressure water monitors (or mobile tracked hydraulic monitors) to deliver a high-pressure water jet to excavate unconsolidated tailings material within the TSF hydraulically. The water from the cannon mixes with the tailings and forms a slurry with a high solids content. The slurry then flows under gravity along trenches at the base of the TSF to a collection sump which is positioned at the lowest elevation of the bench being reclaimed. At the sump, finger screens remove any debris that may impact pumping operations, and a penstock will control water flow into the sump. The position of the collection sump will change as the reclamation progresses. From the collection sump, the slurry reports to a reclamation station. To control the volume of water reporting to the reclamation station, flapper valves are used to hold, and release slurry contained in the collection sump. This slurry is then pumped via pipelines to the Driefontein No. 2 Plant. At the Driefontein No. 2 Plant, the slurry is prepared and treated for gold extraction and beneficiation.



Figure 6-1 Mobile tracked hydraulic monitor on a tailings facility in South Africa

Reclamation will take place in predetermined benches (or ‘cuts’) and will move unidirectionally until the entire TSF has been reclaimed. Generally, 30 m cuts are made for reclamation as per Figure 2-4 below.

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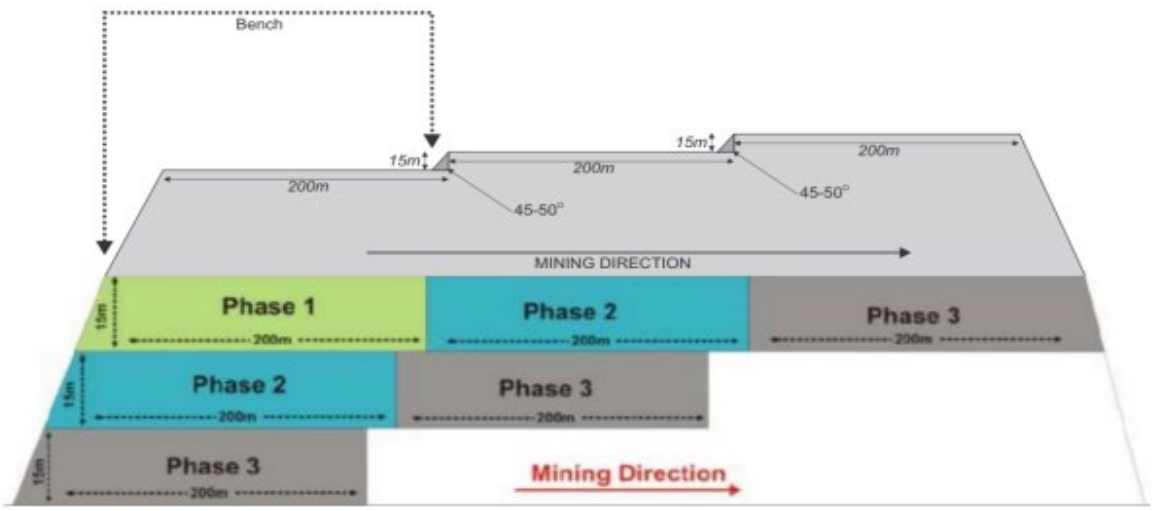


Figure 6-2 Typical bench widths proposed for a gold reclamation project (Source: www.drdgold.com/investors-and-media/circulars/cpr-samrec-wrtrp-26022018.pdf).

An earth berm is constructed on the outer edge of the benches to prevent stormwater and dirty water from contaminating the areas adjacent to the TSF.

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7 CONCEPTUAL STORMWATER MANAGEMENT PLAN

The purpose of the conceptual SWMP is to ensure that clean and dirty water are adequately separated, by diverting clean water away from dirty areas, and ensuring that dirty water from the operation is captured, contained and managed appropriately in accordance with GN R704 regulations and DWS best practice guidelines.

7.1 Stormwater Catchment Areas

The Libanon TSF has 3 catchment areas contributing stormwater runoff to it (see Figure 7-1):

- Clean water areas:
  - Libanon East – the biggest area commencing on the high lying ridge to the south, flowing northwards and concentrating at the eastern corner of the Libanon TSF; and,
  - Libanon West – commencing at the N12 to the south, flowing northwards and concentrating at the western corner of the Libanon TSF;
- Dirty water areas:
  - Libanon TSF – the TSF footprint where stormwater will be contained on the TSF by earth berms constructed as part of the reclamation process; and,
  - Paddocks constructed at the toe of the TSF, to contain stormwater runoff from the side slopes of the TSF and allowing the ponded “dirty” water to either evaporate or infiltrate.

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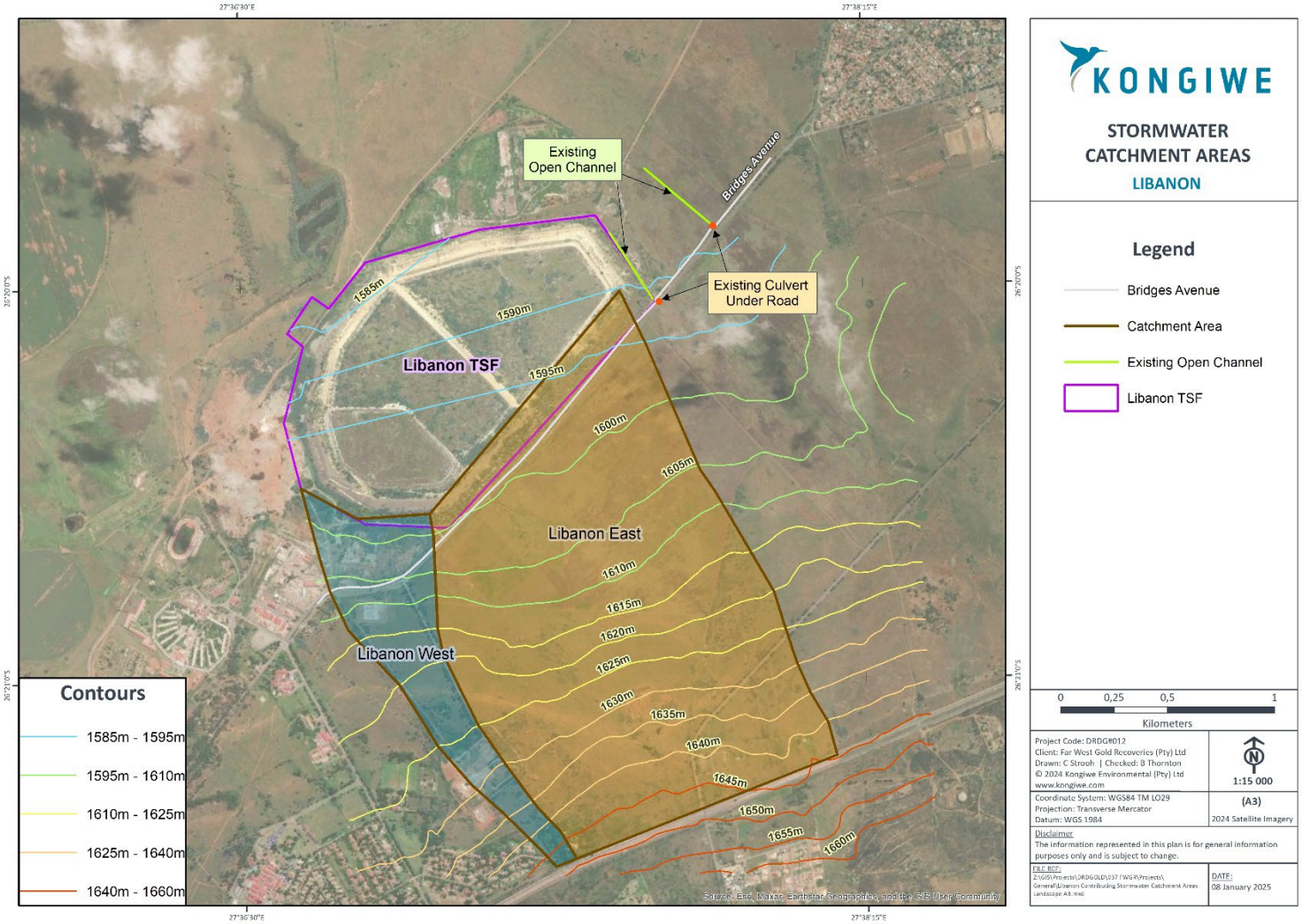


Figure 7-1 - Contributing Stormwater Catchment Areas

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7.2 Characteristics of contributing areas

7.2.1 Libanon East

- Catchment Area: 2.79 km2
- Longest watercourse: 2.597 km
- Average slope: 2.926%
- Dolomitic area: 100%

7.2.2 Libanon West

- Catchment Area: 0.54 km2
- Longest watercourse: 2.08 km
- Average slope: 2.69%
- Dolomitic area: 100%

7.2.3 Libanon TSF

- Catchment Area: 0.97 km2
- Longest watercourse: 1.21 km
- Average slope: 0.88%
- Dolomitic area: 100%

7.2.4 Libanon TSF Paddocks

- Catchment Area: 0.37 km2
- Longest watercourse: 0.07 km
- Average slope: 24.3%
- Dolomitic area: 100%

7.3 Factors used in Rational Formula Calculations

Table 7-1 – Factors used in Rational Formula Calculations

Area	Factor	Value	Comment
Libanon East	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface slope	Flat (1% - 10%)	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	Grassland	See land use
	Roughness coefficient	0.3	Sparse grass over fairly rough surface

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Area	Factor	Value	Comment
	Initial saturation	Adjustment factor for flat and permeable catchments	
Libanon West	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface slope	Flat (1% - 10%)	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	Grassland	See land use
	Roughness coefficient	0.3	Sparse grass over fairly rough surface
	Initial saturation	Adjustment factor for flat and permeable catchments	
Libanon TSF	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface slope	Vlei and pans (<3%) – 90%, Steep slopes (>30%) - 10%.	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	Grassland	See land use
	Roughness coefficient	0.3	Sparse grass over fairly rough surface
	Initial saturation	Adjustment factor for flat and permeable catchments	
Libanon Paddocks	Dolomite	100%	Underlain by Malmani dolomitic subgroup
	Surface Slope	Steep >30%	
	Permeability	Permeable (B/C)	Moderate to slow rate of water transmission
	Vegetation	No vegetation	
	Roughness Coefficient	0.26	
	Initial saturation	Adjustment factor for steep and impermeable catchments	

7.4 Calculated storm peak flows

7.4.1 Rational Formula

Table 7-2 – Calculated storm peak flows in m^3/s (Rational Formula) – Clean water areas

Return Period	Libanon East	Libanon West
2 year	1.009	0.172
5 year	1.480	0.256
10 year	1.903	0.324
20 year	2.415	0.411

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Return Period	Libanon East	Libanon West
50 year	3.470	0.594
100 year	4.613	0.791
200 year	5.045	0.865

7.5 Dirty Water Runoff under 1:50 Condition

7.5.1 Libanon TSF

The volume of dirty water contained within the berm at the top of the Libanon TSF is calculated as follows:

- 1:50 year 24 hr Storm rainfall depth 126.3 mm
- Area of Libanon TSF (top area excluding the side slopes) 96.9 ha
- Rational C factor 0.281
- Runoff volume contained on Libanon TSF 34 390 m^3

7.5.2 Libanon Paddocks

The volume of dirty water from the slopes of Libanon TSF and the paddock area is calculated as follows:

- 1:50 year 24 hr Storm rainfall depth 126.3 mm
- Area of Libanon Paddocks 37.3 ha
- Rational C Factor 0.497
- Runoff volume contained on Libanon TSF 23 414 m^3

7.6 Identified Stormwater Issues

7.6.1 Libanon East

The runoff concentrates at the north eastern corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 2% (Google Earth), the flow width will be 3.926 m and the velocity of flow is 13 m/s. This far exceeds the acceptable maximum velocity for earth of 1.2 m/s, so excessive erosion will occur. The high flow velocity will also be harmful to life.

7.6.2 Libanon West

The runoff concentrates at the north western corner of the catchment area (corner of Libanon TSF). Under the 1 in 50 year condition and the average slope of the land of 1% (Google Earth), the flow width will be 2.742 m and the velocity of flow is 7.3 m/s. However, inspections on site indicate that the land is degraded after previous developments in the area, and the flow will scatter across the area, thus reducing the velocity.

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7.6.3 Libanon TSF

With the proposed reclamation method, the stormwater runoff is being collected within the berm on top of the Libanon TSF and allowed to infiltrate or evaporate. In effect this is a dam on top of the Libanon TSF on top of underlying dolomites, so SANS 1936 must be complied with.

7.6.4 Libanon Paddocks

The stormwater runoff from the TSF side slopes and the paddocks is collected in the paddocks and allowed to infiltrate or evaporate. In effect this is a dam on top of the underlying dolomites, so SANS 1936 must be complied with.

7.7 Proposed Stormwater Measures

7.7.1 Libanon East and West

7.7.1.1 Earth Berm along Southern side of Bridges Avenue

The proposed stormwater attenuation measure for the Libanon East and West catchments are shown in Figure 7-3.

It is proposed to construct an earth berm immediately to the south of Bridges Avenue adjacent to the Libanon TSF to the existing culvert under Bridges Avenue, described as follows:

a. An earth berm top width 1 m, side slopes 1 vertical to 2 horizontal, 1 m high from point A to point B, a length of 1 845 m;

The berm detail is shown in Figure 7-2 below:

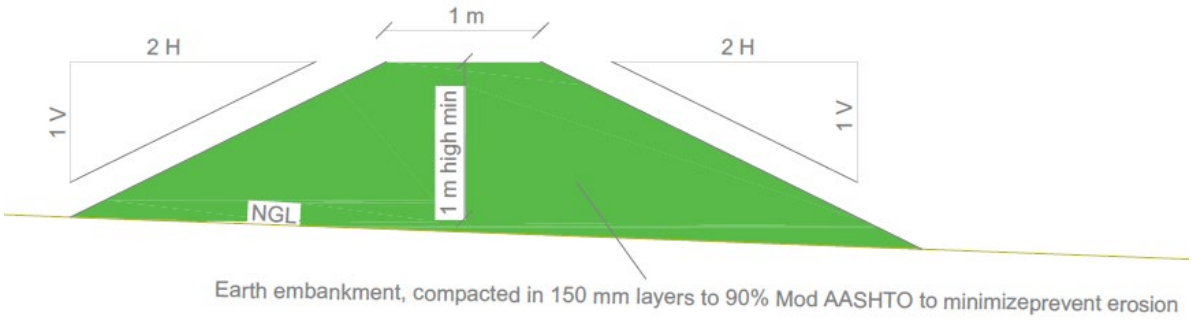


Figure 7-2 - Earth Berm Detail

The above structure will collect all the runoff from the Libanon East catchment, and 60% of the runoff from the Libanon West catchment.

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The existing culvert under Bridges Avenue must be cleaned out and reinstated to its original design state. The size of the culvert could not be ascertained, but normally these structures are designed to handle the 1 in 5 year incident. In the event of the 1 in 50 year storm, the balance of the water not going through the culvert will flow across the road surface.

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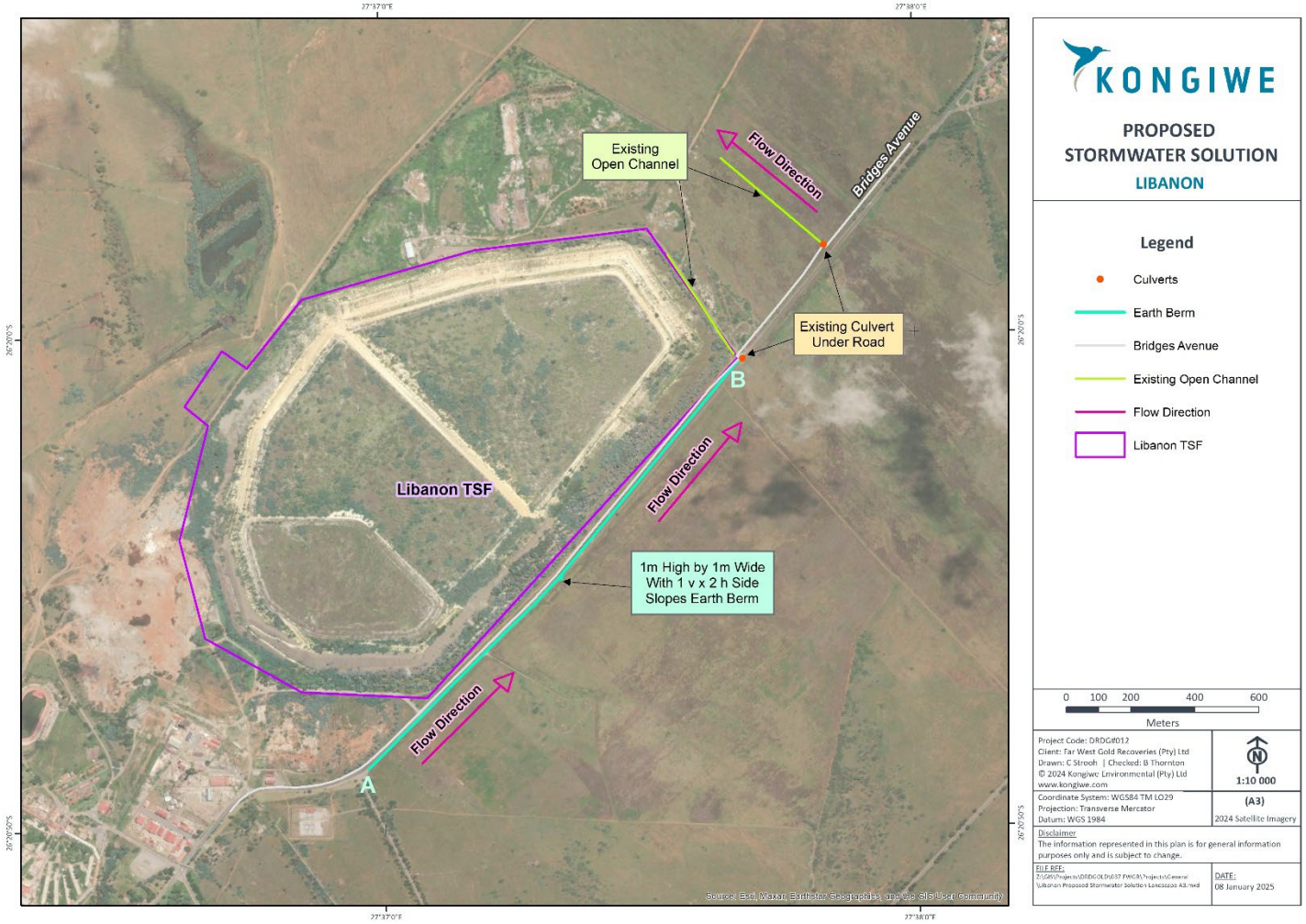


Figure 7-3 – Proposed stormwater solution

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7.7.2 Libanon TSF

It is proposed to contain all stormwater falling on the top surface of the TSF within a berm located on the outside edge of the TSF top surface.

Due to the underlying dolomitic condition, the requirements of SANS 1936 must be adhered to. This will require the following to be carried out:

1. Dolomitic stability investigation
    - General
        - Investigations shall conform to the requirements of SANS 1936-2 (4.3.2 and 4.3.3). The investigator/Competent Person (geo-professional) shall, during the investigation, confirm and refine the Inherent Hazard Zone and the associated Dolomite Area Designations and confirm that the mandatory precautions associated with a designation have been observed;
        - The investigator/Competent Person (geo-professional) shall, as a minimum to comply with the above requirements, interact with suitably qualified professionals and the person responsible for the development of the parcel of land or the relevant portions thereof concerning appropriate planning, design of infrastructure, buildings, and structures; and,
        - The investigator/Competent Person (geo-professional) shall develop a risk management plan strategy specific to the development in accordance with the requirements of SANS 1936;
    - Report
        - The investigator/Competent Person (geo-professional) shall prepare a report including the following:
            - a method description of the work undertaken;
            - a drawing indicating the location of the points profiled in the service trenches;
            - records of all profiles, boreholes and tests;
            - records of any geotechnically problematic conditions intercepted, such as paleokarts structures, sinkholes etc.;
            - a description of any additional geotechnical investigations undertaken;
            - a description of any precautionary or remedial measures applied to problematic conditions identified during the design-level inspections;
            - a site/development layout drawing which confirms the Inherent Hazard Classes and Dolomite Area Designations, in accordance with the requirements of SANS 1936;
            - an indication where the dolomite designations have been changed and provide a motivation for such changes;
            - a comprehensive list and description of any ongoing monitoring required;

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- an identification of monitoring area designations where a risk management plan has been developed; and,
- an indication that amended water precautionary measures shall apply;

- Additional Requirements for **Attenuation Dams, Retention Dams, Reservoirs** and Public Swimming Pools:
  - The requirements for dams, reservoirs and public swimming pools shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:
    - a gravity survey over the site at 30 m grid spacing with a minimum of three lines;
    - additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
    - inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
    - investigation of potential paleosinkhole structures wherever they are exposed; and,
    - where justified, supplementary geotechnical site investigations.

Note 1: The proposed site for dams and reservoirs should be at least 100 m from the nearest housing or commercial development.

2. Compilation of a Dolomite Risk Management Plan

An appropriate Dolomite Risk Management Plan is to be compiled in accordance with SANS 1936. The Dolomite Risk Management Plan is to be site specific and based on all data gathered until that time, taking cognisance of final precautionary measures, site layout and shall also contain the final Monitoring Designations. The Dolomite Risk Management Plan shall outline the responsibilities and actions of the relevant Authority and the Client Department. It is a compulsory requirement for the appointed professional service provider to prepare a site specific Dolomite Risk Management Plan (DRMP) for the development in accordance with the requirements of SANS 1936-4.

7.7.3 Libanon Paddocks

It is proposed to contain all stormwater falling on the slopes of the TSF and in the paddocks at the toe of the side slopes of the TSF within these paddocks.

Due to the underlying dolomitic condition, the requirements of SANS 1936 must be adhered to. This will require the following to be carried out:

1. Dolomitic stability investigation:
   - General

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- Investigations shall conform to the requirements of SANS 1936-2 (4.3.2 and 4.3.3). The investigator/Competent Person (geo-professional) shall, during the investigation, confirm and refine the Inherent Hazard Zone and the associated Dolomite Area Designations and confirm that the mandatory precautions associated with a designation have been observed;
- The investigator/Competent Person (geo-professional) shall, as a minimum to comply with the above requirements, interact with suitably qualified professionals and the person responsible for the development of the parcel of land or the relevant portions thereof concerning appropriate planning, design of infrastructure, buildings, and structures; and,
- The investigator/Competent Person (geo-professional) shall develop a risk management plan strategy specific to the development in accordance with the requirements of SANS 1936;

o Report
- The investigator/Competent Person (geo-professional) shall prepare a report including the following:
  - a method description of the work undertaken;
  - a drawing indicating the location of the points profiled in the service trenches;
  - records of all profiles, boreholes and tests;
  - records of any geotechnically problematic conditions intercepted, such as paleokarts structures, sinkholes etc.;
  - a description of any additional geotechnical investigations undertaken;
  - a description of any precautionary or remedial measures applied to problematic conditions identified during the design-level inspections;
  - a site/development layout drawing which confirms the Inherent Hazard Classes and Dolomite Area Designations, in accordance with the requirements of SANS 1936;
  - an indication where the dolomite designations have been changed and provide a motivation for such changes;
  - a comprehensive list and description of any ongoing monitoring required;
  - an identification of monitoring area designations where a risk management plan has been developed; and,
  - an indication that amended water precautionary measures shall apply.

o Additional Requirements for **Attenuation Dams, Retention Dams, Reservoirs** and Public Swimming Pools
- The requirements for dams, reservoirs and public swimming pools shall comply with the requirements of SANS 1936-2, Annex A (A.8). The investigation shall also include the following:
  - a gravity survey over the site at 30 m grid spacing with a minimum of three lines;

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- additional investigations for alternative sites in the event that Inherent Hazard Class 3, 5, 6, 7 and 8 conditions (refer to SANS 1936) are encountered;
- inspection of the excavation to verify the stability zonation and to check for paleokarst structures;
- investigation of potential paleosinkhole structures wherever they are exposed; and,
- where justified, supplementary geotechnical site investigations.

Note 1: The proposed site for dams and reservoirs should be at least 100 m from the nearest housing or commercial development.

2. Compilation of a Dolomite Risk Management Plan

   An appropriate Dolomite Risk Management Plan is to be compiled in accordance with SANS 1936. The Dolomite Risk Management Plan is to be site specific and based on all data gathered until that time, taking cognisance of final precautionary measures, site layout and shall also contain the final Monitoring Designations. The Dolomite Risk Management Plan shall outline the responsibilities and actions of the relevant Authority and the Client Department. It is a compulsory requirement for the appointed professional service provider to prepare a site specific Dolomite Risk Management Plan (DRMP) for the development in accordance with the requirements of SANS 1936-4.

8 RECOMMENDATIONS

The following is recommended:

- The existing berm/channel system around the TSF are reinstated where damaged, and maintained. This system acts as the containment of the dirty water from the Libanon TSF side slopes;
- The “clean” runoff from the high lying areas above the Libanon TSF is deviated away from the Libanon TSF by an earth berm constructed immediately to the south of Bridges Avenue, up to the existing culvert under Bridges Avenue to the east of the Libanon TSF. The existing culvert is in a poor state of repair and will have to be reinstated; and,
- A dolomitic stability investigation be carried out around the Libanon TSF to confirm that the proposed reclamation method and stormwater containment on top of the TSF and in paddocks around the TSF is acceptable and in accordance with SANS 1936, and a dolomitic risk management plan be developed.

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APPENDIX A:
Curriculum Vitae : H D N Sparks

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Name	**Sparks Hilton D N**
Profession:	Civil Engineer
Date of Birth:	1 August 1947
Nationality:	South African
ID number:	4708015052081

Membership in Professional Societies:

- Professional Engineer Pr Eng 740604;
- Professional Construction Project Manager D/202/2004;
- Member of the South African Institute of Civil Engineers; and,
- Member of South African Institute of Municipal Engineers.

KEY QUALIFICATIONS

Has vast experience in many of the disciplines related to the provision, design, operation and maintenance of civil engineering municipal infrastructure, bulk water supply system design and assessment, risk assessment related to bulk water distribution, project management of large infrastructure projects, management, construction management, formulating and implementing strategies, research and development, bulk sanitation services and knowledge of OHS and environmental matters.

EDUCATION:

- B Sc (Eng), University of Natal – 1969;
- Diploma in Business Management, Damelin – 1977; and,
- NQF 7 Labour Intensive Construction.

PUBLICATIONS:

- "The IDT Capital Subsidy Scheme in the Transvaal - 30 months later" - Housing in Southern Africa, May 1994;
- Layout Planning and Stormwater Management, Afritech Conference, SA Development Bank, June 1992;
- Managing the Environmental Impact of Current and Future Development, Low-Cost Housing and Urbanization Conference, September 1994;
- Katorus: Repairs to Houses Damaged in Unrest, Housing for Africa International Conference, August 1997;
- Katorus wins Impumelelo Award, Housing in Southern Africa, December 2000; and,
- A housing project brings some peace to Katorus and is rewarded with an Impumelelo Award, IMIESA Journal, February 2001.

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AWARDS

- Masimanyane Award for innovation and excellence in engineering – Repairs to Damaged Houses Project, Katorus – 1997; and,
- Impumelelo Award for innovative dedicated work in the field of poverty reduction and community development – Repairs to Damaged Houses Project, Katorus – 2000.

ADDITONAL COURSES

Has attended many courses over the period, most relevant are:

1. Project Management Professional, SAACE course, Johannesburg;
2. Epanet Course, University of Johannesburg; and,
3. NQF 7 Labour Intensive Construction, Johannesburg.

EXPERIENCE RECORD:

January 2024 to date - Kongiwe Environmental (Pty) Ltd

Responsible for the investigation, design (civil works) and the overall project management of environmental projects:

- Surface Water Studies – 7L1 Pump Station, Libanon TSF and Kloof Venterspost TSF;
- Project Management systems for all active Environmental projects; and,
- As-Built drawings – Harmony Gold Mining Free State Operations.

September 2020 to December 2023 - Consultant to Impofu Engineering

Responsible for the investigation, design (civil works) and the overall project management during the design phase in respect of a range of multi-disciplinary engineering projects:

- Project Management of Proposed Gauteng Disaster Management Centre, R2 billion, on hold pending acquisition of land, Gauteng Department of Infrastructure Development;
- Project Manager and Water Engineer for Restoration of Water to Amajuba District Council, KZN Department of Corporate Governance and Traditional Affairs;
- Technical Manager for Construction of Lehae Clinic, Cultura School and Father Smangaliso School, Gauteng Department of Infrastructure Development; and,
- Project Manager for Construction of Marapong Housing Development, Limpopo Department of Corporate Governance and Traditional Affairs.

December 2010 to January 2020 - Scriptio (Pty) Ltd

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- Programme management of Orange Farm projects for City of Johannesburg Project Management Unit; and,
- Stormwater management and irrigation usage computerised model at Golf Course for Johannesburg Country Club;
- Surface Water Resource Study for Johannesburg Country Club.

January 1994 to December 2010 - Phumaf Consulting Engineers

January 1985 to January 1994 - Brain Leech Associates

January 1980 to January 1985 - Hill Kaplan Scott

Responsible for the investigation, design (civil works) and the overall project management during the design phase in respect of a range of multi-disciplinary engineering projects:

- Township Infrastructure in many high-income residential townships:
  - Randparkrif Ext 25 - 700 erven; Hurlingham Ext 5 - 600 erven; Benmore Gardens Ext 3 - 250 erven; The Orchards Ext 13 - 350 erven; The Orchards Ext 16 - 240 erven; Sunward Park Ext's 3, 4 and 5 - 1 000 erven; Wilgeheuwel Ext 3 - 250 erven; Jukskeipark Ext 5 - 250 erven; Bloubosrand Ext 2 - 250 erven;
- Stormwater drainage layouts at planning and detail design stages for numerous townships;
- Hydraulic design for numerous pipe networks for township water supplies;
- Floodlines for numerous streams;
- Analysis of Randburg Northern Areas Water Master Plan, and design of 350/400/450/600 mm Kya Sand Bulk Water Main for Randburg Town Council;
- Sewerage Master Plan for Randburg Northern Areas for Randburg Town Council;
- Engineering services for Moffat View Ext 4 for City of Johannesburg;
- Engineering services for Atteridgeville Ext 19 and Capital Park for City of Tshwane;
- Engineering services for City Deep Extensions 26 and 28 for JOSHCO;
- Township infrastructure in industrial and commercial townships:
  - Rustivia Ext 3, Germiston; Strydom Park Ext 21, Randburg; Alrode Ext 19, Alberton; Sandown Ext 52, Sandton;
- Container Depot at Nelspruit;
- Engineering design and contract documentation for numerous golf courses and golf course estates for Gary Player Group;
- Design of 1 200 mm diameter deviation of Johannesburg Cydna Outfall Sewer through Falcon Crest property;
- Township infrastructure in low-income residential townships for Gauteng Department of Housing, including:
  - Phola Extension, Ogies - 1 340 erven; Vosloorus Ext 25 - 1 800 erven; Vosloorus Ext 9 - 1 436 erven; Vosloorus Ext 26 - 350 erven; Moleleki Ext's 1 & 2 - 1 346 erven; Dobsonville Gardens - 1 000 erven; Mabopane Unit M - 1 500 erven; Tembisa Ext 12 –480 erven; Phuthaditjhaba Unit

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L - 350 erven; Magagula Heights –800 erven; Soshanguve South Ext's 11, 12 and 13 – 5 000 erven;

- Township infrastructure in low income residential townships for Qwaqwa Department of Housing, in Phuthaditjhaba Unit L - 350 erven;
- Report on water supply to Ogies Area, including assessment of existing purification works for Gauteng Department of Housing;
- Assessment of existing sewer network at Steve Bikoville for Gauteng Department of Housing;
- Bulk services to Phola Extension township including potable water ground reservoir and rising main, elevated water tower and sewage Pump Station for Gauteng Department of Housing;
- Project management of SAFA House construction for South African Football Association;
- Project Management of Soccer City Stadium for 2010 World Cup;
- Project management of staff village for Nissan employees - 300 houses;
- Project management of construction of Buhlebemfundo Secondary School in Tsakane using emerging contractors for Gauteng Department of Education;
- Project management of engineering component of Alexandra Renewal Project for Gauteng Department of Housing;
- Project management of repairs to violence damaged houses in Katorus - 2 400 houses for Gauteng Department of Housing;
- Project management of repairs to violence damaged houses in the balance of Gauteng - 400 houses for Gauteng Department of Housing;
- Housing functional coordinator for Katorus Special Presidential Project for Gauteng Department of Housing;
- Project management of Regional Professional Team for Gauteng Department of Housing for implementation of housing backlog in the Tshwane and Metsweding areas;
- Project management of Professional Resource Team for Gauteng Department of Housing for implementation of housing backlog in the Tshwane and Metsweding areas; and,
- Co-ordinating Technical Consultant for Transvaal IDT capital subsidy scheme.

January 1970 to December 1979 - Rand Water Board

Responsible for the investigation, design (civil works) and the overall project management during the design phase in respect of a range of multi-disciplinary engineering projects:

- Engineer in charge of Rand Water Board construction team, involved in many types of work from weirs on rivers to Pump Stations to pipelines;
- Project Manager for 800 Ml/d capacity water purification works at Zuikerbosch Pump Station for Rand Water Board;
- Project coordination and critical path planning of 600 Ml/d capacity water purification works at Zuikerbosch Pump Station for Rand Water Board;
- Design of measuring weirs on numerous rivers flowing into the Vaal River Barrage Catchment for Rand Water Board;
- Model filter tests to ascertain the effectiveness of dual media (anthracite/sand) filter beds as opposed

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to normal single media (sand) filter beds for Rand Water Board;

- Design of "Crump" weir between abutments of railway bridge on Klip River for Rand Water Board;
- Hydraulic and structural design of 2 100 mm diameter steel pipeline, 80 km long for Rand Water Board;
- Hydraulic and structural design of 3 500 mm diameter steel pipeline to carry raw water from Vaal Dam to purification works for Rand Water Board;
- Hydraulic and structural design of 800 mm/ 900 mm/ 1 200 mm diameter steel pipeline for Rand Water Board;
- Tests on strength of in-situ cement mortar lining to steel pipelines, especially when subjected to water hammer surges for Rand Water Board;
- Structural design of wall section for Sasolburg Reservoir for Rand Water Board;
- Structural design of underground coal bunker, Vereeniging Pump Station for Rand Water Board;
- Structural design, 60 No hopper bottomed sedimentation tanks, Zuikerbosch Pump Station for Rand Water Board;
- Structural design, 3 500 mm diameter steel pipeline including tests to confirm design for Rand Water Board.

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APPENDIX B:
Rational Method Stormwater Peak Flow Calculations

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Rational Method

Description of catchment :	Libanon East	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	2.7900	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	2.597	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1649	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1592	MSL	Weather Service station	Springs	
Average slope (S_{av})	0.02926	m/m	Weather Service number	476736	
Over landflow length	3	km	Area distribution factors		
$H_{100\%}$	1649	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1592	MSL	100%	0%	0%
Average slope (S_{av})	0.01900	m/m	Notes:	Libanon East Catchment Area	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	100	%			

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%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.310**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	0%	0.950	0.000
Maximum Flood	0%	1.000	0.000
	0%		
Total (C_2)			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.451 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.539 Hours

Notes: Working area assumed to be paved

$T_{C\text{ - TOTAL}}$	**1.45**	Hours	V=	**0.50**	m/s

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Description of catchment :	Libanon East		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.062	0.062	0.062	0.062	0.062	0.062	0.062
Adjusted factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.031	0.034	0.037	0.042	0.051	0.062	0.062
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.031*	*0.034*	*0.037*	*0.042*	*0.051*	*0.062*	*0.062*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	42.324	56.386	65.899	75.067	87.061	96.160	105.328
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*42.000*	*56.000*	*66.000*	*75.000*	*87.000*	*96.000*	*105.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***1.009***	***1.480***	***1.903***	***2.415***	***3.470***	***4.613***	***5.045***

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Rational Method

Description of catchment :	Libanon West	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	0.5400	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	2.08	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1657	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1615	MSL	Weather Service station	Blyvooruitzicht	
Average slope (S_{av})	0.02692	m/m	Weather Service number	474684	
Over landflow length	2	km	Area distribution factors		
$H_{100\%}$	1657	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1615	MSL	100%	0%	0%
Average slope (S_{av})	0.02100	m/m	Notes:	Libanon West Catchment Area	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	100	%			

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%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.310**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	0%	0.950	0.000
Maximum Flood	0%	1.000	0.000
	0%		
Total (C_2)			**0.000**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.173 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.469 Hours

Notes:

$T_{C\text{ - TOTAL}}$	**1.64**	Hours	V=	**0.35**	m/s

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Description of catchment :	Libanon West		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.310	0.310	0.310	0.310	0.310	0.310	0.310
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.062	0.062	0.062	0.062	0.062	0.062	0.062
Adjusted factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.031	0.034	0.037	0.042	0.051	0.062	0.062
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.031*	*0.034*	*0.037*	*0.042*	*0.051*	*0.062*	*0.062*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	37.403	49.831	58.237	66.339	76.939	84.980	93.082
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*37.000*	*50.000*	*58.000*	*66.000*	*77.000*	*85.000*	*93.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***0.172***	***0.256***	***0.324***	***0.411***	***0.594***	***0.791***	***0.865***

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Rational Method

Description of catchment :	Libanon TSF	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	1.3400	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	1.21	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1630	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1622	MSL	Weather Service station	Blyvooruitzicht	
Average slope (S_{av})	0.00882	m/m	Weather Service number	474684	
Over landflow length	0.8	km	Area distribution factors		
$H_{100\%}$	1627	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1622	MSL	100%	0%	0%
Average slope (S_{av})	0.00625	m/m	Notes:	Libanon TSF Catchment Area	
Roughness coefficient (r)	0.3				
Dolomite area ($D_{\%}$)	100	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	90%	0.01	0.009
Flat areas (3% - 10%)	0%	0.06	0
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	10%	0.22	0.022
Total	**100%**		**0.031**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	0%	0.26	0
Total	**100%**		**0.17**
Total (C_1)			**0.281**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	100%	0.950	0.950
Maximum Flood	0%	1.000	0.000
	100%		
Total (C_2)			**0.950**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

1.015 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.475 Hours

Notes:

$T_{C\text{ - TOTAL}}$	**1.49**	Hours	V=	**0.23**	m/s

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Description of catchment :	Libanon TSF		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.281	0.281	0.281	0.281	0.281	0.281	0.281
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(\text{sum}(D_{factor} \times C_{S\%}))$	0.039	0.039	0.039	0.039	0.039	0.039	0.039
Adjusted factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.020	0.022	0.024	0.026	0.033	0.039	0.039
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.020*	*0.022*	*0.024*	*0.026*	*0.033*	*0.039*	*0.039*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	41.226	54.923	64.189	73.119	84.802	93.665	102.595
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*41.000*	*55.000*	*64.000*	*73.000*	*85.000*	*94.000*	*103.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***0.300***	***0.443***	***0.562***	***0.716***	***1.033***	***1.376***	***1.508***

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Rational Method

Description of catchment :	Libanon TSF	Road Chainage :	
River detail :			
Calculated by :	Hilton Sparks	Date:	06-Nov-24

Physical characteristics

Size of catchment (A)	0.3700	km^2	Mean annual Rainfall (MAP)	711	mm
Longest watercourse (L)	0.07	km	2-year return period rainfall (M)		mm
$H_{85\%}$	1630	MSL	Days of thunder per year (R)		days/year
$H_{10\%}$	1613	MSL	Weather Service station	Blyvooruitzicht	
Average slope (S_{av})	0.24286	m/m	Weather Service number	474684	
Over landflow length	0.07	km	Area distribution factors		
$H_{100\%}$	1630	MSL	Rural (α)	Urban (β)	Lakes (γ)
$H_{0\%}$	1613	MSL	100%	0%	0%
Average slope (S_{av})	0.24286	m/m	Notes:	Libanon TSF Catchment Area	
Roughness coefficient (r)	0.26				
Dolomite area ($D_{\%}$)	100	%			

Rural

Surface slope	%	Factor	C_s
Vleis and pans (< 3%)	30%	0.01	0.003
Flat areas (3% - 10%)	0%	0.06	0
Hilly (10% - 30%)	0%	0.12	0
Steep areas (> 30%)	70%	0.22	0.154
Total	**100%**		**0.157**
Permeability	%	Factor	C_p
Very permeable (A)	0%	0.03	0
Very Permeable (A/B)	0%	0.04	0
Permeable (B)	0%	0.06	0
Permeable (B/C)	100%	0.08	0.08
Semi-permeable (C)	0%	0.12	0
Semi-permeable (C/D)	0%	0.16	0
Impermeable (D)	0%	0.21	0
Total	**100%**		**0.08**
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	0%	0.07	0
Cultivated land	0%	0.17	0
No vegetation	100%	0.26	0.26
Total	**100%**		**0.26**
Total (C_1)			**0.497**

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	0%	0.100	0.000
Sandy, Steep (>7%)	0%	0.200	0.000
Heavy soil, flat (<2%)	0%	0.170	0.000
Heavy soil, Steep (>7%)	0%	0.350	0.000
Residential areas			
Houses	0%	0.500	0.000
Flats	0%	0.700	0.000
Industry			
Light industry	0%	0.800	0.000
Heavy industry	0%	0.900	0.000
Business			
City centre	0%	0.950	0.000
Suburban	0%	0.700	0.000
Streets	100%	0.950	0.950
Maximum Flood	0%	1.000	0.000
	100%		
Total (C_2)			**0.950**

Time of Concentration (Tc)

Overland flow

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$$

0.129 Hours

Defined watercourse

$$T_C = \left(\frac{0{,}87L^2}{1000S_{av}}\right)^{0{,}385}$$

0.015 Hours

Notes:

$T_{C\text{ - TOTAL}}$	**0.25**	Hours	V=	**0.08**	m/s

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Description of catchment :	Libanon TSF		Road Chainage :				
Run-off Coefficient							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Run-off coefficient C_1 ($C_1=C_s+C_p+C_v$)	0.497	0.497	0.497	0.497	0.497	0.497	0.497
Adjusted for dolomitic areas, C_{1D} ($=C_1(1-D_{\%})+C_1D_{\%}(sum(D_{factor} \times C_{S\%}))$	0.189	0.189	0.189	0.189	0.189	0.189	0.189
Adjusted factor for initial saturation, F_t	0.750	0.800	0.850	0.900	0.950	1.000	1.000
Adjusted run-off coefficent, C_{1T} ($=C_{1D} \times F_t$)	0.142	0.151	0.161	0.170	0.179	0.189	0.189
Combined run-off coefficient C_T ($=\alpha C_{1T}+\beta C_2+\gamma C_3$)	*0.142*	*0.151*	*0.161*	*0.170*	*0.179*	*0.189*	*0.189*
Rainfall							
Return period (years), T	**2**	**5**	**10**	**20**	**50**	**100**	**200**
Point Rainfall - SCS data (mm) P_T	61.400	81.800	95.600	108.900	126.300	139.500	152.800
Point intensity (mm/h) $P_{iT}=(P_T/T_C)$	245.600	327.200	382.400	435.600	505.200	558.000	611.200
Area reduction factor (%) ARF_T	100	100	100	100	100	100	100
Average intensity (mm/h) $I_T=(P_{iT} \times ARF_T)$	*246.000*	*327.000*	*382.000*	*436.000*	*505.000*	*558.000*	*611.000*
Peak Flow (m^3/s) $Q_T=C_TI_TA/3,6$	***3.581***	***5.078***	***6.303***	***7.617***	***9.312***	***10.831***	***11.860***