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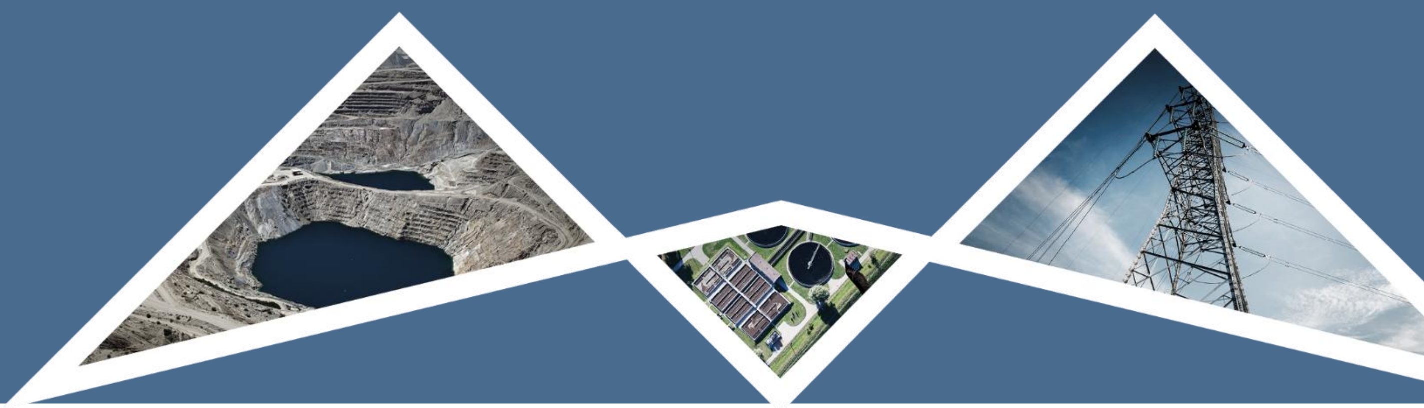
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

HARMONY GOLD:
MPONENG LOWER COMPARTMENT TAILING STORAGE FACILITY (REDEPOSITION)
(GP) 30/5/1/2/2 (01) MR

FEBRUARY 2026



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ACRONYMS AND ABBREVIATIONS

APPA:	Air Pollution Prevention Act
AQSR:	Air Quality Sensitive Receptors
ASTM:	American Standard Testing Methodology
CA:	Competent Authority
CARA:	Conservation of Agricultural Resources Act, 1983
CBA:	Critical Biodiversity Area
CCAM:	Conformal-Cubic Atmospheric Model
CMA:	Catchment Management Agency
CO_2:	Carbon Dioxide
C-Plan:	Conservation Plan
DAFF:	Department of Agriculture, Forestry and Fisheries (now DFFE)
DEA:	Department of Environmental Affairs (now DFFE)
DFFE:	Department of Forestry, Fisheries and the Environment
DMPR:	Department of Mineral and Petroleum Resources
DMRE:	Department of Mineral Resources and Energy (now DMPR)
DSO:	Dam Safety Office
DWS:	Department of Water and Sanitation
EA:	Environmental Authorisation
EAP:	Environmental Assessment Practitioner
EC:	Electrical Conductivity
ECA:	Environmental Conservation Act
EIA:	Environmental Impact Assessment
EIMS:	Environmental Impact Management Services (Pty) Ltd
ELWU:	Existing Lawful Water Use
EMPr:	Environmental Management Programme
EN:	Endangered
ESA:	Ecological Support Areas
GA:	General Authorisation
GCM:	Conformal-Cubic Atmospheric Model
GDARD	Gauteng Department of Agriculture and Rural Development
GHG:	Greenhouse Gasses
GN:	Government Notice
GNR:	Government Notice Regulation
GQM:	Groundwater Quality Management
Ha:	hectare

HIA:	Heritage Impact Assessment
I&AP:	Interested and Affected Party
IDP:	Integrated Development Plan
IEM:	Integrated Environmental Management
IPCC:	Intergovernmental Panel on Climate Change
IWML:	Integrated Waste Management Licence
km:	kilometre
ktpm:	kilotonnes per month
LC:	Leachable Concentration
LED:	Local Economic Development
LOM:	Life of Mine
m:	meters
MAE:	Mean Annual Evaporation
mamsl:	meters above mean sea level
MAP:	Mean Annual Precipitation
MAR:	Mean Annual Runoff
MCLC:	Merafong City Local Municipality
mm:	millimetres
MPRDA:	Minerals and Petroleum Resources Development Act, 2002
MR:	Mining Right
Mt:	Megatonne
µm:	micrometres
NAAQS:	National Ambient Air Quality Standards
NAEIS:	National Atmospheric Emissions Inventory System
NB:	Nominal Bore
NDP:	National Development Plan
NEMA:	National Environmental Management Act, 1998
NEM:AQA:	National Environmental Management: Air Quality Act, 2004
NEM:WA:	National Environmental Management: Waste Amendment Act, 2008
NEMBA:	National Environmental Management: Biodiversity Act, 2004
NGDB:	National Groundwater Database
NGO:	Non-Governmental Organization
NHRA:	National Heritage Resources Act, 1999
NNR:	National Nuclear Regulator
NORM:	Naturally Occurring Radioactive Material
NT:	Near Threatened

NWA:	National Water Act, 1998
ONAs:	Other Natural Areas
PHRAG:	Provincial Heritage Resources Authority Gauteng
PSDF:	Provincial Spatial Development Framework
PIA:	Palaeontological Impact Assessment
PM:	Particulate Matter
PM_{10}:	Particulate Matter with an aerodynamic diameter of 10 micrometers or smaller
$PM_{2.5}$:	Particulate Matter with an aerodynamic of 2.5 micrometers or less
PPP:	Public Participation Process
PPR:	Public Participation Report
RCP:	Representative Concentration Pathways
RE:	Remaining Extent / Remainder
RWD:	Return Water Dam
SAHRA:	South African Heritage Resources Agency
SANS:	South African National Standards
SCC:	Species of Conservation Concern
SDF:	Spatial Development Framework
SLP:	Social & Labour Plan
SPLUMA:	Spatial Planning and Land Use Management Act
SWMP:	Stormwater Management Plan
TC:	Total concentration
TDS:	Total Dissolved Solids
TSF:	Tailings Storage Facility
TSP:	Total Suspended Particulates
WMA:	Water Management Area
WML:	Waste Management License
WRDM:	West Rand District Municipality
WULA:	Water Use License Application
WUL:	Water Use Licence

GLOSSARY OF TERMS

This section provides a catalogue of terms and definitions, which may be used in this report and, or other documents drafted for the project.

Table 1: Glossary of terms

Term	Definition
Alien Invasive Species	Species of plants, animals or other organisms that are not indigenous to a region and which easily spread and destroy the indigenous plant species, taking over an area and causing biological and socio-economic harm.
Applicant	A person who has submitted an application for an environmental authorisation to the competent authority and has paid the prescribed fee.
Buffer	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted
Basic Assessment Process	An environmental assessment process that is undertaken in line with Listing Notices 1 and 3 in terms of the NEMA EIA Regulations with the aim of obtaining Environmental Authorisation.
Clearing/Clearance	Clearing/Clearance refers to the removal of vegetation through permanent eradication and in turn no likelihood of regrowth. 'Burning of vegetation (e.g. fire-breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated'.
Competent Authority	An organ of state charged by the National Environmental Management Act (NEMA) with evaluating the environmental impact of an activity and, where appropriate, with granting or refusing an environmental authorisation in respect of that activity.
Conservation Plan Areas (C-Plan Areas)-	A tool developed by the Environmental Provincial Department to identify sensitive areas. The main purposes of this tool is to: • serve as the primary decision support tool for the biodiversity component of the Environmental Impact Assessment (EIA) process. • inform protected area expansion and biodiversity stewardship programmes in the province; and serve as a basis for development of Bioregional Plans in municipalities within the province. Some of the aspects that inform the identification of C-Plan Areas include Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESA's), Watercourses, Ridges, Protected Areas, etc
Critical Biodiversity Area	Areas that are deemed important to conserve ecosystems and species. For this reason, these areas require protection.
Cultural significance	Means aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance.
Development	Means the building, erection, construction or establishment of a facility, structure, or infrastructure, including associated earthworks or Quarries, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or quarries, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.
Development Footprint (also referred to as study area)	Any evidence of physical alteration as a result of the undertaking of any activity. For purposes of this report, it refers to actually area being assessed and will likely be altered / developed should the project proceed.

Decommissioning	Means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily recommissioned.
Environment	the surroundings within which humans exist and that are made up of— (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Ecological Support Area	Areas that support the ecological functioning of protected areas or CBAs or provide important ecological infrastructure.
Environmental Assessment Practitioner	Individual responsible for the planning, management, coordination or review of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instruments introduced through regulations.
Environmental Authorisation	This is a decision by a Competent Authority to authorise a listed activity in terms of the National Environmental Management Act (NEMA). The authorisation means that a project, either in totality or partially, can commence subject to certain conditions. The Competent Authority has a right to refuse to grant authorisation for a project in totality or partially.
Environmental Impact Assessment Process:	An environmental assessment process that is undertaken in line with Listing Notice 2 the NEMA EIA Regulations with the aim of obtaining Environmental Authorisation.
Environmental Management Programme:	A programme with set objectives and timeframes that seek to achieve a required end state and describes how activities that have or could have an adverse impact on the environment will be mitigated, controlled, and monitored.
Flora	Plant life that occurs in a specific geographical region and/habitat.
Fauna	Animal life that occurs in a specific geographical region and/habitat.
Heritage Resource	Means any place or object of cultural significance.
Indigenous Vegetation	Plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Interested and Affected Party	In relation to an application for Environmental Authorisation, this refers to an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 42 of the NEMA EIA Regulations. This party will ideally be interested in the development but also affected by the proposed application and have a certain interest in the application.
Listed Activity	The activities listed in Appendix 1, identified in terms of section 24(2) (a) of the Act as activities that may not commence without an environmental authorisation from the competent authority
Particulate Matter	Refers to a complex mixture of microscopic solid particles and liquid droplets suspended in the air, including dust, smoke, and soot. It is categorized by size, with the most hazardous being fine particles ($PM_{2.5}$) that are 2.5 micrometers or smaller in diameter, and inhalable particles (PM_{10}) that are 10 micrometers or smaller.
Public Participation Process	In relation to the assessment of the environmental impact of any application for an environmental authorisation, means a process by which potential Interested and Affected Parties are given opportunity to comment on, or raise issues relevant to, the application.

Regulated area of a watercourse:	Refers to: • The outer edge of the 1:100-year flood line and /or delineated riparian habitat whichever is the greatest measured from the middle of a river, spring, natural channel, lake or dam. • In the absence of a determined 1:100-year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act). • 500m radius from the delineated boundary of any wetland or pan.
Return Water Dam	A return water dam is a purpose-built facility, often on a mine, that stores and controls process water, which is then pumped back to the plant or to a reclamation site.
Ridge	A ridge is a long, narrow, elevated geomorphologic landform, structural feature, or a combination of both separated from the surrounding terrain by steep sides.
Riparian Area	A Habitat that includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.
Slurry	In mining, a slurry is a thick, fluid mixture of solids and liquid, usually water, that is used to transport extracted ore and waste materials like tailings from one place to another.
Species of Conservation Concern	IUCN Red List definition: Threatened species, and other species of significant conservation importance: Extinct, Extinct in the Wild, Near Threatened, Data Deficient. In South Africa, the following additional categories are added: Rare, Critically Rare.
Tailings	Tailings are the leftover, finely-ground rock, minerals, and water that remain after the valuable components have been extracted from mined ore. These waste materials are typically processed into a slurry and pumped into surface storage facilities, called tailings dams or Tailings Storage Facilities where they are stored as fine-grained residue.
Tailings Storage Facility	Tailings Storage Facility are specially engineered structures, often large dams, designed to contain the liquid or slurry waste (tailings) from mining operations, which consist of crushed rock, water, and trace chemicals.
Threatened or Protected Species	These refers to either plants or animals that are at a threat of Extinction or are protected due to their high conservation value or national importance.
Urban Edge	A demarcated edge of an area that is used as land use management tool to manage, direct and control the outer limits of development growth around an urban area. The aim is to control urban sprawl due to its associated adverse impacts.
Watercourse	Refers to: (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

EXECUTIVE SUMMARY

Golden Core Trade and Invest (Pty) Ltd -Mponeng Operations (a subsidiary of Harmony Gold Mining Company Limited), hereafter referred to as Golden Core Trade and Invest / “the applicant”, has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the independent Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation and associated consultation processes for a proposed redeposition on Mponeng Lower Compartment Tailings Storage Facility (TSF) and associated infrastructure located at 26°27'10.53"S; 27°24'39.93"E (central TSF point), near Carletonville in the Merafong City Local Municipality (West Rand District Municipality) in Gauteng Province.

The Mponeng Lower Compartment Tailings Storage Facility (hereafter referred to as Mponeng Lower Compartment TSF) was an existing TSF with a footprint of approximately 102ha, however, the Mponeng Lower Compartment TSF is no longer in operation and is currently utilised as a Holding Dam and an approximately 200m^2 portion of the TSF has been converted and is currently used as an authorized General Waste Landfill Facility (Gaut 002-09-10-W0011). Further thereto, the approved 2012 EMPr states that the Mponeng Lower Compartment TSF will no longer be used for tailings storage but rather be used as a Holding Dam. The facility is further included in the Water Use Licence as a Holding Dam. The aim is now to utilize the same footprint for disposal of tailings once again.

The applicant holds an approved Mining Right (MR) and Environmental Management Programme (EMPr), in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA), for the mining of gold at various operations in the West Wits Region in the Gauteng Province. The Savuka Plant currently deposits tailings onto the Savuka 5a, 5b, 7a & 7b TSFs. However, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits Region exceed the available deposition capacity of these TSFs. The Savuka tailings facility has reached the end of its lifecycle and is undergoing a short-term extension of two years. Following this period, tailings from Savuka will need to be diverted to an alternative facility. The Mponeng Lower Compartment has been identified as a viable solution to accommodate tailings until the end of life of the Savuka plant and thereafter accommodate tailings from the Mponeng plant. Tailings were deposited up to 25m on the southern half of the footprint, but deposition was ceased after a natural spring was identified within the footprint. Harmony plans to re-commission the Lower Compartment after the spring is diverted to reduce groundwater contamination.

The Mponeng Lower Compartment TSF will store approximately 43 megatonnes (Mt) of tailings material. It is anticipated to accommodate tailings deposition for a period of 10 years at a rate of 350 kilotonnes per month (ktpm). The end-of-life limiting factors considered were a rate of rise below 4 meters per annum and a final facility height of 60 meters, ensuring safe and sustainable deposition over the operational life of the facility. In order to redeposit on the Mponeng Lower Compartment TSF from the Savuka Plant, slurry pipelines will need to be constructed, either from the Savuka Plant to the TSF, or from the Kuasasalethu Plant to the TSF. The residue deposition pipelines will have a Nominal Bore (NB) diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths.

The proposed main activities are as follows:

- Recommencement of deposition on Mponeng Lower Compartment TSF;
- Construction of slurry and return water pipelines and associated booster pump station;
- Construction of pipeline bridge;
- Construction of pipe culvert;
- Upgrade of Return Water Dam (RWD);
- Installation of Clean Water Diversion System (Spring Diversion);
- Installation of Dirty Water Systems;
- Installation of sub-surface drainage system; and

- Undertaking of ground improvement.

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity: **Listing Notice 1**, *Activities 10, 12, 19, 21D, 21F;* **Listing Notice 2**, *Activity 6*, and 15; and **Listing Notice 3**, *Activities 12, 14, and 23* as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008) – ***Category A****, Activity A14,* ***Category B****, Activities B7, B10 and B11; and*

- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses: **Section 21 (a), (c), Section 21 (i) and Section 21 (g)**. A separate application for a Water Use Licence (WUL) will be lodged with the Department of Water and Sanitation (DWS) for the water use triggers.

PURPOSE OF THE EIA REPORT

The previously completed Scoping Phase of the EIA process identified potential issues associated with the proposed project and defined the extent of the studies required for the EIA Phase. The Scoping Phase also identified potentially sensitive areas within the study site. This EIA Report addresses those identified potential negative and positive environmental impacts (direct, indirect, and cumulative impacts) associated with all phases of the project including design, construction, operation, decommissioning and closure. The EIA Phase recommends appropriate mitigation measures for potentially significant environmental impacts.

The EIA Phase is aimed to achieve the following:

- Provide an overall description and assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project.
- Comparatively assess identified feasible alternatives put forward as part of the project.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake a fully inclusive public involvement process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

PUBLIC PARTICIPATION PROCESS

According to Section (2)(4)(f) of NEMA, the participation of all Interested and Affected Parties (I&APs) must be promoted and all potential I&APs must be informed early and in an informative and proactive way regarding applications that may affect their lives or livelihood. To give effect to the above sections, it is essential to ensure that there is an adequate and appropriate opportunity for Public Participation (PP) in decisions that may affect the environment. The Public Participation Process (PPP) for the proposed project is undertaken in accordance with the requirements of NEMA in line with the principles of Integrated Environmental Management (IEM). The PPP commenced on the 15th of August 2025 with an initial notification and call to register as interested and affected parties (I&APs). The comments received from I&APs during the initial call to register, public review and commenting period of the Scoping Report have been captured in Public Participation Report in **Appendix C**. **This EIA Report has been made available for public review and commenting for a period of 30 days. Comments should be submitted to EIMS by no later than 27 March 2026 through the following means:**

- Contact Person: Mbali Tshabalala (Reference Number: 1658)
  - Postal Address: P.O. Box 2083; Pinegowrie; 2123
  - Telephone: (011) 789 7170;
  - Fax: (086) 571 9047

- E-mail: mponengtsf@eims.co.za

PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the EIA process. According to the above-mentioned, an alternative is defined as *"…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:*

(a) property on which or location where it is proposed to undertake the activity;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity;

(e) operational aspects of the activity; and

(f) includes the option of not implementing the activity."

The alternatives discussed in this report are the No-Go Option; Location Alternative, Route Alternative, Layout or Design Alternatives, and Process Alternatives. The preferred option under each category of alternatives is discussed in detail in **Section 5** of this report. Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria include the nature, extent, duration, magnitude / intensity, reversibility, probability, public response, cumulative impact, and irreplaceable loss of resources. The most significant risks and impacts identified were those that remain high in terms of significance even post mitigation measures being considered. The following identified impacts were determined to have a potentially moderate final significance:

- Negative impact on groundwater during construction, operation and closure phases;
- Negative impact on identified hydrology, wetlands and aquatic species during construction and operation and closure phases;
- Negative visual impact during operation;
- Negative impact on air quality and climate change during the operation phase;
- Negative impact on the health and safety during the operation phase;
- Negative impact on natural habitats, flora and fauna during the planning and construction phases;
- mortality / disturbance of potential Species of Conservation Concern (SCC, high for alternative pipeline route 1 and moderate for alternative pipeline route 2;
- Negative impact on archaeological and cultural heritage during the construction phase, high for alternative pipeline route 1 and moderate for alternative pipeline route 2; and
- Positive socio-economic impact through employment opportunities.

Potential mitigation measures have been identified and are now refined based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist assessments during this EIA phase of the project. The associated EMPr (**Appendix I**) identifies appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive impacts.

The following EIA-phase specialist studies are to be conducted:

- Air Quality Impact Assessment;
- Aquatic Ecology and Wetland Impact Assessment;

- Cultural and Heritage Resources Impact Assessment;
- Geohydrological (groundwater) Impact Assessment;
- Health Risk & Radiological Impact Assessment;
- Hydropedological Compliance Statement;
- Palaeontology Impact Assessment;
- Terrestrial Biodiversity Impact Assessment;
- Soils and Agricultural Compliance Assessment;
- Surface Water (Hydrological) Assessment; and
- Visual Impact Assessment.

CONCLUSIONS AND RECOMMENDATIONS

The findings of the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented.

Despite the negative impacts caused by the TSF, it must be considered that there are positive impacts as well, mostly based on the employment opportunities and SLP initiatives. Based on the nature and extent of the proposed project and the predicted impacts as a result of the construction, operation and closure of the facility, the findings of the EIA, and the understanding of the mostly low - moderate post-mitigation significance level of potential environmental impacts, it is the opinion of the EIA project team that the environmental impacts associated with the application for the proposed Mponeng Lower Compartment TSF project can be mitigated to an acceptable level and the project should be authorized.

The following key mitigations are recommended:

- The TSF Barrier design and implementation must be in line with DWS requirements for the facility.
- Developer must undertake the Dam Safety Technical Assessment and register with the DWS Dam Safety Office.
- There must be focus on maintaining geotechnical stability, controlling water, and ensuring structural integrity, as outlined in the Global Industry Standard on Tailings Management (GISTM).
- Robust emergency preparedness plan inclusive of dam / structural failure must be compiled and must form part emergency drills and environmental awareness training.
- Potential affected groups / communities must be made aware of the emergency plan and how they should react to emergency situations.
- Dam / structural failure sirens must be permanently installed to warn the community and/or motorists on the N12 in the unfortunate event of a dam / structural failure of the TSF.
- Apply dust suppression methods to limit the dust generated during the establishment phase.
- If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these developments.
- Implement a GN 704 compliant stormwater management plan to manage run-on towards the TSF.
- Pipelines are to be installed above-ground on pre-cast concrete plinths.
- Implementing a spring capture system to divert clean groundwater away from the TSF.
- Diverting clean stormwater runoff from the northern area to prevent it from entering the seepage control infrastructure.

- Ensure that flood protection of the TSFs is sufficient to manage flood risk from both adjacent river systems (north and south) and stormwater run-on.
- A hydrocarbon and chemical spill management plan must be put in place to ensure to manage any hazardous spills. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.
- All Archaeological sites will require Monitoring during site clearing in a 20m radius from the identified archaeological sites through the implementation of an archaeological watching brief. Archaeological sites MPnr1 and MPnr2 are to be avoided by a 15m buffer as per s25 of the NHRA. If the construction cannot deviate from the original layout, then further full mitigation and a destruction permit from SAHRA will be required.
- All plant SCC along pipeline route must be avoided, and the 200m buffers be strictly adhered to, if these buffers cannot be avoided then necessary permits must be obtained.
- An Alien Invasive Species Management Plan must be compiled and implemented especially for the category 2 AIP Fabaceae (Acacia melanoxylon) commonly known as the Australian blackwood.
- If soil erosion is detected, the area must be stabilised using geo-textiles and facilitated re-vegetation.
- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.
- All construction/operational and access must make use of the existing roads as much as possible, the creation of new roads should be limited.
- All footprints to be rehabilitated after construction is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.
- 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.
- 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.
- The wetland areas outside of the specific project site area must be avoided where possible.
- As far as possible, the associated pipelines for the project should be relocated to outside of the wetland buffer zones, which would significantly reduce potential impacts to the said systems.
- 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 site 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.
- 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.
- A Dust Management Plan should follow an iterative process, including: implementation, monitoring, reporting, reviewing and adjustment to the necessary steps.
- The TSF must form part of an Air Quality Management Plan. If one does not exist, a new one must be developed for the proposed TSF, including air quality monitoring to ensure compliance at upwind and downwind locations.
- Vegetation of exposed areas of the TSF and wind barriers to reduce wind erosion and/or the application of dust suppressants should be incorporated.
- A vegetation covering layer should be provided over the exposed areas of the TSF to reduce wind erosion and radon exhalation.
- Safe operating systems and procedures are to be implemented during operation of the facility.
- The mine must implement a community-friendly external grievance mechanism in conjunction with communities. The mine must develop a community relations strategy to plan for and guide its involvement with the community. The strategy should include feedback mechanisms about aspects of concern to the community.
- The mine should put measures in place to ensure the most effective local employment strategy, in conjunction with local leadership.

1 INTRODUCTION

Golden Core Trade and Invest (Pty) Ltd -Mponeng Operations (a subsidiary of Harmony Gold Mining Company Limited), hereafter referred to as Golden Core Trade and Invest / "the applicant", has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the independent Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation and associated consultation processes for a proposed redeposition on Mponeng Lower Compartment Tailings Storage Facility (TSF) and associated infrastructure located at 26°27'10.53"S; 27°24'39.93"E (central TSF point), near Carletonville in the Merafong City Local Municipality (West Rand District Municipality) in Gauteng Province.

The Mponeng Lower Compartment Tailings Storage Facility (hereafter referred to as Mponeng Lower Compartment TSF) was an existing TSF with a footprint of approximately 102ha, however, the Mponeng Lower Compartment TSF is no longer in operation and is currently utilised as a Holding Dam and an approximately 200m^2 portion of the TSF has been converted and is currently used as an authorized General Waste Landfill Facility (Gaut 002-09-10-W0011). Further thereto, the approved 2012 Environmental Management Programme (EMPr) states that the Mponeng Lower Compartment TSF will no longer be used for tailings storage but rather be used as a Holding Dam. The facility is further included in the Water Use Licence as a Holding Dam. The aim is now to utilize the same footprint for disposal of tailings once again.

The applicant holds an approved Mining Right (MR) and Environmental Management Programme (EMPr), in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA), for the mining of gold at various operations in the West Wits Region in the Gauteng Province. The Savuka Plant currently deposits tailings onto the Savuka 5a, 5b, 7a & 7b TSFs. However, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits Region exceed the available deposition capacity of these TSFs. The Savuka tailings facility has reached the end of its lifecycle and is undergoing a short-term extension of two years. Following this period, tailings from Savuka will need to be diverted to an alternative facility. The Mponeng Lower Compartment has been identified as a viable solution to accommodate tailings until the end of life of the Savuka plant and thereafter accommodate tailings from the Mponeng plant. Tailings were deposited up to 25m on the southern half of the footprint, but deposition was ceased after a natural spring was identified within the footprint. Golden Core Trade and Invest plans to re-commission the Lower Compartment after the spring is diverted to reduce groundwater contamination.

The Mponeng Lower Compartment TSF will store approximately 43 megatonnes (Mt) of tailings material. It is anticipated to accommodate tailings deposition for a period of 10 years at a rate of 350 kilotonnes per month (ktpm). The end-of-life limiting factors considered were a rate of rise below 4 meters per annum and a final facility height of 60 meters, ensuring safe and sustainable deposition over the operational life of the facility. In order to redeposit on the Mponeng Lower Compartment TSF from the Savuka Plant, slurry pipelines will need to be constructed, either from the Savuka Plant to the TSF, or from the Kuasasalethu Plant to the TSF. The residue deposition pipelines will have a Nominal Bore (NB) diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths.

At the time of compilation of this report, Mponeng Lower Compartment TSF engineering designs were at phase 2 (preliminary phase) and were being finalized in the parallel engineering studies. Based on the design information provided by the applicant and Mponeng Lower Compartment Tailings Storage Facility Pre-Feasibility Study - Pre-Feasibility Design Report by Eco Elementum and Engineering (Pty) Ltd (2025) (**Appendix F**) the proposed activities entails the following:

- Mponeng Lower Compartment TSF: the TSF will cover a total area of approximately 102 hectares (ha). The Mponeng Lower Compartment TSF will store approximately 43 Mt. The facility is expected to accommodate tailings deposition for a period of 10 years at a rate of 350 ktpm. The end-of-life limiting factors considered a rate of rise below 4 meters per annum and a final facility height of 60m. Hydrocyclone deposition method is proposed. The TSF barrier system will be determined in consultation with the authorities and will be in compliance with relevant norms and standards for determination of liner requirements.

- The residue deposition pipelines will have a NB diameter of 250 - 300mm with a peak throughput of 913 m3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths. An approximately 18x13m booster pump station with feeder tank is proposed for the functionality of the slurry and return water pipelines.
- Construction of pipeline bridge (final designs still in progress), based on current information and other similar Harmony pipeline bridges, the pipeline bridge will likely make use of two concrete pillars (beams) approximately 100m apart on either side of the channelled valley bottom wetland with the pipelines running from one end to the other on top of an approximately 5m wide steel trusses framework.
- Construction of pipeline culvert (final designs still in progress): based on current information, the culvert will be an approximately 12m long and 10m wide arch, circular or box culvert made of concrete or corrugated metal.
- Upgrade of Return Water Dam (RWD) to a Class C lined, earth fill embarkment RWD with a capacity of 327,000m^3. This capacity is sufficient to contain all dirty water inflows without the dam spilling more than once in 50 years.
- Installation of Clean Water Diversion System (Spring Diversion), the spring water currently daylighting in the northern portion of the proposed footprint will require diversion around the TSF. A dedicated spring capturing and diversion system will be required prior to the installation of sub-surface drains.
- Installation of Dirty Water Systems, to achieve both Government Notice 704 (GN704) regulatory compliance and cost efficiency, trapezoidal concrete-lined channels are planned to be installed within the existing, unlined paddocks.
- Installation of sub-surface drainage system: in addition to the TSF barrier (should it be required by DWS), a sub-surface drainage network below the liner would need to be installed to prevent accumulation of pore water pressure beneath the TSF liner. The sub-surface drainage network for the TSF comprises a series of 110mm and 160mm perforated High-Density Polyethylene (HDPE) sub-soil drainage pipes installed within a graded gravel drainage layer, all enclosed in a geotextile separation fabric to prevent the migration of the tailings fines.
- Undertaking of ground improvement, in addition to the presence of a spring, there is also a landfill site located on the northern portion of the TSF that poses a significant geotechnical and environmental risk as it contains heterogeneous and potentially compressible waste materials, which introduces the possibility of uneven settlement over time. To mitigate this risk, long-term ground improvement measures are necessary. Ground improvement, such as dynamic compaction, is recommended to densify the underlying landfill material, reduce voids, and improve uniformity in stiffness and bearing capacity across the area.

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity:
    - **GNR983 Listing Notice 1**, Activities 10, 12, 19, 21D, and 21F.
    - **GNR984 Listing Notice 2**, Activity 6, and 15.
    - **GNR985 Listing Notice 3**, Activities 12, 14, and 23.
- National Environmental Waste Act (Waste Act 59 of 2008) - Listed activity:

- **GNR921** Category A, Activity A14 and Category B, Activity B7, B10 and B11; and

- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses:
    - **Section 21** (a), (c), (i) and (g).

It must be noted that a separate application for a Water Use Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS) and this application is running concurrently with the NEMA EA application.

1.1 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in **Table 2** below.

Table 2: Report structure.

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 3(a):	Details of – i. The EAP who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae;	**Section 1.4**
Appendix 3(b):	The location of the activity, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties on which the activity is to be undertaken;	**Section 1.7**
Appendix 3(c):	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is - (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**Section 1.7 & 2**
Appendix 3(d):	A description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development;	**Section 2**
Appendix 3(e):	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	**Section 4**
Appendix 3(f):	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;	**Section 3**
Appendix 3(g):	A motivation for the preferred development footprint within the approved site;	**Section 5**
Appendix 3(h):	A full description of the process followed to reach the proposed development footprint within the approved site, including: (i) details of the development footprint alternatives considered;	**Section 5**

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and (x) a concluding statement indicating the preferred alternative development location within the approved site;	**Section 6** **Section 7** **Section 8** **Section 11.2**
Appendix 3(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	**Section 8.1**
Appendix 3(j)	An assessment of each identified potentially significant impact and risk, including (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk;	**Section 8.3**

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	(iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	
Appendix 3(k):	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	**Section 8.3** **Section 11.1**
Appendix 3(l):	An environmental impact statement which contains (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	**Section 8.3.15** **Section 9** **Section 11.3**
Appendix 3(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	**Section 8.3** **Section 11.1** **Section 11.4**
Appendix 3(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	**Section 11.2**
Appendix 3(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	**Section 11.4**
Appendix 3(p)	Description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**Section 12**
Appendix 3(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	**Section 11.4**
Appendix 3(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	N/A

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 3(s)	An undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	**Section 13** **Section 14**
Appendix 3(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Closure objectives are included in **Section 10** and **Appendix G**
Appendix 3(u)	An indication of any deviation from the approved scoping report, including the plan of study, including (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	N/A
Appendix 3(v)	Any specific information that may be required by the competent authority; and	Information included in various sections of the report to address DMPR comments in the scoping acceptance letter
Appendix 3(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act	N/A

1.2 PURPOSE OF THE REPORT

The Scoping Phase of the EIA process identified potential issues associated with the proposed project and defined the extent of the studies required for the EIA Phase. The Scoping Phase also identified potentially sensitive areas within the study site. This EIA Phase Report addresses those identified potential environmental impacts and benefits (direct, indirect, and cumulative impacts) associated with all phases of the project including design, construction, operation, decommissioning and closure. The EIA Phase recommends appropriate mitigation measures for potentially significant environmental impacts.

The EIA Phase aimed to achieve the following:

- Provide an overall description and assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project.
- Comparatively assess identified feasible alternatives put forward as part of the project.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake a fully inclusive public involvement process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

1.3 THE SCOPING AND EIA REQUIREMENTS

The list of activities applied for in terms of the NEMA EIA Regulations 2014 as amended are discussed in **Section 2.3**. These listed activities triggered by the proposed development of Mponeng Lower Compartment TSF facility must follow the required Environmental Impact Assessment process as required by the NEMA EIA Regulations 2014, as amended, as set out in Government Notice Regulations 982 in Government Gazette No. 40772 of 7 April 2017. Based on these Regulations, a Scoping and EIA process must be followed. The Application Form was submitted to the Competent Authority, the Department of Mineral and Petroleum Resources (DMPR) Gauteng Region. The DMPR is the relevant Competent Authority stipulated in the 2014 NEMA EIA Regulations application procedures as the applicant is a private company and the proposed redeposition onto Mponeng Lower Compartment TSF is a mining application within the Gauteng Province, thus, is in line with the identified activities which the Member of the Executive Council of the National Department of Forestry, Fisheries and the Environment (DFFE) has delegated to the DMPR provincial departments.

1.4 DETAILS OF THE EAP

EIMS is appointed by Harmony as the independent EAP and to assist in preparing and submitting the EA and WUL applications, Scoping and EIA Reports, and undertaking a Public Participation Process (PPP) in support of the proposed redeposition on the Mponeng Lower Compartment TSF footprint. The contact details of the EIMS consultant and EAP who compiled this Report are indicated in **Table 3**.

Table 3: Details of the Environmental Assessment Practitioner.

EAP:	Mr. Vukosi Mabunda
Tel No:	+27 11 789 7170
Fax No:	+27 86 571 9047
E-mail:	vukosi@eims.co.za
Qualifications	• MSc Geography (University of Johannesburg, 2021).

EAP:	Mr. Vukosi Mabunda
	• BSc Honours in Geography (University of Johannesburg, 2017). • BSc Life & Environmental Sciences (University of Johannesburg, 2016). • Environmental Law – Short Course (North-West University, 2025). • ISO14001:2015 – Short Course (North-West University, 2025). • Environmental Management Systems – Lead Auditor Short Course, North-West University, 2025
Professional Registrations:	• Registered Environmental Assessment Practitioner with Environmental Assessment Practitioner Association of South Africa – EAPASA (Reg. No: 2019/867). • Professional Natural Scientist with the South African Council for Natural Scientific Professions – SACNASP (Reg. No: 134178). • Registered Provisional Auditor (SAATCA: #LC5544) ISO 37301:2021 Legal Compliance Management Systems. • Registered Provisional Auditor (SAATCA: #LC5544) ISO 14001:2015 Environmental Management Systems

1.5 EXPERTISE OF THE EAP

EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS is an independent specialised environmental consulting firm offering the full spectrum of environmental management services across all sectors within the African continent. EIMS has successfully completed many hundreds of assignments over the years with an excess of 30 years' experience in conducting EIA's for both the government and private sector. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available.

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

This EIA Report was prepared by Vukosi Mabunda, a Registered EAP employed by EIMS. His CV is included in **Appendix B** of this report. Vukosi Mabunda is currently a Senior Environmental Assessment Practitioner (EAP) & Geographic Information Systems (GIS) Consultant with over eight (8) years' working experience. Vukosi is a Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA). He is one of the few dual registered professionals with the South African Council for Natural Scientific Professions (SACNASP) as a Professional Environmental Scientist and Geospatial Scientist. Vukosi is also one of the few dual registered auditors, currently registered with the South African Auditor & Training Certification Authority (SAATCA) as a Registered Provisional Auditor for ISO 37301:2021 Legal Compliance Management Systems (one of four registered auditors) and Registered Provisional Auditor for ISO 14001:2015 Environmental Management Systems (one of forty-four registered auditors). Vukosi has dual professional background in Geographic and Environmental Sciences having academic qualifications which focused on these disciplines as well as relevant work experience. Vukosi's highest qualification is a Master of Science Degree in Geography obtained from the

University of Johannesburg in 2021. Vukosi has recently completed short courses on Environmental Law, ISO 14001:2015 Environmental Management Systems and ISO 14001:2015 Environmental Management Systems Lead Auditor from the North-West University in March 2025 and October 2025 respectively.

Vukosi has experience in various environmental assessment projects ranging from Environmental Screening, Basic Assessments, Section 102 Amendments and Scoping & Environmental Impact Assessments processes. Vukosi has also undertaken Water Use Authorisations applications through both the General Authorisation and Water Use Authorisation processes. Vukosi is also an Environmental Auditor and Environmental Control Officer who has experience in various environmental and legal compliance audits assessing compliance against the requirements of Environmental Authorisations, Environmental Management Programmes, Operational Environmental Management Plan, Waste Management License, Atmospheric Emission Licenses, Water Use Authorisations, General Authorisations as well as Legal & Environmental Performance Audits. Vukosi's career highlights include the crucial role in the City of Johannesburg's Revised Bioregional Plan, where he was the lead GIS personnel as well as successfully completing the first Environmental Registration under the Standard for the Development and Expansion of Power Lines and Substations within Identified Geographical Areas Revision 2 in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended in Mpumalanga Province in 2024 in which he also assisted the Provincial Department Officials to understand the Standard, their roles and process of reviewing and making decisions on such applications.

1.6 SPECIALIST CONSULTANTS

One of the objectives of a Scoping Report was to identify the required specialist assessment to be undertaken during the EIA Phase. Based on a review of the National Web-Based Environmental Screening Tool Report (DFFE Screening Tool), EAPs Site Sensitivity Verification and review of available information, the following specialist assessments were pre-identified as necessary assessments required for the EIA phase and undertaken to inform this EIA Report.

Table 4: Specialist details for the Mponeng Lower Compartment TSF

Specialist Theme	Consultant / Company	Representative / Specialist
Agricultural Potential, Soils & Land Capability Compliance Assessment	The Biodiversity Company	Maletsatsi Mohapi / Matthew Mamera
Air Quality Impact Assessment	Airshed Planning Professionals	Reneé von Gruenewaldt
Aquatics and Wetland Impact Assessment	The Biodiversity Company	Divan van Rooyen / Namitha Singh
Archaeological and Cultural Heritage Impact Assessment	PGS Heritage	Wouter Fourie
Financial Provisions: Closure and Rehabilitation Plan	Minelock Environmental Engineers	Douglas Richards
Health Risk & Radiological Impact Assessment	AquiSim Consulting	Japie van Blerk
Hydropedological Compliance Assessment	The Biodiversity Company	Matthew Mamera
Noise Impact Assessment	Airshed Planning Professionals	Nick Grobler
Palaeontological Impact Assessment	Banzai Environmental	Elize Butler
Terrestrial Biodiversity Impact Assessment	The Biodiversity Company	Carami Burger / Martinus Erasmus
Geohydrological Impact Assessment	Hydrologic Consulting	Mark Bollaert
Visual Impact Assessment	Graham Young Landscape Architect	Graham Young

Engineering inputs have also been obtained to inform the proposed activities, refer to the engineering design report (**Appendix F**). The specialist studies listed above involved the gathering of data relevant to identifying and assessing environmental impacts that may occur as a result of the proposed project. Impacts were assessed according to pre-defined impact rating methodology (**Section 8.1**). Mitigation / management measures to minimise potential negative impacts or enhance potential benefits are put forward in this EIA Report (refer **Section 8.3**).

1.7 DESCRIPTION OF THE PROPERTY

Table 5 provides a description of the property details of the proposed Mponeng Lower Compartment TSF site as well as the distance to the nearest towns. See **Figure 1** and **Figure 2** for the locality of the proposed Mponeng Lower Compartment TSF as well as the associated pipeline routes.

Table 5: Locality details

<table>
<tr><td>Property</td><td colspan="4">Mponeng Lower Compartment TSF (existing TSF) is located on Remainder of Portion 23 of the Farm Elandsfontein 115IQ. The pipelines traverses through Remainder (RE) of Portion 5 Farm Elandsfontein 115IQ, Portions 3, 4 and 5 of Farm Blyvooruitzicht 116 IQ, and the Remainder of Portion 27 of Farm Elandsfontein 144IQ.</td></tr>
<tr><td rowspan="7">Property Name, 21-digit Surveyor General Code and Ownership</td><td>Farm Name</td><td>Portion</td><td>LPI Code</td><td>Ownership Type</td></tr>
<tr><td>Farm Elandsfontein 115IQ</td><td>RE/23/115</td><td>T0IQ00000000011500023</td><td>Applicant</td></tr>
<tr><td>Elandsfontein 115IQ</td><td>RE/5/115</td><td>T0IQ00000000011500005</td><td>Applicant</td></tr>
<tr><td>Blyvooruitzicht 116 IQ</td><td>3</td><td>T0IQ00000000011600003</td><td>Applicant</td></tr>
<tr><td>Blyvooruitzicht 116 IQ</td><td>4</td><td>T0IQ00000000011600004</td><td>Applicant</td></tr>
<tr><td>Blyvooruitzicht 116 IQ</td><td>5</td><td>T0IQ00000000011600005</td><td>Applicant</td></tr>
<tr><td>Elandsfontein 144IQ</td><td>RE/27</td><td>T0IQ00000000014400027</td><td>Private</td></tr>
<tr><td>Application Area (Ha)</td><td colspan="4">The approximate size of the infrastructure is as follows:
• Mponeng Lower Compartment TSF footprint is approximately 102ha;
• Proposed residue pipeline route is approximately 3.36km long;
• Approximately 18x13m booster pump station with feeder tank;
• Proposed return water pipeline route is approximately 4.85km long;
• Alternative residue and return water pipeline route is approximately 13.6km long;
• Upgrading of return water dam to approximately 8.20ha
• New pipe culvert approximately 20m long within an area of approximately 0.23ha; and
• New pipe bridge approximately 100m long within an area of approximately 0.81ha.</td></tr>
<tr><td>Magisterial District</td><td colspan="4">The project area falls within the West Rand District Municipality in Gauteng Province. Development area falls within Wards 11, 14 and 27 of Merafong City Local Municipality administrative area.</td></tr>
<tr><td>Distance and direction from nearest towns</td><td colspan="4">Mponeng Lower Compartment TSF is located at 26°27'10.53"S; 27°24'39.93"E (central coordinates) in Wadela, immediately north of the N12. The site is approximately 7km northwest of Fochville, 10km south of Carletonville central and 20km west of Westonaria (refer to Figure 1).</td></tr>
<tr><td>Surrounding land uses</td><td colspan="4">The study area (site) is mostly grassland with scattered areas that are disturbed and degraded due to anthropogenic activities, such as clearing of vegetation, presence of alien and invasive plant species, and fragmentation due to the presence of the mining infrastructure such as existing TSFs and access roads. Existing TSFs located to the west of the Mponeng Lower Compartment TSF (Mponeng Upper Compartment) and northwest of the</td></tr>
</table>

	pipelines start point (Savuka TFS). There is vacant land immediately north of the site characterised by a ridge elevating from 1546m above mean sea level (mamsl) at the Mponeng Lower Compartment TSF to 1706m amsl at the highest level before sloping down to around 1600m amsl at Western Deep Levels community, a change in elevation of 160m within a distance of 2.5km. There are several watercourses around the Mponeng Lower Compartment TSF site consisting of dams and drainage channels. Mponeng Water Treatment Works is located 400m east of the site. The Mponeng Hostel is the closest community to the site, located 800m east of Mponeng Lower Compartment TSF. The Wadela residential community is located 1.2km west of the site. It must be noted that the Mponeng Lower Compartment and Wadela community is separated by the Mponeng Upper Compartment. Western Deep Levels and Elandsrand residential communities are located further away from Mponeng Lower Compartment TSF, 2.6km north and 2.7km northwest of Mponeng Lower Compartment TSF respectively. There are established large-scale agricultural activities south of the site (approximately 3km) with a combination of pivot and horizontal farming techniques.

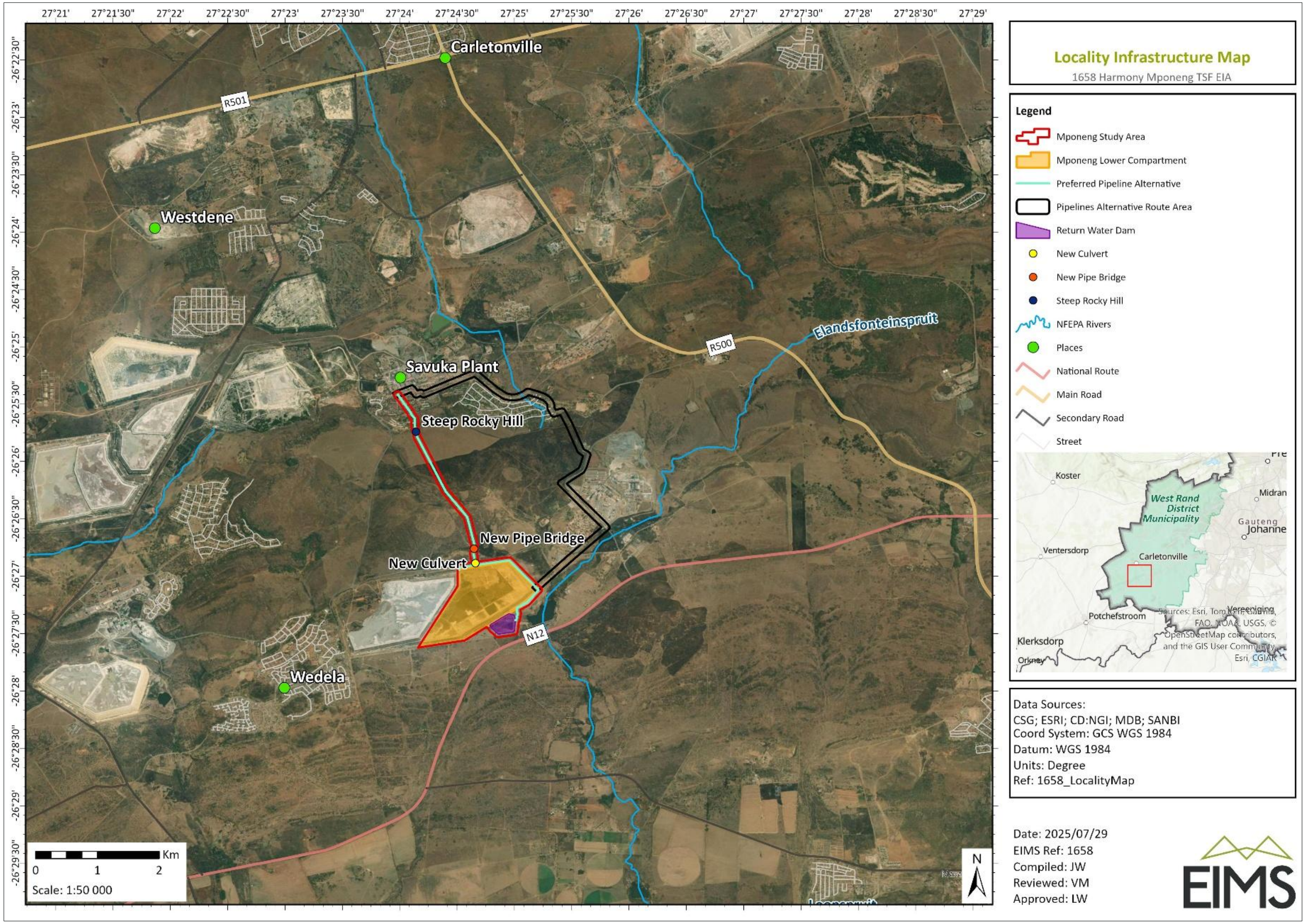


Figure 1: Aerial imagery locality map indicating the location of the proposed Mponeng Lower Compartment TSF and associated infrastructure.

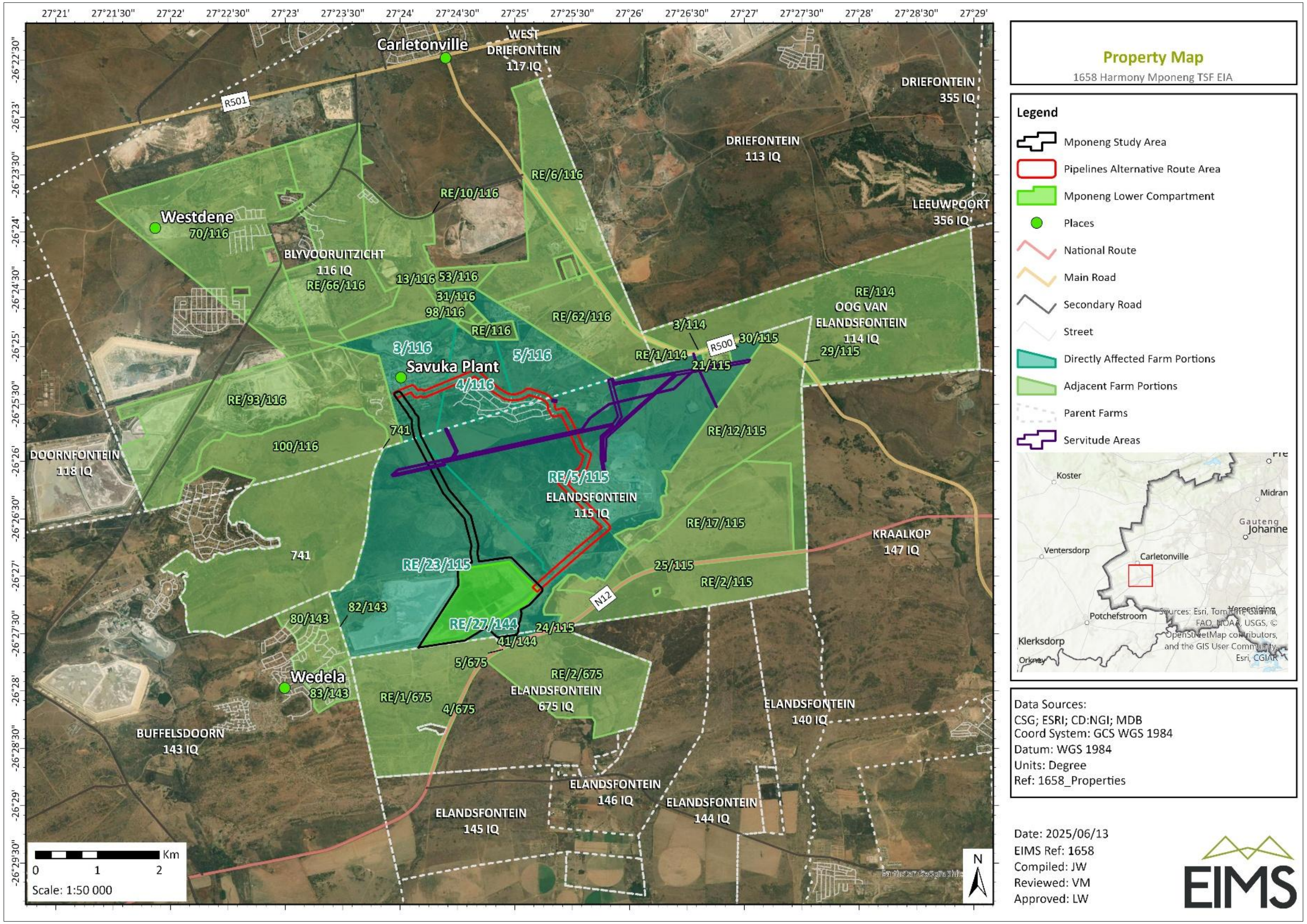


Figure 2: Locality map indicating the location of the proposed Mponeng Lower Compartment TSF and cadastral information.

2 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

This section provides a detailed description for the proposed project. Most of the key information presented in this chapter was obtained from the applicant. The aim of the project description is to describe the proposed activities planned to take place at the Mponeng Lower Compartment TSF project area. Furthermore, the project description is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the potential impacts identified and assessed in this EIA Report, and for which management measures have been, or will be designed.

2.1 PROJECT DESCRIPTION

Golden Core Trade and Invest (the applicant) holds an approved MR and an EMPr, in terms of the MPRDA, for the mining of gold at various operations in the West Wits Region in the Gauteng Province. The Savuka Plant currently deposits tailings onto the Savuka 5a, 5b, 7a & 7b TSFs. However, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits Region exceed the available deposition capacity of these TSFs. Accordingly, Golden Core Trade and Invest is undertaking a feasibility assessment to recommence deposition on the Mponeng Lower Compartment TSF. In order to redeposit on the Mponeng Lower Compartment TSF, from the Savuka Plant, slurry pipelines will need to be constructed from the Savuka Plant to the TSF.

The Mponeng Lower Compartment TSF is an existing TSF, however, the Mponeng Lower Compartment TSF is no longer in operation and is currently utilised as a Holding Dam and a portion used as a Landfill Facility (authorised). Further thereto, the approved 2012 EMPr states that the Mponeng Lower Compartment TSF will no longer be used for tailings storage but rather be used as a Holding Dam. The facility is further included in the Water Use Licence as a Holding Dam. The aim is now to utilize the same footprint for disposal of tailings once again.

A summary of the proposed activities are indicated in **Table 6** below and discussed in detail in the sub-sections below.

Table 6: Summary of proposed activities

Activity	Description / Auxiliary Activity
Recommencement of deposition on Mponeng Lower Compartment TSF	The proposed Mponeng Lower Compartment TSF is proposed within an existing TSF footprint which extends 102ha wide. Approximately 200m^2 of the TSF footprint was converted into a General Waste Landfill. The proposed Mponeng Lower Compartment TSF is proposed adjacent to the Mponeng Upper Compartment TSF. The Mponeng Lower Compartment TSF will be approximately 102ha wide and store approximately 43 megatonne (Mt). It is anticipated to accommodate tailings deposition for a period of 10 years at a rate of 350 kilotonnes per month (ktpm). The end-of-life limiting factors considered were a rate of rise below 4 meters per annum and a final facility height of 60 meters, ensuring safe and sustainable deposition over the operational life of the facility. An unlined facility is proposed due to the fact that tailings have already been deposited on the proposed footprint below the level that a liner can be safely installed.
Construction of slurry and return water pipelines	In order to redeposit on the Mponeng Lower Compartment TSF from the Savuka Plant, slurry pipelines will need to be constructed from the Savuka Plant to the TSF. The proposed new residue pipeline route is approximately 3.36km long while the proposed new return water pipeline route is approximately 4.85km long. The residue deposition pipelines will have a NB diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths.

Activity	Description / Auxiliary Activity
Construction of pipeline bridge	In order for the pipes to connect Savuka Plant and the Mponeng Lower Compartment TSF, a new pipe bridge approximately 100m long and 5m wide will be required to cross the channelled valley bottom wetland. An engineered solution to prevent spillages from the pipeline from entering the wetland is being investigated.
Construction of pipeline culvert	In order for the pipes to connect Savuka Plant and the Mponeng Lower Compartment TSF, a new pipeline culvert approximately 12m long and 10m wide will be required to cross the surfaced road immediately north of the Mponeng Lower Compartment TSF.
Construction of booster pump station	Booster pump stations for slurry and return water pipelines are critical infrastructure for high-density transport in mining, using centrifugal or positive displacement pumps to overcome friction and maintain, or exceed, the required minimum transport velocity to prevent settling. For effective functioning of the slurry and return water pipeline, an approximately 18 x 13m booster pump station with feeder tank is proposed immediately west of the 15m heritage buffer on the proposed pipeline route (26°25'42.71"S; 27°24'6.75"E) to maintain pressure and velocity, allowing for higher flow rates
Upgrade of Return Water Dam (RWD)	The current RWD does not have sufficient capacity to accommodate both current and future operational demands. Therefore, the existing dam will need to be enlarged to provide adequate capacity to contain the 1:50-year, 24-hour storm event above the mean operating level The proposed Mponeng Lower Compartment TSF RWD will be of the earth fill embankment type, with an upstream and downstream slope of 1:3 (V:H). The RWD will have a footprint is approximately 8.20ha with a capacity of 327,000m^3. This capacity is sufficient to contain all dirty water inflows without the dam spilling more than once in 50 years. A Class C performance barrier system has been opted for the RWD in line with DWS consultation.
Installation of Clean Water Diversion System - Spring Diversion	The spring water currently daylighting in the northern portion of the proposed footprint will also require diversion around the TSF. A dedicated spring capturing and diversion system will be required prior to the installation of sub-surface drains. This system is proposed on the upstream side of the currently active spring located along the northern boundary of the proposed lower compartment footprint. The purpose of this spring capturing system is to intercept and manage any clean groundwater emerging from the surrounding higher-elevation areas before it enters the TSF footprint.
Installation of Dirty Water Systems	Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources Government Notice 704 (GN704) requires that all dirty water collection and conveyance systems associated with mining-related activities be designed to prevent seepage of polluted water and promote the reuse of water. To achieve both regulatory compliance and cost efficiency, trapezoidal concrete-lined channels are planned to be installed within the existing, unlined paddocks. These channels will serve to collect and convey dirty water in a controlled manner, minimising seepage and preventing contamination of the surrounding environment. The channels will discharge into concrete silt traps before entering the RWD.
Installation of sub-surface drainage system	In addition to the inverted barrier, a sub-surface drainage network below the liner would need to be installed to prevent accumulation of pore water pressure beneath the liner. The sub-surface drainage network for the TSF has been designed as an integrated system aimed at effectively intercepting and conveying seepage. The system comprises a series of 110mm and 160mm perforated HDPE sub-soil drainage pipes installed within a graded gravel drainage layer, all enclosed in a geotextile

Activity	Description / Auxiliary Activity
	separation fabric to prevent the migration of the tailings fines. The sub-surface drains connect to a network of secondary and main branches.
Undertaking of ground improvement	In addition to the presence of a spring within the footprint and the proposed groundwater-intercepting sub-surface drainage network designed to manage seepage and maintain slope stability, there is also a landfill site located on the northern portion of the facility that poses a significant geotechnical and environmental risk. The landfill site contains heterogeneous and potentially compressible waste materials, which introduces the possibility of uneven settlement over time, especially under the loading conditions imposed by the overlying tailings. To mitigate this risk, long-term ground improvement measures are necessary. Ground improvement, such as dynamic compaction, is recommended to densify the underlying landfill material, reduce voids, and improve uniformity in stiffness and bearing capacity across the area. To further support the foundation and distribute applied loads evenly, a load-distribution platform should be constructed.

In line with the abovementioned activities, EIMS are compiling and submitting the required documentation in support of applications for of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity: **Listing Notice 1**, *Activities 10, 12, 19, 21D, 21F;* **Listing Notice 2**, *Activity 6*, and 15; and **Listing Notice 3**, *Activities 12, 14, and 23* as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008) – ***Category A****, Activity A14,* ***Category B****, Activities B7, B10 and B11; and*

- Water Use Licence (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses: **Section 21 (a), (c), Section 21 (i) and Section 21 (g)**. A separate application for a Water Use Licence (WUL) with the Department of Water and Sanitation (DWS) for the water use triggers is in progress.

2.2 DESCRIPTION OF ACTIVITIES TO BE UNDERTAKEN

Design criteria and parameters adopted for the study are summarised in **Table 7**.

Table 7: Summarized Design Considerations / Proposed Activities (Eco Elementum, 2025)

Parameter	Value	Source
	TSF Design	
Pertinent Standards and Guidelines	SANS 10286	Eco Elementum (**Appendix F**)
Tailings Ore body	Gold	Applicant
Tailings Waste Classification	Type-3	Eco Elementum (**Appendix F**) - Based on other, similar Gold Tailings Projects.
Life of TSF	10 Years (minimum)	Applicant & Eco Elementum (**Appendix F**)
Deposition Rate	350 ktpm	Applicant
Total Tailings Produced	43Mt (Current LoM)	Eco Elementum (**Appendix F**) - As per capacity assessment.
Total Volume	27.9 Mm^3 (Current LoM)	Eco Elementum (**Appendix F**) - Calculated

Parameter	Value	Source
Hazard Rating	High	Eco Elementum (**Appendix F**) - Annual report for the Upper compartment at similar height.
Deposition strategy	Upstream construction with hydrocyclone deposition	Eco Elementum (**Appendix F**) - Based on other, similar Gold Tailings Projects with a high Rate of Return.
Particle size distribution	85% Passing 75 µm	Mponeng Upper Compartment Lab Test Results (23-2486-WMF-5-HARMONY MPONENG TSF 2024 ANNUAL REPORT).
Particle Specific Gravity	2.7 (t/m^3)	Mponeng Upper Compartment Lab Test Results (23-2486-WMF-5-HARMONY MPONENG TSF 2024 ANNUAL REPORT).
Dry density (average)	1.54 (t/m^3)	Eco Elementum (**Appendix F**) - Triaxial tests done on Savuka tailings
Maximum Rate of Rise	4 m per annum	Capacity assessment.
Maximum TSF Height	60m	Eco Elementum (**Appendix F**) - To be confined with slope stability calculations.
Bench widths	8m	Eco Elementum (**Appendix F**) - Best Practice
Lift height	8m	Eco Elementum (**Appendix F**) - Best Practice
Interim side slopes	1 (V}:2.5 (H)	Eco Elementum (**Appendix F**) - Best Practice
Overall side slope	1 (V):3.5 (H)	Eco Elementum (**Appendix F**) - Best Practice
Stormwater Management Plan		
Temporary diversion structures during construction. 1:2 year	1:2 year	GNR 704
Stormwater diversion channels and their erosion protection.	1:50 year storm event / 72-hour drawdown from TSF and drain seepage outflow.	GNR 704
Penstock design	1:100 year 72-hour drawdown on top of TSF	Best practice
RWD sizing	1:50 year 24-hour storm event	GNR 704
RWD Lining	Type 3 waste	Eco Elementum (**Appendix F**) Based on other, similar Gold Tailings Projects.
Groundwater Management		
Spring Water to be Diverted	1 611 m^3 per annum	AngloGold Ashanti Limited EMP report (2009)
Embankment Stability / Earthquake Criteria		

Parameter	Value	Source
Earthquake Loading	1:2,475-year return period = 0.148 g (0.108 + 0.040 g) PGA (OBE) = 0.074 g (0.148 g / 2)	
Minimum Stability Factors of Safety (SANS 10286, 2022)	After construction: 1.30. Static drained conditions: 1.50. Short-term undrained (peak) 1.30. Short-term undrained earthquake: 1.10. Short-term undrained post-earthquake (liquefied): 1.10. Damage and deformation allowed (<freeboard allowance) - No release of tailings or water.	Eco Elementum (**Appendix F**) - Best Practice

Specific detailed project description is provided in the subsections below.

2.2.1 RECOMMENCEMENT OF DEPOSITION ON MPONENG LOWER COMPARTMENT TSF

Tailings are the mineral waste remaining after ore processing to extract mineral concentrates and are typically stored within an engineered containment structure known as a tailing storage facility or TSF. Tailings is a common by-product of the metals and minerals recovery process. It usually takes the form of a liquid slurry made of fine metal or mineral particles and water – created when mined ore is crushed and finely ground in a milling process (refer to **Figure 3**).

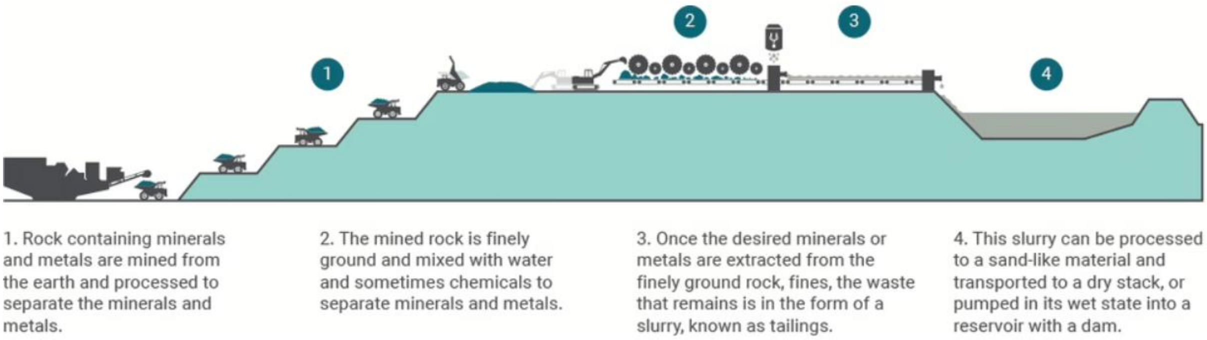


Figure 3: Tailings Storage Facility Process (International Council on Mining and Metals, 2023).

From the mill, the tailings are typically pumped to storage facilities (TSFs). As the sandy residue of tailings gradually drains and becomes compact and dry, grass and other vegetation can be planted to stabilise the environment through a reclamation process. Before the water in the tailings can be used again, or discharged into the local drainage system, it must be treated to remove harmful substances that would pollute the environment or risk the health and safety of local communities near the facility.

If not managed properly, tailings can have chronic adverse impacts on the environment and human health and safety, with pollution from effluent and dust emissions being potentially toxic to humans, animals or plants. Acute and potentially very damaging impacts can occur should a tailings storage facility physically fail. In such instances, flowable tailings materials can inundate and greatly impact the surrounding environment and even lead to loss of human life.

Tailings differ from overburden: the waste rock or material that overlies an ore or mineral body and is displaced unprocessed and stockpiled separately (or co-disposed with tailings) during mining. Tailings can be in the form of liquid, solid, or a slurry of fine particles. The proposed Mponeng Lower Compartment TSF is a slurry TSF (refer to **Figure 4**) and will cover a footprint of approximately 102ha. Based on the Mponeng Lower Compartment Tailings Storage Facility Pre-Feasibility Study Report (Eco Elementum, 2025), the Mponeng Lower Compartment TSF was designed to meet the client's minimum capacity requirement of 40.3 million tonnes (Mt). The current design exceeds this target, providing a total storage capacity of approximately 43 Mt. This design was developed with operational and geotechnical constraints in mind, specifically aiming to limit the rate of rise to a maximum of 4 meters per annum and to cap the final facility height at 60 meters, ensuring safe and sustainable deposition over the operational life of the facility.

The facility will include a starter wall and a toe wall as part of its initial construction phase. The TSF will be raised in successive 8 m high lifts, each separated by 8 m wide benches. This stepped configuration not only aids in structural stability and erosion control but also provides access for construction and inspection activities as the facility is developed over time. At this stage the proposed delivery system is expected to consist of hydrocyclones. The underflow material (coarse, dewatered tailings) is separated from the slurry by the hydrocyclones and deposited at the outer core. The overflow material (fine tailings and slurry water) is deposited in the basin. The facility will be served by hydrocyclones on three sides (north, east, and south) with a proposed spigot system to deposit tailings at the interface of the upper and lower compartments.

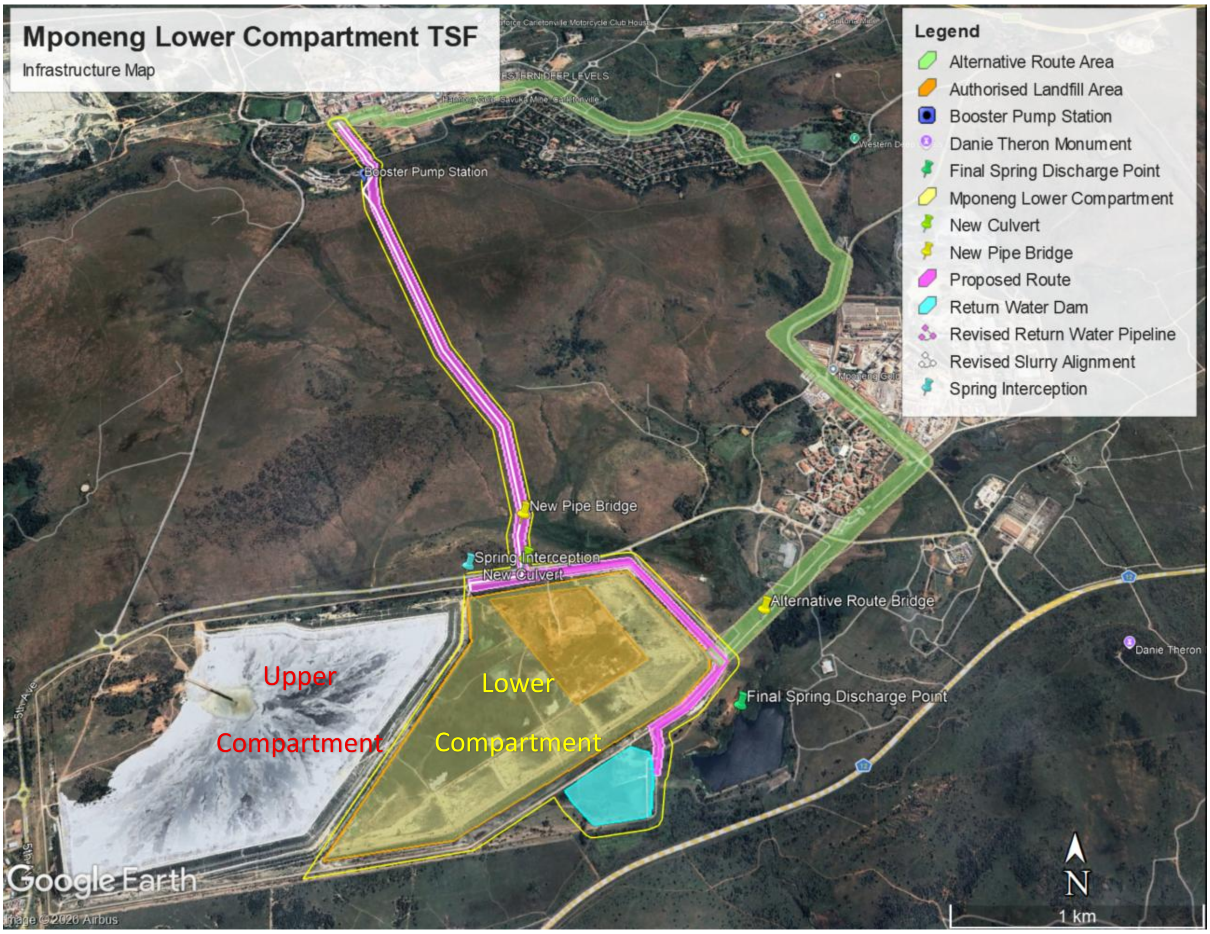


Figure 4: Aerial view of Mponeng Tailings Storage Facility and proposed infrastructure at the Harmony West Wits Region Operations (Google Earth, 2025)

Supernatant water (the liquid that remains above a solid residue after a mixture has been allowed to settle or has been centrifuged to separate components) is decanted by a gravity penstock system through a flanged steel pipe encased in concrete beneath the pollution control barrier. The penstock outfall pipe discharges water into the solution trench from where the water is conveyed via the concrete-lined dirty canal system and silt trap to the RWD.

2.2.1.1 UNLINED OPTION

This option would entails a process where the Mponeng Lower Compartment TSF remains unlined. The only mitigation is the rehabilitation and decommissioning of the TSF during the closure (decommissioning) phase.

GCS Water & Environmental Consultants conducted hydrogeological investigations for the Mponeng TSF in January 2019 and April 2025 to support designs for water management. The investigations focused on identifying the source of a spring at the northeastern corner, characterising the underlying hydrogeological regime, commenting on the hydrogeological impact and management options, reviewing methods to manage the spring in terms of water quality and flow and informing seepage management strategies.

The January 2019 report concluded that seepage rates are currently low—ranging from 12 to 20 mm/year—but are expected to increase moderately with the proposed elevation of the TSF. Seepage rates will remain fairly low for gold tailings, due the foundation geology (shales and andesites) and characteristics of the tailings material. Furthermore, most monitoring points show sulphate levels below 100 mg/L, with only two boreholes exceeding 500 mg/L. A calibrated groundwater model predicted a sulphate plume of 200-600 mg/L remaining largely confined to the TSF and return water dam areas by the year 2060. However, the Aquatic Dam is already showing elevated sulphate levels, which could rise further if seepage is not effectively managed.

The April 2025 report recommended three key mitigation strategies:

- Implementing a spring capture system to divert clean groundwater away from the TSF;
- Diverting clean stormwater runoff from the northern area to prevent it from entering the seepage control infrastructure;
- And installing a series of scavenger boreholes along the TSF's southern toe to intercept contaminated seepage caused by groundwater mounding.

These interventions aim to significantly reduce the environmental impact of the TSF during both operational and post-closure phases. The groundwater profile was subsequently modelled from the available data and is illustrated in **Figure 5**.

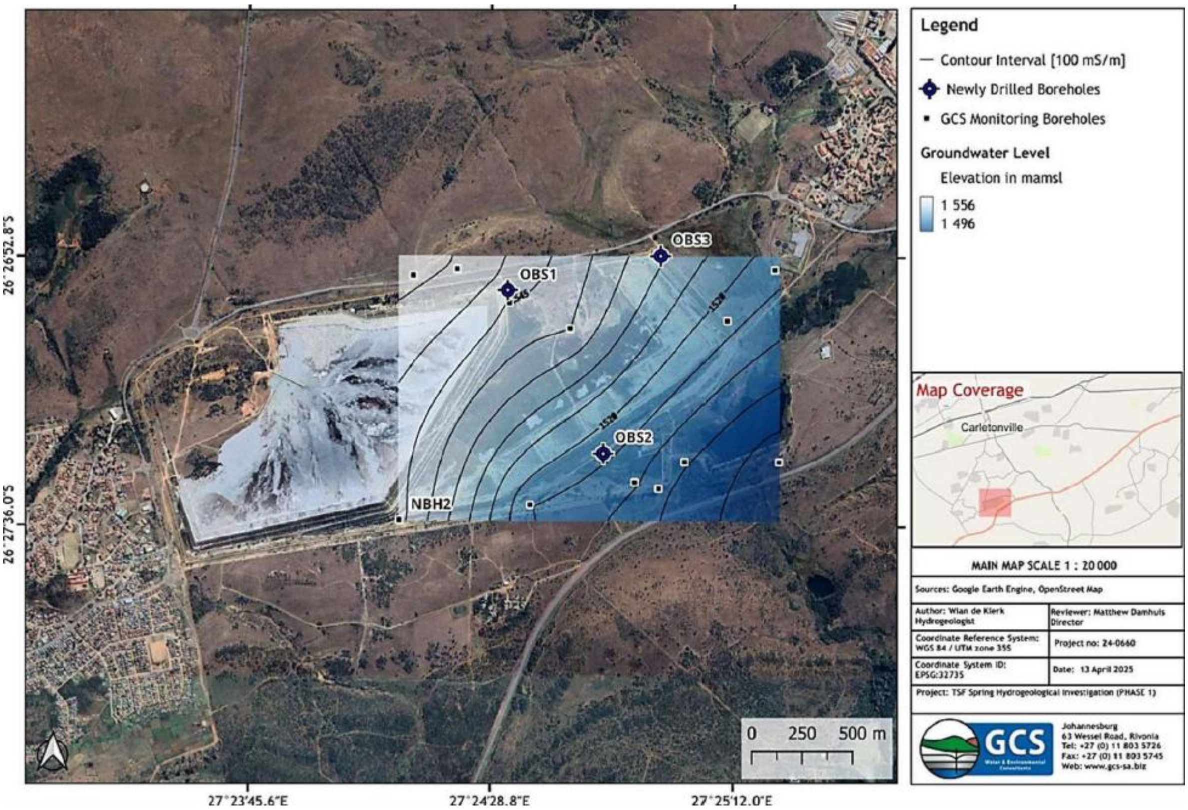


Figure 5: Groundwater level map (GCS, 2025)

The previous hydrogeological studies have indicated very low seepage rates beneath and around the facility, primarily due to the low permeability of the bedrock and the presence of artesian conditions. Additionally, tailings have already been deposited on the proposed footprint below the level that a liner can be safely installed. For these reasons, Golden Core Trade and Invest prefers an unlined facility. The Geohydrological Assessment (MvB Consulting, 2025), found that most test pits on the original ground level showed no seepage during the geotechnical investigation, except TP32, which may be influenced by the upper compartment's embankment. Moderate to strong seepage was observed at the base of the landfill site due to its permeable waste material, though downstream test pits showed no seepage, suggesting localized infiltration. Additionally, significant seepage was found at the southeast corner of the starter wall, potentially sourced from the lower compartment's catchment area or along bedrock lineations. Due to the very low seepage rates beneath and around the facility and the facility already largely existing (102ha x 20m high deposition), this option could be a viable option which is further assessed in this EIA Report. There is, however, a cumulative impact from the existing TSF and the aim of the numerical modelling use for the EIA Phase has quantified the benefit of installing a liner.

2.2.1.2 BARRIER DESIGN (LINED OPTION)

Under current environmental legislation in South Africa, tailings are viewed as potentially hazardous waste that needs to be disposed of in compliance with the appropriate minimum requirements. Traditionally, tailings in South Africa have been built on top of the *in-situ* soils. The use of composite liners is relatively new in tailings dam construction in South Africa and brings with it its own set of challenges. The requirement for a barrier system in South Africa regulations were promulgated under the National Environmental Management Act - Regulations 632, 634, 635 and 636. These are currently administered by the Department of Water and Sanitation (DWS). Under these regulations waste, including tailings, is assessed under Waste Acceptance Criteria for Disposal to Landfill, which determines the requirements for disposal of different types of waste. Under these regulations, many mineral residue deposits are found to require a barrier system, which typically includes a geomembrane. It is usually not practical, and currently not mandatory, to retrofit a barrier system to existing tailings dams such as the existing Mponeng Lower Compartment footprint. However, there is an increase in the number of new tailings dams being constructed to include a barrier system.

The Department (DWS) no longer condones South Africa's philosophy of the past 20 years, in terms of which dilution of water contamination and dispersion relying on attenuation was regarded as acceptable (Legge, 2019). Protection of water resources, and prevention of contamination in the first place (source) is now being sought in preference to mitigating contamination spread (pathway) and pollution cleanup (receptor). Apart from preventing polluted leachate from seeping into the groundwater, an additional benefit of lining a tailings dam is that more water in the tailings system can be captured and returned to the plant. This is useful in a water-scarce country such as South Africa. Since the tailings industry has not always included barrier systems in design or construction, there are learnings to be acquired, even by seasoned tailings consultants and contractors, on how to work with these systems. A proposed amendment to Regulation 632 (2016) has been drafted whereby there could in future be a relaxation of the regulations on a case-by-case basis, following a risk-based approach. However, such regulations have yet to be promulgated into law. In the meantime, the current regulations apply to the disposal of tailings in the same way they apply to the disposal of any other waste to landfill.

The alternatives relate to the liner design for the TSF. However, the liner requirements are based on the waste classification of the material, geohydrological modelling and risk assessment. Tailings use liners to prevent the release of concentrated mine chemicals into the environment. Many regulatory agencies request lined TSFs in hopes of better protecting groundwater resources. Liners are not always desirable, however, tailings solution containment is critical to meeting environmental requirements and the necessary assessments and measures must be undertaken to ensure best environmental practices. The necessity of liners for TSF are subject to the type, nature and surrounding geohydrological conditions in consultation with the 2013 regulations published in terms of the National Environmental Management: Waste Act, notably GN R. 634 to GN R. 636 relevant to Waste Classification and Management, National Norms and Standards for the Assessment of Waste for Landfill Disposal and National Norms and Standards for Disposal of Waste to Landfill.

For important reasons, hazardous waste landfills are the most closely regulated and structured landfills. They are specifically designed to hold hazardous wastes in a way that virtually eliminates the chance of it being released into the environment. Some of the design requirements for hazardous waste landfills include:

- Double liners;
- Double leachate collection and removal systems;
- Leak detection systems;
- Run on, runoff and wind dispersal controls; and
- Construction quality assurance programs.

Once the waste has been assessed and waste type determined, the Norms and Standards can be used to determine the minimum requirements for the landfill and containment barrier design. This will distinguish between Class A, Class B, Class C, or Class D landfills and the associated containment barrier requirements. Although the National Norms and Standards for the Assessment of Waste for Landfill Disposal and National Norms and Standards for Disposal of Waste to Landfill prescribe the containment barrier or liner design for each determined waste type, the recent amendments in chapter 3 of the regulations to the planning and management of residue stockpiles and residue deposits, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the regulations. The recommendation should be founded on a risk analysis based on the characteristics and classification in regulation 4 and 5 of these Regulations, towards determining the appropriate mitigation and management measures.

In determining the Waste Type for Landfill Disposal, the following are important to note:

- If a chemical substance is not listed in the Norms and Standards and the waste is classified as hazardous according to South African National Standards (SANS) 10248 it is considered a TYPE 1 waste
- Wastes listed in (2)(b) of the Regulations are considered to be TYPE 1 waste unless determined otherwise
- If Total Concentration (TC) of an element/substance is above Total Concentration Threshold of Category 2 and cannot be reduced but the LC is < LCT 3 the waste is TYPE 1
- If the Leachable Concentration (LC) for all metal ions and inorganic anions in the waste are equal or less to Leachable Concentration Threshold Limits Category 0 such wastes are TYPE 3 irrespective of the TC of the elements provided:
    - The concentration of the chemical substances are below the limits for the organics and pesticides listed;
    - The waste is stable and won't change over time; and
    - The waste will be disposed of to landfill without any other waste.

Under the current requirements of the National Water Act (NWA) and associated regulations, TSFs are classified as facilities intended for the storage or disposal of Type 3 waste. Therefore, TSFs must be designed and constructed with a Class C equivalent barrier system. At the time of writing this report, no formal waste classification information has been made available. In the absence of this data, the waste material is assumed to fall under Type 3 waste, in accordance with the NEMWA classification system. This assumption is based on similarities with tailings produced by other gold mining operations, which typically exhibit geochemical and physical characteristics consistent with Type 3 waste.

An inverted barrier system with equivalent performance to a Class C barrier can be motivated for implementation if the facility needs to be lined. It is important to note that this barrier system will reduce contamination from newly deposited tailings on the Lower Compartment but will not reduce contamination from the tailings already placed on the facility nor from the existing Upper Compartment. The inverted barrier system, shown in **Figure 6,** substantially reduces the seepage areas as well as the seepage rate by changing the seepage flow from orifice flow to Darcian flow. This is achieved by placing the geomembrane on top of a South African National Standards (SANS) 10409 (2020) compliant receiving face of reworked foundation soil (consisting of existing tailings) instead of a clay layer and sliming fine tailings over the geomembrane.

Seepage losses through a traditional Class C barrier is primarily determined based on the number of holes intersecting wrinkles as reflected in the Casagrande lecture 2012 by RK Rowe. For the inverted barrier, seepage losses change from orifice flow controlled by the Bernoulli equation at wrinkles (with Darcian flow through the area beneath the wrinkle) to Darcian flow through the tailings at the discontinuity in the geomembrane. Furthermore, this barrier system substantially reduces the risk of damage to the liner when placing above liner ballast and gravel by mechanical means and increases stability by eliminating the low strength expansive clay and its interface with the geomembrane in the outer wall zone between the toe wall and starter wall (Eco Elementum, 2025).

Figure 6: Proposed Inverted Barrier System (Eco Elementum, 2025)

2.2.1.3 INSTALLATION OF SUB-SURFACE DRAINAGE SYSTEM

In addition to the inverted barrier (should it be required), a sub-surface drainage network below the liner would then need to be installed to prevent accumulation of pore water pressure beneath the liner. Elevated pore pressures could result from seepage originating in the upper TSF compartment, as well as existing interstitial water within the tailings caused by continuous recharging from the holding dam. If such pore pressures are allowed to build up, they could lead to saturated conditions with elevated hydraulic gradients, significantly increasing the risk of foundation instability.

The sub-surface drainage network for the TSF lower compartment has been designed as an integrated system aimed at effectively intercepting and conveying seepage. The system comprises a series of 110mm and 160mm perforated High-Density Polyethylene (HDPE) sub-soil drainage pipes installed within a graded gravel drainage layer, all enclosed in a geotextile separation fabric to prevent the migration of the tailings fines. The sub-surface drains connect to a network of secondary and main branches. The main perforated trunk lines run longitudinally through the footprint, ultimately discharging into the lined concrete dirty water channels, which are designed to direct collected flows toward the return water dam (Eco Elementum, 2025).

2.2.1.4 UNDERTAKING OF GROUND IMPROVEMENT

In addition to the presence of a spring within the footprint and the proposed groundwater-intercepting sub-surface drainage network designed to manage seepage and maintain slope stability, there is also a landfill site located on the northern portion of the facility that poses a significant geotechnical and environmental risk. The landfill site contains heterogeneous and potentially compressible waste materials, which introduces the possibility of uneven settlement over time, especially under the loading conditions imposed by the overlying tailings. To mitigate this risk, long-term ground improvement measures are necessary.

Ground improvement, such as dynamic compaction, is recommended to densify the underlying landfill material, reduce voids, and improve uniformity in stiffness and bearing capacity across the area. To further support the foundation and distribute applied loads evenly, a load-distribution platform should be constructed. This platform should incorporate a high-strength geogrid (at least 100KN/m) to provide tensile reinforcement and interlock with the granular material, combined with a 1m thick rockfill layer to act as a bridging and load-spreading medium. Together, these measures will help ensure structural stability and reduce the potential for differential settlement (Eco Elementum, 2025).

2.2.2 CONSTRUCTION OF SLURRY AND RETURN WATER PIPELINES

To allow for slurry deposition on Mponeng Lower Compartment TSF from the Savuka plant, new slurry and return water pipes will be required (refer to **Figure 7**) as described below:

- Savuka Plant to Mponeng Lower Compartment TSF Proposed Pipeline Route:
    - The proposed slurry and return water pipes extend from the south of Savuka Plant at starting point 26°25'24.95"S; 27°23'58.94"E, extending southwards, parallel to each other until reaching the northern extent of Mponeng TSF where they split. Thereafter, the slurry pipeline extends to west before connecting to Mponeng TSF while the return water pipeline extends east then south around the TSF to the return water dam.
    - The slurry pipeline is approximately 3.36km long extending from the Savuka Plant at 26°25'24.95"S; 27°23'58.94"E and ending at the Mponeng Lower Compartment TSF northern edge at 26°26'57.60"S; 27°24'31.59"E.
    - The return water pipeline is approximately 4.85km long extending from the Savuka Plant at 26°25'24.95"S; 27°23'58.94"E and ending at the Mponeng Lower Compartment TSF return water at 26°27'23.09"S; 27°25'0.37"E.
    - **It should be noted that there are heritage features (stonewalling) on this alternative at 26°25'43.88"S; 27°24'8.47"E which the engineers have deviated around the 15m buffer to avoid impacting on the heritage features**.
- Savuka Plant to Mponeng Lower Compartment TSF Alternative Pipeline Route:
    - There alternative slurry and return water pipeline route extends to the east through Western Deep Levels then south along Mponeng Gold Mine before heading to the west where it connects to Mponeng.
    - The alternative slurry and return water pipelines route follow the same path. Both commence at the Savuka Plant at 26°25'24.95"S; 27°23'58.94"E and connect to the Mponeng Lower Compartment TSF on the southeastern section at 26°27'6.62"S; 27°25'10.61"E where the slurry pipeline ends while the return water pipeline extends slightly further to connect to the return water dam at 26°27'23.09"S; 27°25'0.37"E. Subsequently, the alternative slurry pipeline is 6.73km long while the alternative return water pipeline is 7.4km long.

The residue deposition pipelines will have a NB diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths (see **Figure 7**). Booster pump stations for slurry and return water pipelines are critical infrastructure for high-density transport in mining, using centrifugal or positive displacement pumps to overcome friction and maintain, or exceed, the required minimum transport velocity to prevent settling. For effective functioning of the slurry and return water pipeline, an approximately 18 x 13m booster pump station with feeder tank is proposed immediately west of the 15m heritage buffer on the proposed pipeline route (26°25'42.71"S; 27°24'6.75"E) to maintain pressure and velocity, allowing for higher flow rates

Figure 7: View existing aboveground residue deposition pipeline on site (left) and view of typical slurry and return water pipes taken from a different Harmony plant (right)

2.2.3 CONSTRUCTION OF PIPELINE BRIDGE

In order for the pipes to connect Savuka Plant and the Mponeng Lower Compartment TSF, a new pipe bridge approximately 100m long and 5m wide will be required to cross the channelled valley bottom wetland. The bridge will have two concrete pillars (beams) on either side of the channelled valley bottom wetland identified on site with the pipelines running from one end to the other on top of a steel trusses framework (see **Figure 8**). Detailed designs will be provided to the competent authority in the Final EIA Report once the engineering designs have been completed.

Figure 8: Example of a typical Harmony pipeline bridge proposed for the project at the water crossing

2.2.4 CONSTRUCTION OF PIPELINE CULVERT

In order for the pipes to connect Savuka Plant and the Mponeng Lower Compartment TSF, a new pipeline culvert of approximately 12m long and 10m wide will be required to cross the surfaced road immediately north of the Mponeng Lower Compartment TSF. The culvert will either be an arch, circular or box culvert. The culvert will be made of concrete or corrugated metal (see **Figure 9**).

Figure 9: Example of a typical Harmony pipeline culvert proposed for the project at the road crossing

2.2.5 INSTALLATION OF CLEAN WATER DIVERSION SYSTEM - SPRING DIVERSION

In addition to the repurposed clean water channels and berms discussed in **Section 2.2.1**, the spring water currently daylighting in the northern portion of the proposed footprint will also require diversion around the TSF. A dedicated spring capturing and diversion system will be required prior to the installation of sub-surface drains. This system may be implemented on the upstream side of the currently active spring located along the northern boundary of the proposed lower compartment footprint (as shown in **Figure 10**). The purpose of this spring capturing system is to intercept and manage any clean groundwater emerging from the surrounding higher-elevation areas before it enters the TSF footprint. By doing so, it prevents this clean water from contributing to groundwater recharge beneath the tailings facility, which could otherwise elevate pore water pressures and compromise the integrity of not only the proposed lower compartment but also the foundation of the upper compartment toe.

GCS Water and Environmental Consultants investigated the origin of the spring and provided preliminary recommendations for capturing and diverting the water around the facility. These measures include vertical shafts with horizontal drains (as shown in **Figure 11**). It was recommended by GCS in the January 2019 report that trial study be initiated where the spring is intercepted by borehole MB20 and a potential 2nd borehole about 20 to 50m to the north-east. Once these have been established, further investigation will be necessary to determine the optimal placement of the capture system to effectively drain and redirect clean water away from the facility.

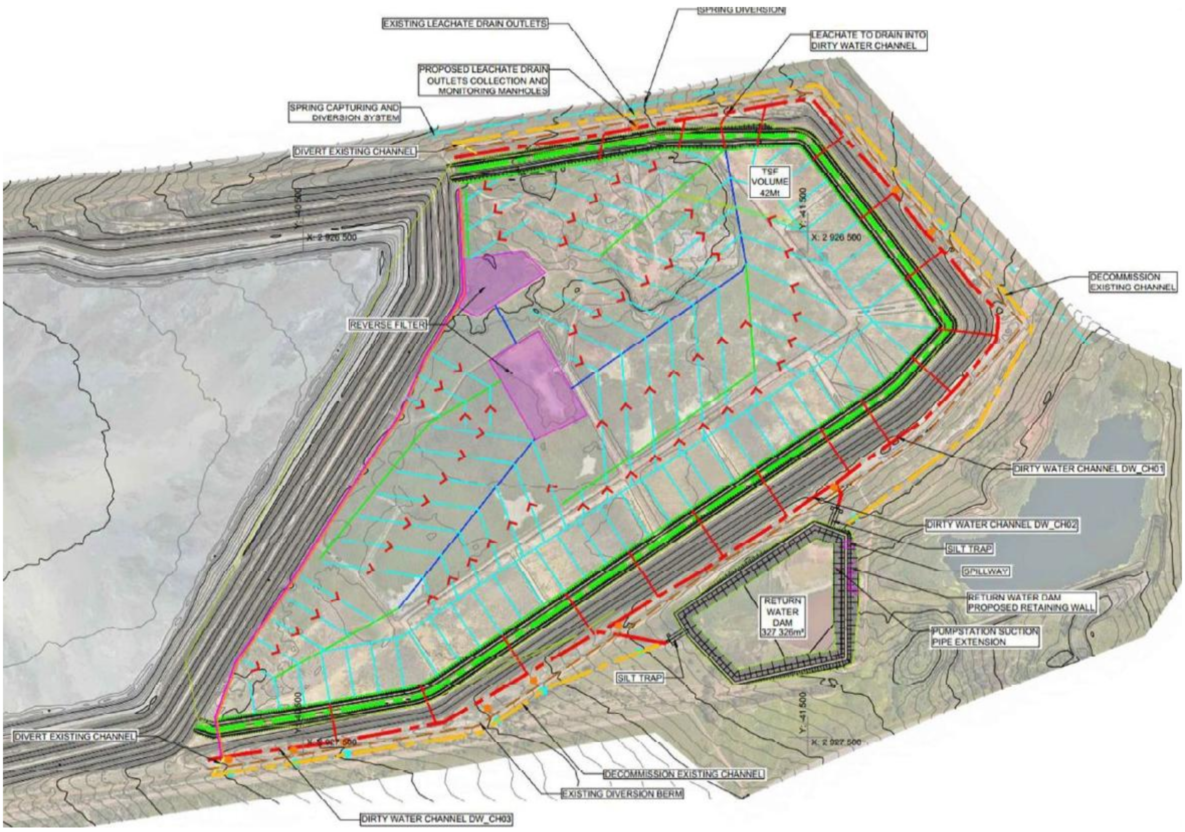


Figure 10: Potential stormwater and leachate collection system (Eco Elementum, 2025)

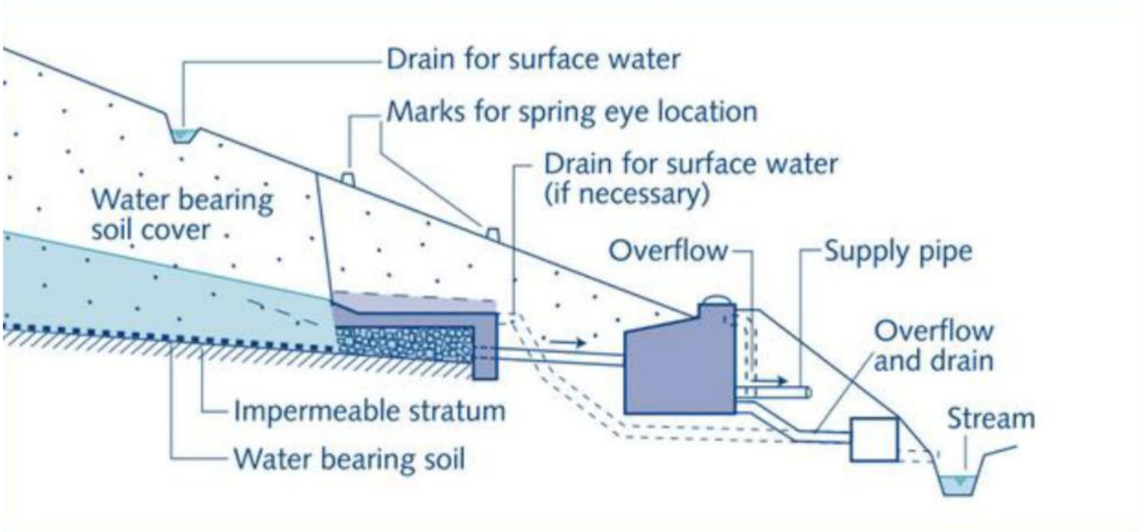


Figure 11: Schematic Detail a potential spring capturing system (Smet & van Wijk, 2002)

2.2.6 INSTALLATION OF DIRTY WATER SYSTEMS

2.2.6.1 SURFACE WATER CONVEYANCE

In support of the potential Water Use Licence Application (WULA) for the re-commissioning of the lower compartment, this study focuses solely on the direct infrastructure upgrades required on the lower TSF compartment to ensure regulatory compliance, particularly with respect to water management systems as prescribed under Government Notice 704 (GN704) of the National Water Act. GN704 requires that all dirty water collection and conveyance systems associated with mining-related activities be designed to prevent seepage of polluted water and promote the reuse of water. To achieve both regulatory compliance and cost efficiency, trapezoidal concrete-lined channels (**Figure 12**) are planned to be installed within the existing, unlined paddocks.

These channels will serve to collect and convey dirty water in a controlled manner, minimising seepage and preventing contamination of the surrounding environment. The channels will discharge into concrete silt traps before entering the RWD.

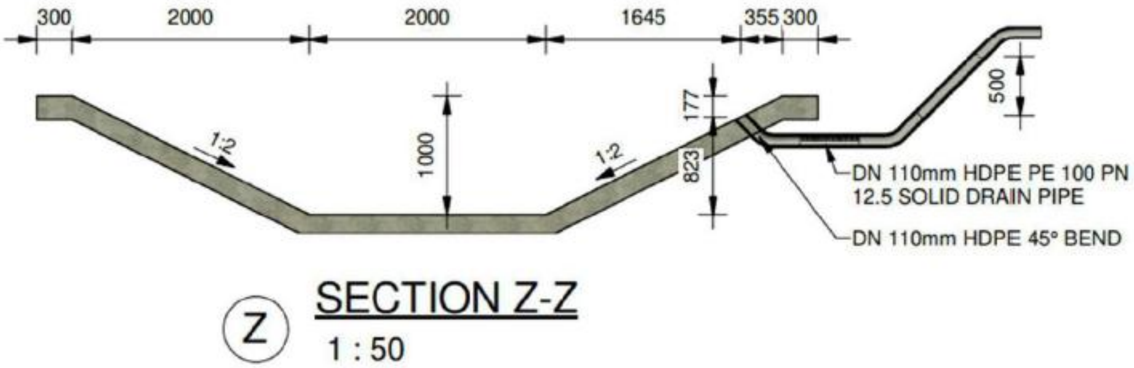


Figure 12: Typical Trapezoidal Concrete-lined Channel Detail (Eco Elementum, 2025)

Importantly, this proposed system strategically utilises existing infrastructure to minimise capital expenditure. The outer paddock bund wall and the existing earth-lined solution trench, both of which are already in place and in suitable condition with minor repairs, will be repurposed to function as components of the clean and dirty water separation system. The bund wall acts as a physical barrier, delineating clean runoff areas from the TSF, while the existing solution trench will continue to serve as a means of intercepting and directing water away from the facility (Eco Elementum, 2025).

2.2.6.2 **LEACHATE COLLECTION**

The leachate collection system has been set out to efficiently capture and convey leachate generated within the impoundment area, thereby reducing hydraulic head buildup and minimise seepage of contaminated water. This system plays a critical role in the environmental performance and geotechnical stability of the facility by promoting unsaturated conditions in the outer structural zone. The leachate collection system comprises a high-permeability drainage layer, consisting of a network of perforated HDPE collector pipes embedded in free-draining gravel (as shown in **Figure 13)**.

In addition to the leachate drainage network, the Lower Compartment of the TSF is equipped with a toe blanket drain (**Figure 14**) at the downstream toe of the facility. This drain serves as a secondary seepage control measure, capturing any leachate or seepage that migrates toward the outer limits of the impoundment. The toe blanket drain enhances the overall seepage control capacity of the TSF by providing an additional pathway for water interception before it can accumulate or emerge at the downstream slope, thereby reducing pore pressures and improving long-term slope stability.

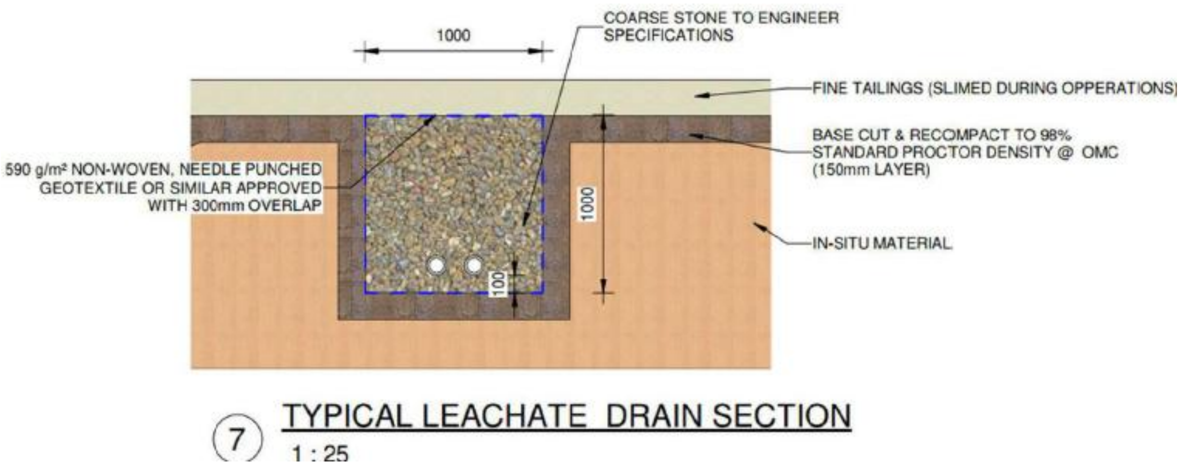


Figure 13: Typical Leachate Drain Detail (Eco Elementum, 2025)

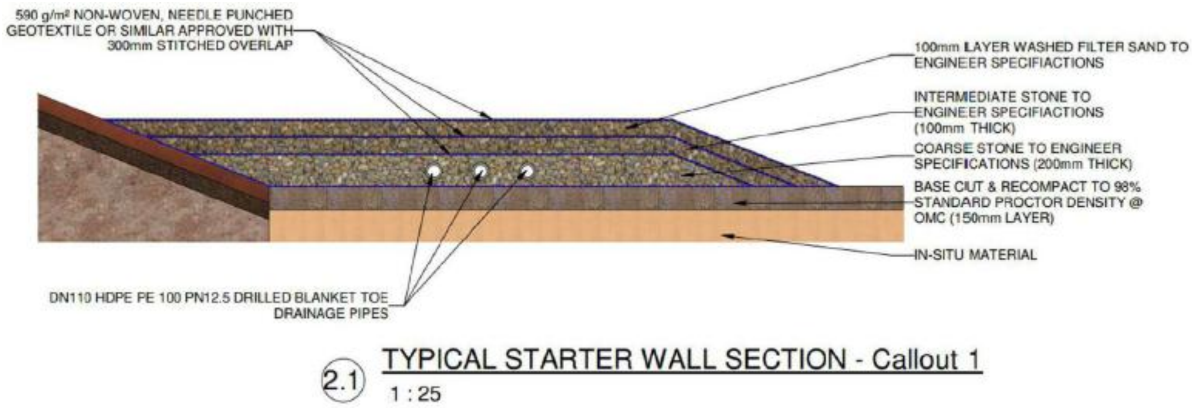


Figure 14: Typical Toe Drain Detail (Eco Elementum, 2025)

To maintain geotechnical stability and minimise the risk of seepage-induced failure, an interface curtain drain will be installed along the slope separating the Upper Compartment from the proposed Lower Compartment of the TSF. The curtain drain (as shown in **Figure 15**) has been designed to intercept and convey seepage emerging from the advancing Lower Compartment tailings before it can migrate laterally into the previously deposited, more permeable materials of the Upper Compartment. The interface drain will reduce the risk of increased pore water pressures within the coarser tailings Zone, reducing effective stress and possibly triggering localised instability. It is envisaged that the initial construction will establish a 4-meter-high curtain drain at the slope interface. However, because tailings deposition in the Lower Compartment will continue throughout the TSF's operational life, the curtain drain will need to be progressively extended upward by the operational contractor.

At the upstream side of the footprint, two reverse filter packs are strategically positioned at the current existing spring and holding dam locations to serve as seepage interception points. These reverse filters comprise a thick waste rock layer with non-woven needle-punched geotextile encapsulating the drain. If the Lower Compartment footprint is be dried out, and time is allowed for the subsurface water to dissipate, before construction works begin then the necessity of the filter packs will be reassessed. It should also be noted that the lower compartment currently has ten leachate collection outlet pipes that discharge into the existing unlined solution trenches. However, based on data from the Heavy-Medium Separation (HMS), no measurable flow has been recorded from these outlets for over a year. Therefore, it is proposed that these outlet points be intercepted and fitted with monitoring manholes. These manholes will be designed to either overflow or allow for controlled pumping into the solution trenches in the event that leachate accumulates within them. **Figure 15** below illustrates the proposed leachate and dirty surface water management system (Eco Elementum, 2025).

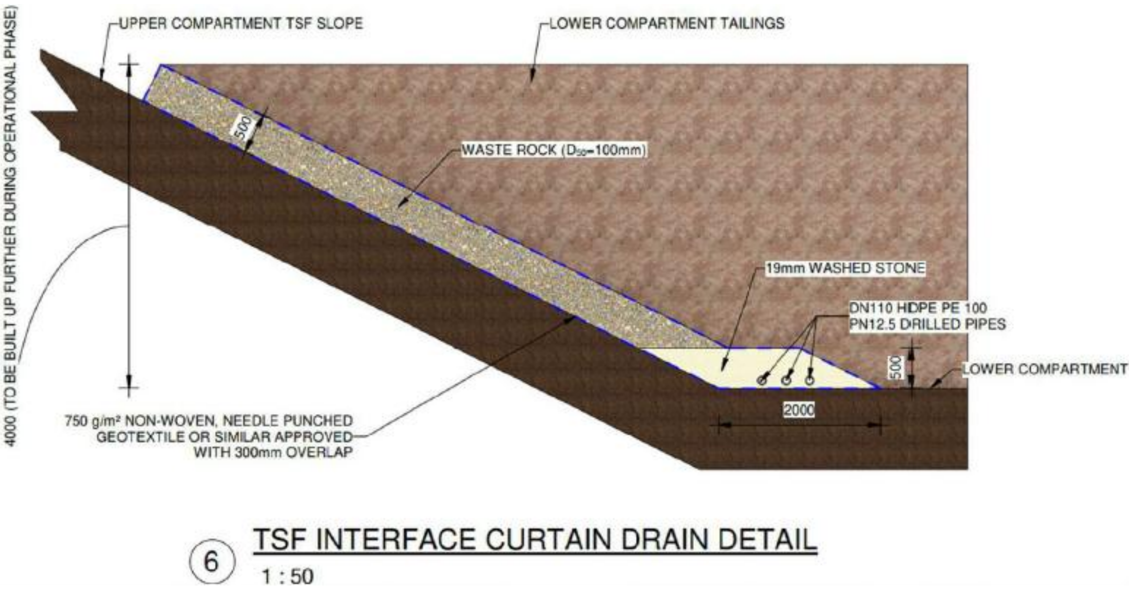


Figure 15: Typical Detail of the Interface drain (Eco Elementum, 2025)

2.2.7 UPGRADE OF RETURN WATER DAM (RWD)

2.2.7.1 **RWD DESIGN**

The current RWD does not have sufficient capacity to accommodate both current and future operational demands. Therefore, the existing dam will need to be enlarged to provide adequate capacity to contain the 1:50-year, 24-hour storm event above the mean operating level. The RWD is designated for the runoff, TSF pool drawdown, leachate, and sub-surface water of both the upper and lower compartments of the TSF. The RWD will be equipped with two silt traps (on the eastern and western sides of the dam, respectively) and an emergency spillway. The RWD will be of the earth fill embankment type, with an upstream and downstream slope of 1:3 (V:H). To prevent seepage and groundwater contamination, the RWD will be constructed with a Class C performance barrier system. The RWD will also be provided with a minimum freeboard of 800mm and an overflow spillway capable of safely passing the 1:100-year flood event.

A Class C performance barrier system has been opted for the RWD. The geomembrane was changed from a general Class C 1.5 mm HDPE to a 2 mm HDPE to improve the liner performance as well as to negate the use of a clay layer below. Due care should be taken when installing the barrier on top of the founding soil, which is to comply to SANS 10409 (2020), receiving face of reworked foundation soil. Soilcrete as a ballast layer and soilcrete-filled geocells are to be placed on the floor and wall area, respectively. Care should be taken when placing these layers above the liner. An Electric Leak Location (ELL) survey has been specified for the covered geomembrane in the RWD by means of Dipole testing according to ASTM D7007 to ensure that no damage has been caused to the barrier system after installation. Refer to the detailed information and schematic representation of the RWD and liner (**Figure 16**) (Eco Elementum, 2025).

EMBANKMENT CONSTRUCTION SPECIFICATIONS

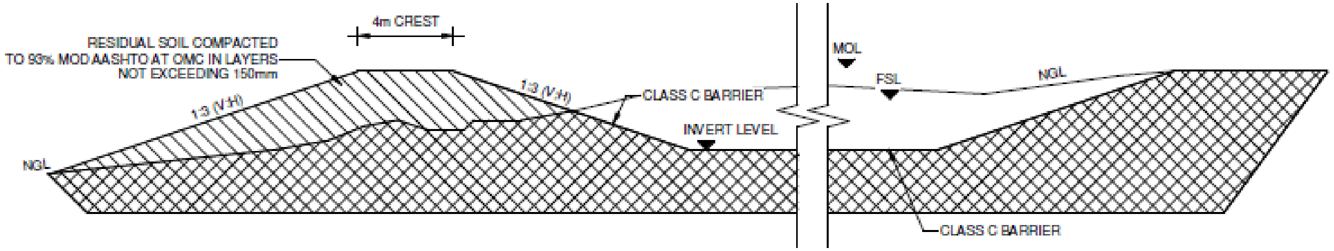
1. STRIP TOPSOIL 150mm TO 300mm FOR ENTIRE FOOTPRINT OF RWD AND STOCKPILE AS PER MINE REQUIREMENT FOR STOCKPILING AND TOP SOIL MAINTENANCE
2. EXCAVATE MATERIALS TO RESIDUAL SOIL OCCURING AT A DEPTH OF 0.4m TO 2m.
3. RIP AND COMPACT IN-SITU MATERIAL BELOW EMBANKMENTS TO 93% OF MOD AASHTO DENSITY
4. CONSTRUCT EMBANKMENT WITH RESIDUAL SOIL MATERIAL FROM EXCAVATIONS AND COMPACT TO 93% MOD AASHTO DENSITY AT OMC IN LAYERS NOT EXCEEDING 150mm.

T-LOCK NOTE

1. INSTALL "T-LOCK" TO MANUFACTURES SPECIFICATIONS

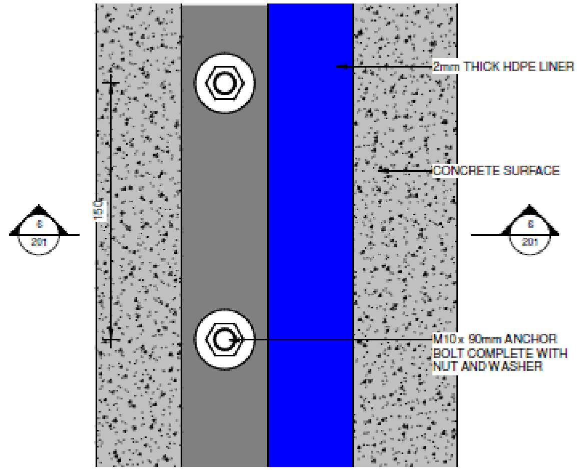
CLASS C BARRIER PROTECTION AND SURFACE PREPARATION

1. EXCAVATE RWD TO 300mm BELOW FINAL INVERT LAYER
2. EXCAVATE SUBSOIL DRAINAGE TRENCHES TO INSTALL SUB-SURFACE DRAINAGE PIPES. SUPPLY AND PLACE GEO-FABRIC (230g/m² NON-WOVEN NEEDLE PUNCHED GEOTEXTILE) IN SUB-SURFACE DRAINS AND BELOW FLOORS. PLACE 26mm AGGREGATE ON TRENCH FLOOR TO FORM PIPE BEDDING. SUPPLY, LAY AND BED 110mm DIAMETER HDPE SLOTTED SUB-SURFACE DRAINAGE PIPES. SUPPLY AND PLACE 19mm CRUSHED STONE IN SUBSOIL DRAIN.
3. FOUNDING SOIL TO COMPLY TO SANS 10409(2020) RECEIVING FACE OF REWORKED MATERIAL.
4. SUPPLY AND INSTALL 2mm HDPE GEOMEMBRANE TO SANS 10409(2020) BY SPECIALIST SUPPLIER (TO BE APPROVED BY ENGINEER) TO DAM FLOOR AND EMBANKMENTS
5. SUPPLY AND INSTALL ROCKGRID BY SPECIALIST SUPPLIER (TO BE APPROVED BY ENGINEER) TO DAM FLOOR AND EMBANKMENTS
6. ANCHOR LINER IN TRENCH 1300mm WIDE AND 500mm DEEP ON TOP OF EMBANKMENT AS SHOWN ON DRAWING.
7. ELL SURVEY TO BE PERFORMED FOR COVERED GEOMEMBRANE BY MEANS OF DIPOLE TESING ACCORDING TO ASTM D7007.



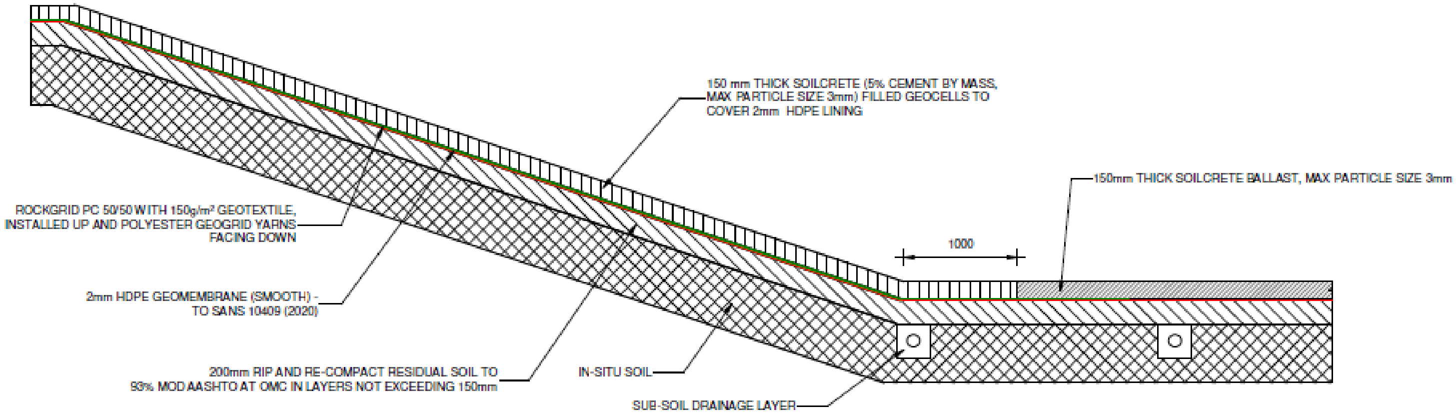
1 TYPICAL SECTION THROUGH EMBANKMENT

1 : 200



3 LINER TO CONCRETE FIXING PLAN VIEW

1 : 2



2 CLASS C DAM LINING DETAIL - EMBANKMENT

1 : 30

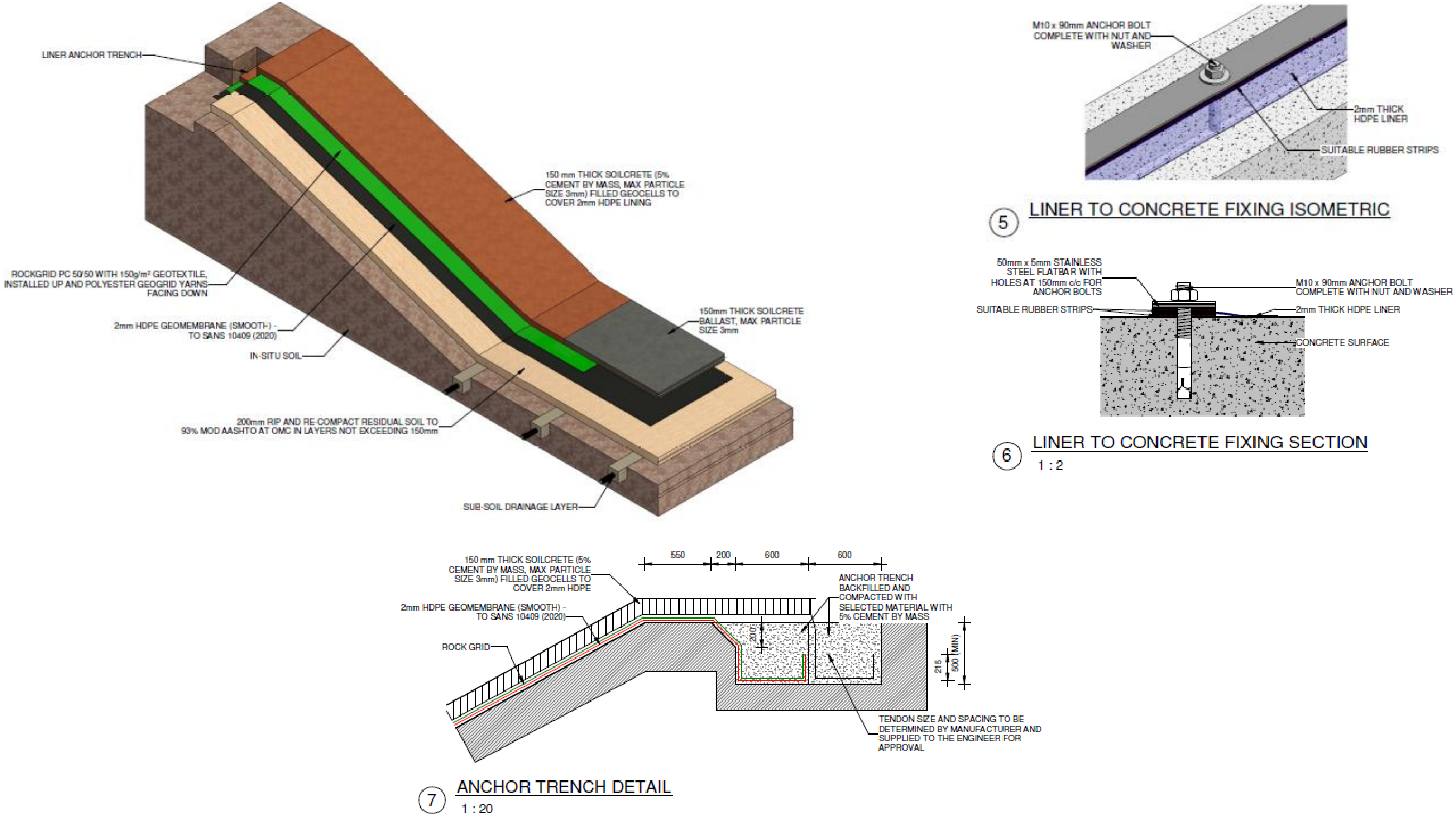


Figure 16: Proposed RWD layout and liner detail. (Eco Elementum, 2025)

2.2.7.2 **RWD SIZING (WATER BALANCE)**

A water balance was conducted to ensure that the size of the dirty water management infrastructure is adequate and that the mine complies with the requirements set out in the National Water Act (NWA), Act 36 of 1998, as well as the regulations on water usage for mining activities stated in Government Notice Nr. GN704 dated June 1999. The results of the water balance model are summarized below:

- Excess water in the RWD is at risk of overflowing into the downstream environment when both the Upper and Lower TSFs are operational, with the potential to degrade the surface and groundwater qualities of surrounding areas. Excess water from Mponeng operations must be sent to the Savuka Operations to ensure that the proposed RWD is adequately sized to accommodate all the dirty water inflows.
- The proposed capacity of Mponeng TSF RWD is 327,000m^3. This capacity is sufficient to contain all dirty water inflows without the dam spilling more than once in 50 years.
- Average of 3.03 Ml/day needs to be pumped back to the Savuka plant.
- Average of 6.16 Ml/day needs to be pumped back to the Mponeng plant.
- Roughly 40% of the RWD capacity was allowed for the operating level of the RWD.

2.3 LISTED AND SPECIFIED ACTIVITIES TRIGGERED

In terms of Section 24(2) of NEMA, the Minister and/or any MEC in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. Environmental Impact Assessment (EIA) Regulations were promulgated in 2014 and amended in 2021 in terms of Section 24(5) and Section 44 of the National Environmental Management Act (NEMA), Act 107 of 1998 and consist of the following:

- *Government Notice Regulation (GNR) 982* provide details on the processes and procedures to be followed when undertaking an Environmental Authorisation process (also referred to as the EIA Regulations);
- *GNR 983 Listing Notice 1* (Regulation 983, as amended) defines activities which will trigger the need for a Basic Assessment process;
- *GNR 984 Listing Notice 2* (Regulation 984, as amended) defines activities which trigger an Environmental Impact Assessment (EIA) process. If activities from both R 983 and R 984 are triggered, then an EIA process will be required; and
- *GNR 985 Listing Notice 3* (Regulations 985, as amended) defines certain additional listed activities for which a Basic Assessment process would be required within identified geographical areas.

The above regulations were assessed to determine whether the proposed project will trigger any of the above listed activities, and if so, which Environmental Authorisation Process would be required. The triggered listed activities presented in **Table 8** and the applicant requires an Environmental Authorisation (EA) and Waste Management License (WML) in terms of GNR 983 Listing Notice 1, GNR 984 Listing Notice 2 and GNR 985 Listing Notice 3 of the NEMA EIA Regulations 2014 as amended and GN921 (as amended) promulgated under the National Environmental Management Waste Act (Act 59 of 2008 - NEMWA). A Scoping and EIA process is required in line with all the requirements of the NEMA EIA Regulations, 2014, as amended.

Table 8: Relevant NEMA listed activities relevant to the proposed development

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
GN983, Activity 10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process	In order to allow for slurry deposition on Mponeng from either of the operational plants (Kusasalethu or Savuka), new residue deposition

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	water, waste water, return water, industrial discharge or slimes- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more.	pipelines will be required. The residue deposition pipelines will have a NB diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s).
GN983, Activity 12	The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs (a) within a watercourse or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.	The proposed TSF and associated infrastructure such as RWD upgrade, pipelines, drainage systems, culvert and bridge exceed the 100m^2 threshold and are located within a natural spring, channelled valley bottom, aquatic dam and proximity of the Elandsfonteinspruit
GN983, Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The proposed pipelines and maintenance road will likely intersect wetlands and may require infilling of more than 10m^3 to ensure structural integrity.
GN983, Activity 21D	Any activity including the operation of that activity for which the Minister responsible for mineral resources has issued an exemption in a Government Notice in terms of section 106(1} of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required for the exercising of such exempted activity	Amendment of the approved Mining Right EMPr through a MPRDA Section 102 application may be required.
GNR983 Activity 21F	Any activity including the operation of that activity required for the reclamation of a residue stockpile or a residue deposit as well as any other applicable activity as contained in this Listing Notice or in Listing Notice 3 of 2014, required for the reclamation of a residue stockpile or a residue deposit	The residue stockpile may eventually be reclaimed once deposition has been completed and the reclamation process is considered a viable process.
GN984, Activity 6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	The proposed Mponeng Lower Compartment TSF will involve the disposal of waste with potential to cause pollution, thus, requiring a Water Use Licence in terms of Section 21(g).
GN984, Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation.	There will be clearance requirements of indigenous vegetation which will exceed 20ha to allow for the necessary stabilization and installation/upgrades of associated infrastructure required for the recommencement of deposition on Mponeng Lower Compartment TSF.
GN985 Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for	Clearance of vegetation in the preparation of the construction footprint will result in a potential

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	maintenance purposes undertaken in accordance with a maintenance management plan. ***c. Gauteng*** *ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.*	impact on Critical Biodiversity Areas (CBA) 2 and Ecological Support Areas (ESA) 1.
GN985 Activity 14	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. ***c. Gauteng*** *ii. National Protected Area Expansion Strategy Focus Areas;* *iii. Gauteng Protected Area Expansion Priority Areas;* *iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;* *vi. Sensitive areas identified in an environmental management framework adopted by the relevant environmental authority.*	The proposed footprint for the TSF, pipelines and access roads is located within 32m of wetlands, will exceed 10 square metres and will result in a potential impact on CBA 2 and ESA 1.
GN985 Activity 23	The expansion of— (i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs— (a) within a watercourse; (b) in front of a development setback adopted in the prescribed manner; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. ***c. Gauteng*** *ii. National Protected Area Expansion Strategy Focus Areas;* *iii. Gauteng Protected Area Expansion Priority Areas;* *iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;* *vi. Sensitive areas identified in an environmental management framework adopted by the relevant environmental authority.*	The RWD requires an upgrade to a Class C lined, earth fill embarkment RWD with a capacity of 327,000m^3. This capacity is sufficient to contain all dirty water inflows without the dam spilling more than once in 50 years.

The listed activities that are triggered by the project in terms of GN921 (as amended) promulgated under the National Environmental Management Waste Act (Act 59 of 2008 - NEMWA) are specified in **Table 9** below.

Table 9: Applicable NEMWA Activities relevant to the proposed development

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
Category A, Activity A14	The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule.	The current licensed Mponeng Landfill Site located on the Mponeng Lower Compartment TSF needs to be decommissioned from site and relocated to a different area.
Category B, Activity B7	The disposal of any quantity of hazardous waste to land.	TSF operations
Category B, Activity B10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	TSF construction
Category B, Activity B11	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	TSF establishment

As previously indicated, The Mponeng Lower Compartment TSF was an existing TSF with a footprint of approximately 102ha, however, the Mponeng Lower Compartment TSF is no longer in operation and is currently utilised as a Holding Dam and an approximately 200m^2 portion of the TSF has been converted and is currently used as an authorized General Waste Landfill Facility (Gaut 002-09-10-W0011). The current licensed Mponeng Landfill Site located on the Mponeng Lower Compartment TSF will be discontinued for the purposes of the TSF construction. The License Holder intends to surrender the Waste Management License to allow for the recommencement of tailings deposition on the facility through Regulation 57 of the NEMWA. Comments / concerns regarding the proposed process of surrendering the Mponeng General Waste Management License should were requested during the public review and comment of the scoping report. It is important to note that no objections were received by EIMS.

The DMPR has been identified as the CA for both the NEMA and NEMWA listed activities triggered by the project. A separate application for a WUL is in progress with the Department of, Water and Sanitation (DWS) for the water use triggers namely:

a) Section 21a: Taking water from a water resource (to be confirmed by DWS with respect to the spring capture and diversion options);

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

c) Section 21 g: Disposing of waste in a manner which may detrimentally impact on a water resource;

d) Section 21 i: Altering the bed, banks, course or characteristics of a watercourse.

3 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

The needs and desirability analysis component of the "Guideline on need and desirability in terms of the EIA Regulations (Notice 819 of 2014)" includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g., on livelihoods, loss of heritage site, opportunity costs, etc.). This section of the report provides the need and desirability for the proposed Mponeng Lower Compartment TSF.

The applicant holds an approved Mining Right (MR) and Environmental Management Programme (EMPr), in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA), for the mining of gold at various operations in the West Wits Region in the Gauteng Province ((GP 30/5/1/2/2 (01)) MR. The Savuka Plant currently deposits tailings onto the Savuka 5a, 5b, 7a & 7b TSFs. However, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits Region exceed the available deposition capacity of these TSFs. The Savuka tailings facility has reached the end of its lifecycle and is undergoing a short-term extension of two years. Following this period, tailings from Savuka will need to be diverted to an alternative facility. The Mponeng Lower Compartment has been identified as a viable solution to accommodate tailings until the end of life of the Savuka plant and thereafter accommodate tailings from the Mponeng plant. Tailings were deposited up to 25m on the southern half of the footprint, but deposition was ceased after a natural spring was identified within the footprint. Golden Core Trade and Invest plans to re-commission the Lower Compartment after the spring is diverted to reduce groundwater contamination. This process will allow for the operations to continue safely.

If the project was to not proceed, it would entail a situation where once the Mponeng Upper Compartment and Savuka TSFs reach their carrying capacity and approved height, deposition would stop which would mean the mining activities would come to a halt. That would negatively affect the future viability of Harmony's West Wits mining operations and massive socio-economic impacts would emanate due to lack of deposition space. This would also negatively affect the company's financial closure and rehabilitation plans. Subsequently, it would result in a significant negative financial impact on not only Harmony but also have a direct negative impact on the workforce on the mine and surrounding businesses and communities that are directly or indirectly linked to the operations. **Table 10** present the needs and desirability analysis undertaken for the project.

Table 10: Needs and desirability analysis for the proposed TSF

Ref No.	Question	Answer
1	Securing ecological sustainable development and use of natural resources	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	Although the study area has been disturbed through the active mining operations, based on the proposed development and site sensitivity verification, several specialist studies form part of this environmental impact assessment including: • Soils and Agricultural Impact Assessment; • Air Quality Impact Assessment; • Surface Water (Hydrological) Assessment; • Groundwater Impact Assessment; • Aquatic Ecology Impact Assessment; • Terrestrial Biodiversity Assessment; • Wetland Delineation and Assessment; • Cultural and Heritage Resources Assessment; • Visual Impact Assessment; • Health Risk & Radiological Impact Assessment; • Palaeontology Assessment; and • Closure and Rehabilitation Plan These studies assisted in identifying any Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Areas, Conservation Targets, Ecological drivers of the ecosystem and other environmental sensitives. Where sensitive areas, species or ecosystem drivers were identified, relevant mitigation measures have been put forward to prevent or minimise the impacts.
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	The overall proposed development site inclusive of the TSF and RWD, pipelines and access roads is approximately 120ha. Based on the specialist assessments, the study area is largely disturbed but does contain species of conservation concern along both pipeline routes assessed. As per the Biodiversity Impact Assessment, a search and rescue (relocation) permit and plan will be required post the EA Phase, Therefore, the sensitive species will be relocated to the nearby habitat with no final impact from the activities.
1.3	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts	The proposed project entails the redeposition onto an existing footprint of a hazardous waste facility which can have detrimental environmental and health impacts. As per the

Ref No.	Question	Answer
	could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Radiational Impact Assessment, there are minimal potential health risks associated with the proposed activities and the impacts can be reduced further through the specific mitigation measures indicated in **Section 8.3**. As stipulated in the mitigation hierarchy, the EAP / specialist will recommend to first avoid adverse impacts, then minimize impacts that cannot be avoided, and lastly offset, or compensate for, unavoidable impacts. Refer to ecological statement in **Section 7** and the impact assessment in **Section 8** of this report.
1.4	What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	This development will possibly generate various general and minor hazardous waste, the majority of which will be generated during the construction phase. The general waste will be stored in designated areas and through the process of recovery and recycling, the volume of general waste being disposed to landfill will be minimised. The hazardous portion of the waste stream will also be adequately stored prior to disposal at a suitably licenced hazardous waste disposal facility. Safe disposal certificates will be obtained from the disposal facility used. Waste during the operational phase will largely be from the tailings material which will be managed accordingly through an integrated waste and tailings storage facility management approach. Waste has been identified as an impact and assessed in **Section 8**. However, it is anticipated that the following measures can be utilised to reduce the impact of the waste on the receiving environment. Waste must be stored correctly. All hazardous waste such as oil must be stored separately and disposed of at a registered facility. Proof of disposal must be kept by the Applicant.
1.5	How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	A heritage impact assessment was undertaken as part of the EIA to determine areas of archaeological and/or cultural heritage and associated mitigation measures. The Heritage Study (**Appendix G**) found stonewalling along proposed pipeline route. Based on the deviation around the 15m buffer and associated mitigation measures included in the specialist report, this EIA Report and EMPr (**Appendix I**), the impact will can be reduced from medium negative prior mitigation to low negative post mitigation.
1.6	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources	Refer to the impact assessment in **Section 8** of this report. As a result of the fact that this project entails the recommencement of deposition on an existing TSF, it is anticipated

Ref No.	Question	Answer
	been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	that this project will not lead to a significant impact or depletion of non-renewable resources.
1.7	How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	It is anticipated that the project will have a medium - low negative impact on the localised ecology post mitigation. Refer to the impact assessment in **Section 8** of this report.
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e., de-materialised growth)?	The proposed project is only for additional deposition space required for Harmony's West Wits Region.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The proposed project will not, at this stage, involve the use of the natural resources apart from the TSF footprint area to be cleared.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed project is only for additional deposition space required for Harmony's West Wits Region.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts:	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	In order to prevent repetition, the reader is directed to the assumptions and limitations presented in **Section 11**.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk is considered low at this stage.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	At this stage it is anticipated that this project will not lead to a significant impact on the receiving environment. Refer to the impact assessment in **Section 8** of this report.

Ref No.	Question	Answer
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following?	
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The proposed activities are anticipated to have medium - low negative ecological impacts post mitigation. Refer to the impact assessment in **Section 8** in this report.
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	A medium to low impact on third party wellbeing, livelihoods and ecosystem services is currently foreseen. Refer to the impact assessment in **Section 8** of this report.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	The proposed survey activities are anticipated to have generally low negative ecological impacts. Refer to the impact assessment in **Section 8** in this report.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	As part of the EIA phase, suitable alternatives were considered and assessed. Refer to **Section 5** for the details of the alternatives considered for the project.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to **Section 8** of this report for the identified impacts, their assessment and recommended mitigation measures.
2	**Promoting justifiable economic and social development**	
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following:	

Ref No.	Question	Answer
2.1.1	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area	Refer to **Section 7.12** of this report for a breakdown of the demographics and social environment in the project area. The Merafong City Local Municipality IDP and West Rand District Municipality IDP identifies Economic infrastructure and development as one of the key mayoral strategic priorities (IDP Merafong Municipality 2023/24 IDP and West Rand Municipality 2024/25 Reviewed IDP).
2.1.2	Spatial priorities and desired spatial patterns (e.g., need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville.
2.1.3	Spatial characteristics (e.g., existing land uses, planned land uses, cultural landscapes, etc.), and	Refer to the baseline environment in **Section 7** of this report.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	Considering the location of the activities, it is not anticipated to significantly promote or facilitate spatial transformation and sustainable urban development.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Refer to the impact assessment in **Section 8** in this report.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville. In addition, Harmony has various social and LED initiatives required under their Social & Labour Plan (SLP) commitments.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to the public participation process and feedback contained in **Appendix C**.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	Refer to the impact assessment and mitigation measures in **Section 8** of this report.

Ref No.	Question	Answer
2.5	**In terms of location, describe how the placement of the proposed development will:**	
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville.
2.5.2	Reduce the need for transport of people and goods.	The activities are not anticipated to have an impact on the transportation of goods and people.
2.5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms of public transport),	The activities are not anticipated to have any significant impact on the public transport.
2.5.4	Compliment other uses in the area,	The surrounding area is impacted by existing TSF facilities.
2.5.5	Be in line with the planning for the area.	Refer to item 2.1.1 of this table (above).
2.5.6	For urban related development, make use of underutilised land available with the urban edge.	The proposed activity is only for additional deposition space required for the applicant's existing operations on an existing footprint, pipelines and access roads will be along existing pipeline routes and road, as such the activity will not require any additional land.
2.5.7	Optimise the use of existing resources and infrastructure,	Refer to **Section 2** of this report.
2.5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g., not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	The proposed activity is only for additional deposition space required for the applicant's existing operations on an existing footprint, pipelines and access roads will be along existing pipeline routes and road, as such the activity will not require any additional land.

Ref No.	Question	Answer
2.5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	Refer to items 2.5.7 – 2.5.9 of this table (above).
2.5.11	Encourage environmentally sustainable land development practices and processes	Refer to impact assessment in **Section 8** of this report.
2.5.12	Take into account special locational factors that might favour the specific location (e.g., the location of a strategic mineral resource, access to the port, access to rail, etc.),	Refer to alternative analysis in **Section 5**.
2.5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville. In addition, Harmony has various social and LED initiatives required under their various SLP commitments.
2.5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Refer to impact assessment in **Section 8** of this report.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	Given the scale of the development it is not anticipated that the activities will contribute significantly to settlements or areas in terms of direct socio-economic returns however the development will allow operations at the Savuka and Kusasalethu plant and various Harmony West Wits Region mining operations to continue.
2.6	**How was a risk-averse and cautious approach applied in terms of socio-economic impacts:**	
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Refer to **Section 11** of this report.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions should the recommended mitigation and management measures be implemented and adhered to.

Ref No.	Question	Answer
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions (refer to **Section 8**) should the recommended mitigation and management measures be implemented and adhered to (refer to **Section 8.3**).
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1	Negative impacts: e.g., health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the impact assessment in **Section 8.3** of this report.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	Refer to the impact assessment in **Section 8.3** of this report.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the impact assessment in **Section 8.3** of this report.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Refer to the impact assessment in **Section 8.3** of this report.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Refer to the impact assessment in **Section 8.3** of this report.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting an EIA Process, the applicant ensures that equitable access has been considered. Refer to the impact assessment in **Section 8** of this report.

Ref No.	Question	Answer
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Refer to the impact assessment in **Section 8** of this report. The EMPr (**Appendix I**) has specified timeframes within which mitigation measures must be implemented.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to **Section 6** of this report, describing the public participation process undertaken for the proposed project.
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	Refer to **Section 6** of this report, describing the public participation process undertaken for the proposed project. Advertisements, notification letters and site notices have been made available in English, Afrikaans and Setswana to assist in understanding of the project.
2.13.3	Ensure participation by vulnerable and disadvantaged persons,	
2.13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
2.13.5	Ensure openness and transparency, and access to information in terms of the process,	
2.13.6	Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Refer to **Section 6** of this report, describing the public participation process undertaken for the proposed project.

Ref No.	Question	Answer
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Potential future workers will have to be educated on a regular basis as to the environmental and safety risks that may occur within their work environment. Furthermore, adequate measures will have to be taken to ensure that the appropriate personal protective equipment is issued to workers based on the conditions that they work in and the requirements of their job.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	The number of temporary versus permanent jobs that will be created.	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville. However, as indicated in **Section 8.3.13**, there will be minimal job opportunities associated with the activities due to the nature of the proposed activities.
2.16.2	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	
2.16.3	The distance from where labourers will have to travel.	
2.16.4	The location of jobs opportunities versus the location of impacts.	
2.16.5	The opportunity costs in terms of job creation.	
2.17	What measures were taken to ensure:	
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The EIA Process requires governmental departments to communicate regarding any application. In addition, all relevant departments are notified at various phases of the project by the EAP.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to **Section 6** of this report, describing the public participation process implemented for the application, as well **Section 8**, the impact on any national estate.

Ref No.	Question	Answer
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the impact assessment and mitigation measures in **Section 8** of this report.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The proposed survey activities are not anticipated to produce significant pollution, environmental damage or adverse health effects in the long term.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to **Section 5**, description of the process followed to reach the proposed preferred site.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to the impact assessment and mitigation measures in **Section 8** and the EMPr (**Appendix I**).

4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, which is the DMRE, in accordance with the requirements of the NEMA EIA Regulations 2014, as amended. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed activity. The key legislation applicable to this project is discussed in the subsections below. The contents of this report are based on a review of the information that was available at the time of the compilation of the report. The discussion in this chapter is by no means an exhaustive list of the legal obligations of the applicant in respect of environmental management for the proposed Mponeng Lower Compartment TSF project.

4.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the proposed Mponeng Lower Compartment TSF operates is governed by many Acts, Regulations, Standards and Guidelines on a national level. Legislation applicable to the project includes (but is not limited to) those discussed below.

4.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act No. 108 of 1996) makes provisions for environmental issues and declares that: *"Everyone has the right -*

a) to an environment that is not harmful to their health or well-being; and

b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

i. prevent pollution and ecological degradation;

ii. promote conservation; and

iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The State must therefore respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate. The application for an Integrated Environmental Authorisation, Water Use Authorisation and any other licenses / permits for the proposed Mponeng Lower Compartment TSF will ensure that the environmental right enshrined in the Constitution contributes to the protection of the biophysical and social environment.

4.1.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIAs became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now Department of Forestry, Fisheries and the Environment – DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended several times between 2010 and 2022. The NEMA EIA Regulations, 2014, as amended, are applicable to this project.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that are triggered by the proposed project. The purpose of these procedures is to provide the competent authority with adequate information to make informed decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIAs in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity (refer to **Figure 17**).

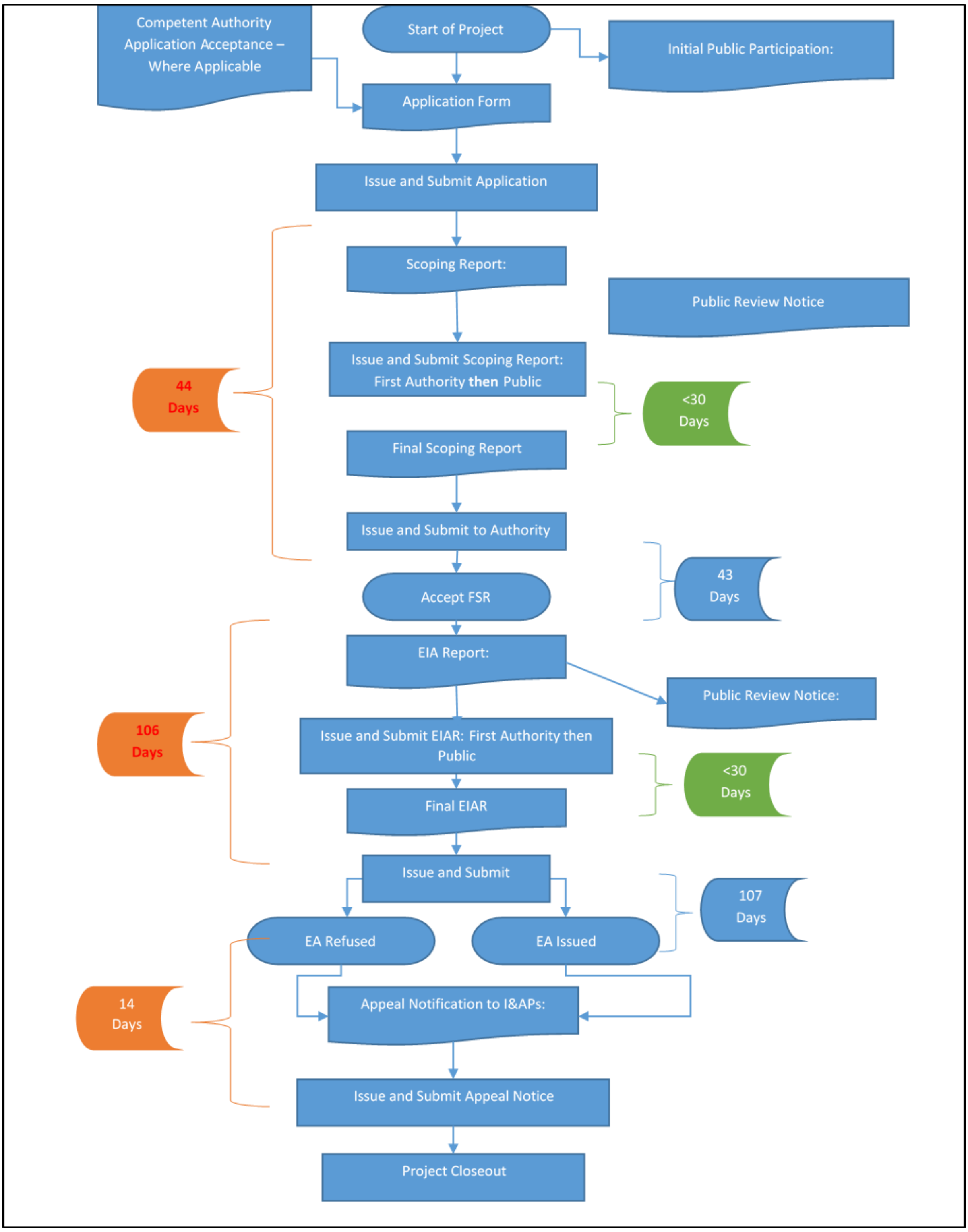


Figure 17: EIA process diagram

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. **Figure 17** provides a graphic representation of all the components of a full EIA process.

Section 24P of the NEMA requires that an applicant for an environmental authorisation relating to prospecting, mining or production must, before the Minister responsible for mineral resources issues the EA, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts. Therefore, the potential environmental liabilities associated with the proposed activity must be quantified and the method of financial provision indicated in line with the DMPR Financial Provision Regulations (2015) under the National Environmental Management Act (NEMA), which mandate mining and petroleum companies (holders of rights and permits) to set aside sufficient funds for environmental rehabilitation, remediation, and closure of operations. The financial provision costs are presented in this EIA Report (**Appendix G**). The listed activities, the proposed project triggers and consequently requires authorisation prior to commencement are detailed in **Section 2.3**.

NEMA is the main Environmental Legislation in South Africa and other Specific Environmental Management Acts (SEMA's) support its objectives. Examples of SEMA's include the following:

- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008);
- National Water Act, 1998 (Act No. 36 of 1998);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004); and
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

Some specific Environmental Management Legislation is discussed in **Sections 4.1.4 to 4.1.20.** The key principles of NEMA as outlined in Chapter 3 can be summarised as follows:

- sustainability must be pursued in all developments to ensure that biophysical and socio-economic aspects are protected; or
- there must be equal access to environmental resources, services and benefits for all citizens including the disadvantaged and the vulnerable. Adverse environmental impacts shall be distributed fairly among all citizens;
- environmental governance must include the participation of all interested and affected parties who must be catered for to allow their effective participation;
- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; and

The polluter pays principle must be applied in all cases where any person has caused pollution or undertaken any action that led to the degradation of the environment.

4.1.3 NEMA ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities that require authorisation as these activities may negatively affect the environment. The Act requires that in such cases the impacts must be considered, investigated and assessed before their implementation, and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The NEMA EIA Regulations guide the processes required for the assessment of impacts of Listed Activities.

The requirement for the undertaking of Environmental Impact Assessments and Basic Assessments began in 1997 with the promulgation of the EIA Regulations under the Environment Conservation Act, 1989 (ECA) (Act No. 73 of 1989). These were followed by the 2006, 2010 and 2014 regulations. **Table 11** is a summary of the progression of the EIA regulations to date.

Table 11: Summary of the South African EIA regulations from inception to date

EIA **Regulations**	**Government Gazette**
EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989	GNR 1182 & 1183: Government Gazette No 18261, 5 September 1997
Amendment of the ECA EIA Regulations	GNR 670 and GNR 672 of 10 May 2002, Government Gazette No 23401
2006 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 385, 386 and 387 Government Gazette No 28753, Pretoria, 21 April 2006
2010 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 543, 544, 545 and 546 Government Gazette No 33306, Pretoria, 18 June 2010
2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 982, 983, 984 and 985 Government Gazette No 38282, Pretoria, 04 December 2014
Current **Amendment of the 2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998**	GNR 982, 983, 984 and 985 Government Gazette No 44701, Pretoria, 2021 as amended

The scoping and EIA process for the proposed Mponeng Lower Compartment TSF is undertaken in terms of the NEMA EIA Regulations, 2014, as amended.

4.1.4 THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002

The MPRDA aims to "make provision for equitable access to, and sustainable development of, the nation's mineral and petroleum resources". The MPRDA outlines the procedural requirements that need to be met to acquire mineral and petroleum rights in South Africa. The MPRDA further governs the sustainable utilisation of South Africa's mineral resources.

Several amendments have been made to the MPRDA. These include, but are not limited to, the amendment to Section 102 which concerns the amendment of rights, permits, programmes and plans, to requiring the written permission from the Minister for any amendment or alteration; and the Section 5A(c) requirement that landowners or land occupiers receive twenty-one (21) days' written notice prior to any activities taking place on their properties. One of the most recent amendments requires all mining related activities to follow the full NEMA process as per the 2014 EIA Regulations, which came into effect on 4 December 2014 as was last amended in April 2017.

In support of the separate WML activities, the applicant is required to conduct an Integrated EIA process comprising of the preparation of environmental Scoping and EIA Reports, an EMPr, as well as Interested and Affected Party (I&AP) consultations, all of which must be submitted to the DMPR for adjudication. This report has been compiled in accordance with Regulation 49 of the MPRDA and Regulation 21 and Appendix 2 of the EIA Regulations (2014, as amended) in order to satisfy the criteria for a Scoping Report. This EIA Report pertains to both the NEMA and WML application as part of the Integrated EA Application for the proposed Mponeng Lower Compartment TSF.

4.1.5 THE MINING AND BIODIVERSITY GUIDELINES, 2013

The Mining and Biodiversity Guidelines (2013) was developed by the Department of Mineral Resources, the Chamber of Mines, the SANBI and the South African Mining and Biodiversity Forum, with the intention to find a balance between economic growth and environmental sustainability. The Guideline is envisioned as a tool to "foster a strong relationship between biodiversity and mining, which will eventually translate into best practice within the mining sector. It provides a tool to facilitate the sustainable development of South Africa's mineral resources, in a way that enables regulators, industry and practitioners to minimise the impact of mining on the country's biodiversity and ecosystem services. It provides the mining sector with a practical, user- friendly manual for integrating biodiversity considerations into the planning processes and managing biodiversity during the operational phases of a mine, from exploration through to closure. The Guideline provides explicit direction in terms of where: mining-related impacts are legally prohibited; biodiversity priority areas may present high risks for mining projects; and biodiversity may limit the potential for mining.

In identifying biodiversity priority areas, which have different levels of risk against mining, the Guideline categorises biodiversity priority areas into four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining in these areas:

A) Legally protected areas, where mining is prohibited;

B) Areas of highest biodiversity importance, which are at the highest risk for mining;

C) Areas of high biodiversity importance, which are at a high risk for mining; and

D) Areas of moderate biodiversity importance, which are at a moderate risk for mining.

Based on the Baseline Terrestrial Report (The Biodiversity Company, 2025 - **Appendix G**), the study area is located within Categories B, C and D due to the existing mining activities in the area (**Figure 18**). Based on the Mining and Biodiversity Guidelines, specifically the restrictions, the proposed project is in an area that is **not** legally protected or where mining is prohibited (Category A).

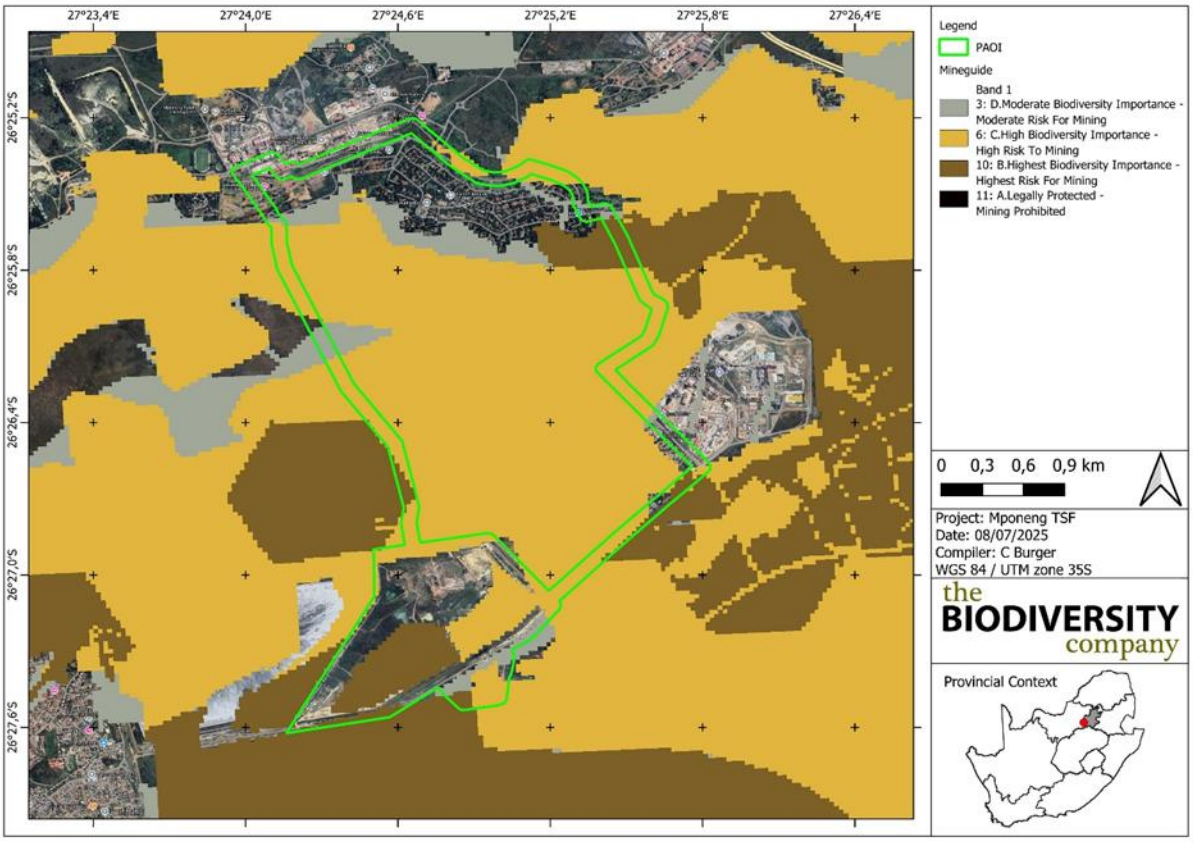


Figure 18: Map illustrating the Mining Biodiversity Importance/Risk (The Biodiversity Company, 2025)

4.1.6 NATIONAL RADIOACTIVE WASTE DISPOSAL INSTITUTE ACT 53 OF 2008

In terms of this Act the generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility. The generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility.

Generators of radioactive waste must:

A) develop and implement site-specific waste management plans based on national policy;

B) provide all relevant information on radioactive waste as required by the chief executive officer;

C) demonstrate compliance with any conditions of a radioactive waste disposal certificate;

D) provide site access to staff of the Institute for inspection against any conditions of the radioactive waste disposal certificate.

The TSF slurry is considered radioactive waste. Generators of radioactive waste remain responsible for all liabilities in connection with such radioactive waste under their control.

4.1.7 THE NATIONAL WATER ACT, 1998

4.1.7.1 DAM SAFETY RISK

In the context of the Department of Water and Sanitation (DWS), a dam refers to any physical structure, whether temporary or permanent, designed to contain, store, or impound water. Tailings Storage Facilities are a type of dam, specifically an embankment dam, designed to contain mining waste (tailings) instead of water. While both are essentially dams, a TSF's primary function is waste containment, unlike a conventional water dam, and it is a dynamic structure that often grows over the mine's lifespan to accommodate increasing waste volumes. The Department (DWS) is responsible for regulating dams and managing water resources under the National Water Act. DWS oversees dam safety, licensing, and registration, particularly for dams that pose a safety risk. DWS Dam safety risk refers to the Department of Water and Sanitation's (DWS) regulatory framework for managing dams in South Africa that pose a danger to life and property due to their potential to fail. A "dam with a safety risk" is defined by a wall height exceeding 5 meters and a storage capacity greater than 50 000 cubic meters (m^3) or 17 657 tonnes, although the Minister can also designate other dams. The DWS's Dam Safety Office (DSO) manages this risk by registering these dams, enforcing safety regulations, and conducting technical assessments to prevent catastrophic dam failures. The registration is a requirement for all dams with a safety risk to be registered with the DSO, regardless of whether they are public or private. Every dam with a safety risk must be classified as a Category I, II or III dam (with I being the lowest risk and III being the highest risk). This is done on the basis of the dam's size and its hazard potential rating. Only 6% of South African dams have a Category III rating.

Based on preliminary information, the Mponeng Lower Compartment TSF will have a wall of 60m high and a capacity of 43 000 000 tonnes or 121 762 440m^3 of tailings material thereby requiring technical assessment, enforcement of safety regulation by DWS and registration with the DSO. It must be noted that a tailings dam is not inherently a Category III rating; rather, its hazard potential determines its category, which can range from I to III, with Category III representing the highest risk based on factors like size and potential for loss of life or economic impact in the event of failure. Therefore, a specific tailings dam could be a Category I, II, or III, depending on its individual characteristics and the risk assessment conducted. A dam safety risk assessment will be required for the Mponeng Lower Compartment TSF prior the registration with DSO.

4.1.7.2 WATER USES

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. These water use processes are described in **Figure 19**. A person may use water if the use is –

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a licence.

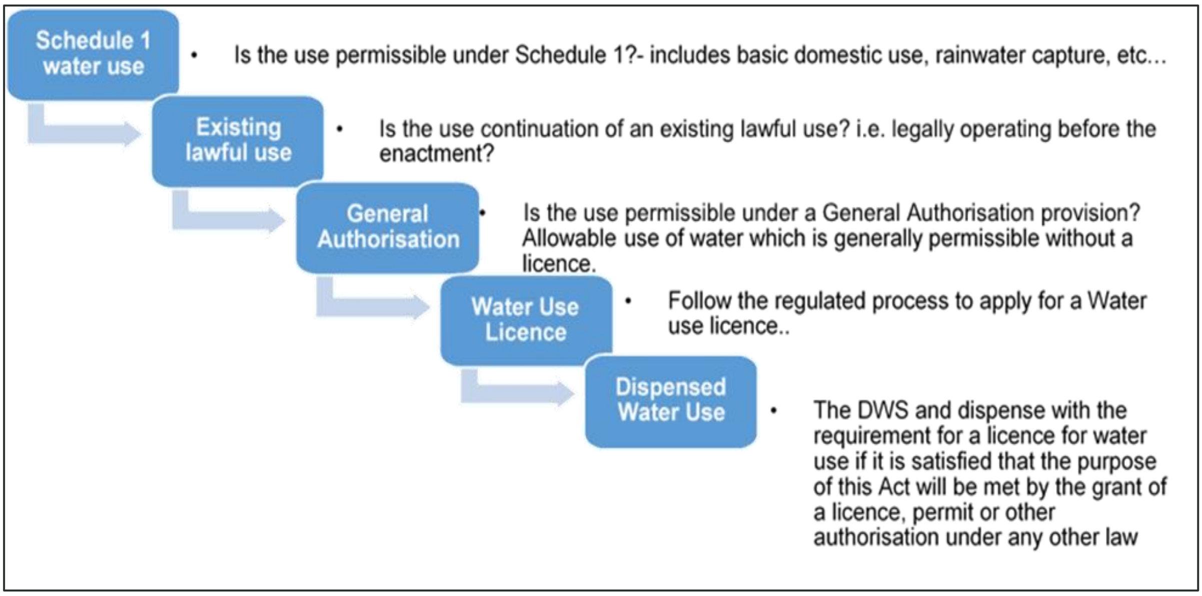


Figure 19: Authorisation processes for new water uses

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways that take into account:

- Meeting basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest; facilitation social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and drought.

The NWA defines 11 water uses in Section 21 of the Act. A water use may only be undertaken if authorised by the Department of Water and Sanitation (DWS). The water uses for which an authorisation or licence can be issued include:

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 conduits;

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 characteristics of a watercourse;

j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

k) Using water for recreational purposes.

The regulated area of a watercourse for section 21 activities of the Act water uses is similarly defined in terms of the Act as follows:

a) The outer edge of the 1 in 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;

b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

A review of the NWA Section 21 activities was undertaken to assess if the proposed development triggers any activity. Based on the information provided by the developer, the proposed development triggers Section 21a, 21c, Section 21i and Section 21g of the NWA. Subsequently, a Water Use License Application is required for the project with the Department of Water and Sanitation, Gauteng Region. During the compilation of this report, the WUL Application process was in Phase 3.

4.1.7.3 THE NATIONAL WATER ACT, GOVERNMENT NOTICE 704, 1999

GN 704 (Government Gazette 20118 of June 1999) was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. The five main principal conditions of GN 704 applicable to this project are:

- Condition 4 – which defines the area in which, mine workings or associated structures may be located, with reference to a watercourse and associated flooding. Any residue deposit, dam, reservoir together with any associated structure or any other facility should be situated outside the 1:100-year flood-line. Any underground or opencast mining, prospecting or any other operation or activity should be situated or undertaken outside of the 1:50 year flood-line. Where the flood-line is less than 100 metres away from the watercourse, then a minimum watercourse buffer distance of 100 metres is required for infrastructure and activities;

- Condition 5 – which indicates that no residue or substance which causes or is likely to cause pollution of a water resource may be used in the construction of any dams, impoundments or embankments or any other infrastructure which may cause pollution of a water resource;

- Condition 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 the 1:50 year peak flow. 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 0.8m above full supply level;

- Condition 7 – which describes the measures which must be taken to protect water resources. All dirty water or substances which may cause pollution should be prevented from entering a water resource (by spillage, seepage, erosion, etc.) and ensure that water used in any process is recycled as far as practicable; and

- Condition 10 – which describes the requirements for operations involving extraction of material from the channel of a watercourse. Measures should be taken to prevent impacts on the stability of the watercourse, prevent scour and erosion resulting from operations, prevent damage to in-stream habitat through erosion, sedimentation, alteration of vegetation and flow characteristics, construct treatment facilities to treat water before returning it to the watercourse, and implement control measures to prevent pollution by oil, grease, fuel and chemicals.

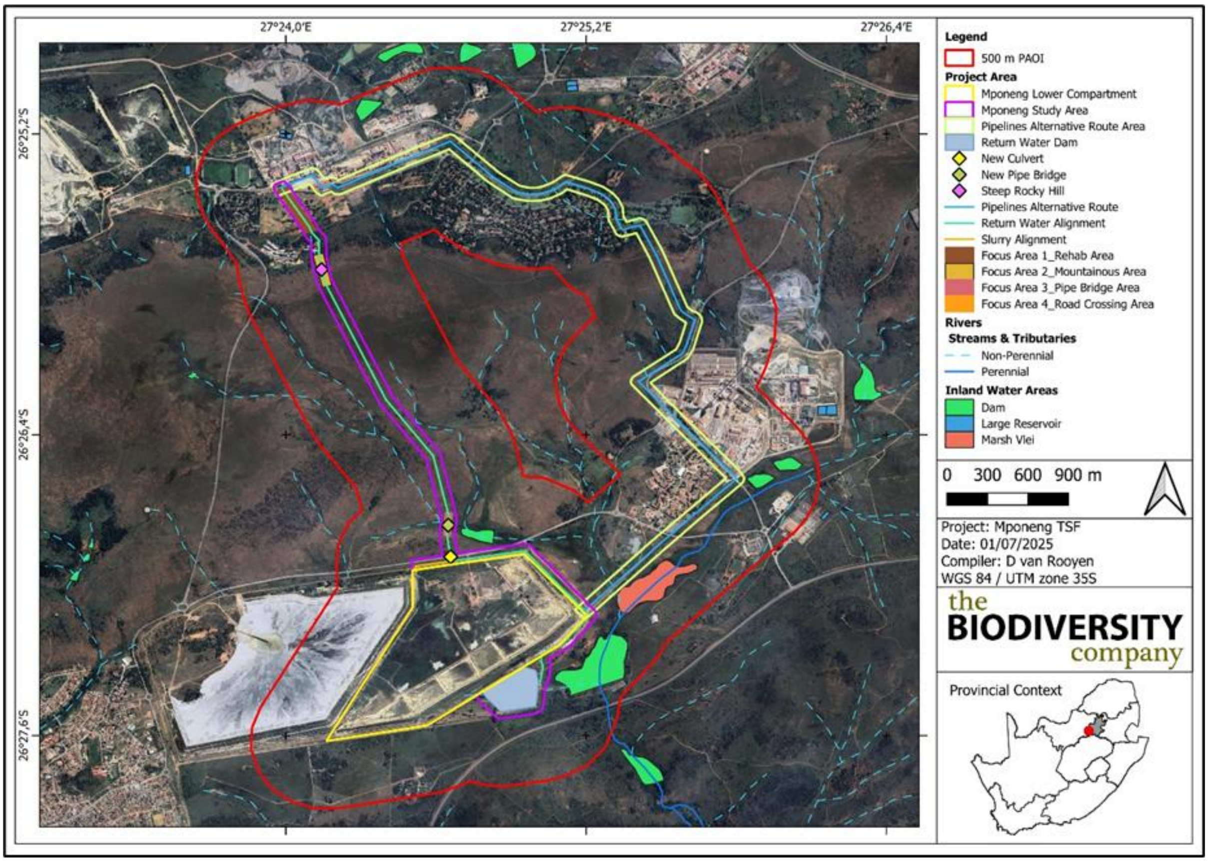


Figure 20: Topographical inland water areas and river lines that intersect the Project Area of Influence (The Biodiversity Company, 2025)

At the time of compilation of this report, the floodline assessment was in progress to support the WULA. Based on the preliminary assessment, it is unlikely that the Mponeng Lower Compartment TSF will be located within the 1:100-year floodline of a watercourse. This will be updated once the floodline report is received in the Final EIA. Based on the Aquatic and Wetlands Study (The Biodiversity Company, 2026 - **Appendix G**), the topographical inland and river line data for the "2627" dataset indicated several inland water areas, which were classified as numerous dams, one marsh vlei and three large reservoirs. Furthermore, several topographic non-perennial drainage features were identified within the study area, along with one perennial river, the Elandsfonteinspruit (**Figure 20**). It must be noted this does not exempt the applicant from the requirements of GN 704 as discussed in **Section 4.1.7.4** below.

4.1.7.4 DWS GN704 - REGULATIONS ON USE OF WATER FOR MINING AND RELATED ACTIVITIES

Regulations on Use of Water for Mining and Related Activities Aimed at the Protection of Water Resources Government Notice 704 (GNR 704) is a regulation under the National Water Act (Act No. 36 of 1998) in South Africa that places restrictions on mining operations for the purpose of protecting water resources. It prescribes measures and precautions that must be taken to prevent pollution of water resources and minimize the impact of mining activities on the environment. Compliance with this regulation is crucial for companies that engage in any mining related process on the mine including the operation of washing plants, mineral processing facilities, mineral refineries and extraction plants, and the operation and the use of mineral loading and off-loading zones, transport facilities and mineral storage yards. Non-compliance to GNR 704 can result in severe consequences for such companies, such as fines, penalties, and damage to their reputation.

The principle conditions of GN 704 applicable to the site and/or activity are:

i. Condition 4 – Restrictions on locality – No person in control of a mine or activity may:

(a) locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked;

(b) except in relation to a matter contemplated in regulation 10 (i.e. Additional regulations relating to winning sand and alluvial minerals from watercourse or estuary), carry on any underground or opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, whichever is the greatest;

(c) place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; or

(d) use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance which causes or is likely to cause pollution of a water resource within the 1:50 year flood-line of any watercourse or estuary.

ii. Condition 5 – Restrictions on use of material:

(a) No person in control of a mine or activity may use any residue or substance which causes or is likely to cause pollution of a water resource for the construction of any dam or other impoundment or any embankment, road or railway, or for any other purpose which is likely to cause pollution of a water resource.

iii. Condition 6 - Capacity requirements of clean and dirty water systems

Every person in control of a mine or activity must:

(a) confine any unpolluted water to a clean water system, away from any dirty area;

(b) design, construct, maintain and operate any clean water system at the mine or activity so that it is not likely to spill into any dirty water system more than once in 50 years;

(c) collect the water arising within any dirty area, including water seeping from mining operations. outcrops or any other activity, into a dirty water system;

(d) design, construct, maintain and operate any dirty water system at the mine or activity so that it is not likely to spill into any clean water system more than once in 50 years; and

(e) design, construct, maintain and operate any dam or tailings dam that forms part of a dirty water system to have a minimum freeboard of 0.8 metres above full supply level, unless otherwise specified in terms of Chapter 12 of the Act.

(f) design, construct and maintain all water systems in such a manner as to guarantee the serviceability of such conveyances for flows up to and including those arising as a result of the maximum flood with an average period of recurrence of once in 50 years

iv. Condition 7 – Protection of water resources

Every person in control of a mine or activity must take reasonable measures to:

(a) prevent water containing waste or any substance which causes or is likely to cause pollution of a water resource from entering any water resource, either by natural flow or by seepage, and must retain or collect such substance or water containing waste for use, re-use, evaporation or for purification and disposal in terms of the Act;

(b) design, modify, locate, construct and maintain all water systems, including residue deposits, in any area so as to prevent the pollution of any water resource through the operation or use thereof and to restrict the possibility of damage to the riparian or in-stream habitat through erosion or sedimentation, or the disturbance of vegetation, or the alteration of flow characteristics;

(c) cause effective measures to be taken to minimise the flow of any surface water or floodwater into mine workings, opencast workings, other workings or subterranean caverns, through cracked or fissured formations, subsided ground, sinkholes, outcrop excavations, adits, entrances or any other openings;

(d) design, modify, construct, maintain and use any dam or any residue deposit or stockpile used for the disposal or storage of mineral tailings, slimes, ash or other hydraulic transported substances, so that the water or waste therein, or falling therein, will not result in the failure thereof or impair the stability thereof;

(e) prevent the erosion or leaching of materials from any residue deposit or stockpile from any area and contain material or substances so eroded or leached in such area by providing suitable barrier dams, evaporation dams or any other effective measures to prevent this material or substance from entering and polluting any water resources;

(f) ensure that water used in any process at a mine or activity is recycled as far as practicable, and any facility, sump, pumping installation, catchment dam or other impoundment used for recycling water, is of adequate design and capacity to prevent the spillage, seepage or release of water containing waste at any time;

(g) at all times keep any water system free from any matter or obstruction which may affect the efficiency thereof; and

(h) cause all domestic waste, including wash-water, which cannot be disposed of in a municipal sewage system, to be disposed of in terms of an authorisation under the Act.

The Minister of the DWS may in writing, authorise an exemption to instances of GN 704 non-compliance. DWS must be engaged regarding the applicability or exemption for the project in relation to GN 704 during the WULA Application.

4.1.7.5 CATCHMENT MANAGEMENT STRATEGIES

In the development of the National Water Resources Strategy (2004) (a process that included extensive public participation) 19 water management areas were defined for the country, in each of which, it was envisaged, a Catchment Management Agency (CMA) would be established. This was a significant departure in approach to the management of water resources. However, there were concerns raised during the gazetting of the original Water Management Areas (WMA) as to the capacity of the country to support 19 CMAs. Taking these matters into consideration, a decision was made to reduce the number of water management areas to nine, concomitantly requiring the establishment of nine CMAs. To support this, the department has recognised the establishment and ring-fencing of Proto-CMAs, headed by an Acting Chief Executive Officer. Drawing on international experience one can identify several key drivers for catchment-based management of water resources, this includes amongst others:

- Achieving integrated management of the catchment;
- Facilitating the participation of stakeholders in decision making and management of water resources;
- Separation between the policy and national strategy functions of the Ministry/department and the operational functions of the CMA

Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the Catchment Management Strategy (CMS) which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources.

According to the Baseline Hydrological Study (Hydrologic Consulting, 2025, **Appendix G**), the proposed development site is situated within the Upper Vaal Water Management Area (WMA 8). The Mponeng Lower Compartment TSF and RWD are positioned within quaternary catchment C23J with the proposed pipelines extending to quaternary catchment C23E. The Upper Vaal WMA is responsible for assessing the availability of local surface water and groundwater resources. It is responsible for managing water quality, including long-term trends and short-term impacts. It is responsible for managing water supply to local authorities and district councils. The Upper Vaal WMA is used for industrial, mining, power generation, commercial agriculture, nature conservation, and urban and rural human settlements The main watercourses in these quaternary catchments include the Mooirivierloop (C23E) and the Loopspruit (C23E), with several non-perennial drainages in both quaternaries. Water quality at sampling point SW06, which is a downstream point on the Loopspruit (C23J) indicate elevated concentrations of Nitrate, Chloride, Electrical Conductivity, Fluoride and Sulfate that exceeds the In-Stream Water Quality Guidelines for the Vaal Barrage subcatchment. Elevated concentration of Nitrate, Chloride, Electrical Conductivity and Sulfate that exceeds the In-Stream Water Quality Guidelines for the Vaal Barrage sub-catchment was observed in the unnamed river which is a tributary of the Mooirivierloop.

The nearest River to the study area is the Elandsfonteinspruit River to the south-east of the site, however, this river is only labelled in the 1:500,000 river dataset for South Africa. The NGI's 1:50,000 topographical map data illustrates numerous non-perennial river systems to the north and south, both of which converge to the south east of the site. The northern system feeds the Elandsfonteinspruit, enabling perennial flows (per the NGI's classification). The northern and southern system are associated with a vlei to the east and dams both north and south to the site. There are upstream furrows directing runoff from part of the greater Mponeng Operation (south of the Old North Complex TSF) and along the Mponeng TSF trenches draining to the non-perennial rivers to the west. The southern system is characterised by two larger dams, one of which is listed as the proposed return water dam for the Mponeng TSF (Hydrologic Consulting, 2025, **Appendix G**). Subsequently, the applicant is required to apply for a Water Use License to ensure that any water resources (surface and groundwater as well as wetlands) affected by the proposed project activities are licensed and managed in accordance with the relevant water and environmental legislation.

4.1.8 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

The National Environmental Management: Waste Act, no 59 of 2008 (NEMWA) came into effect on the 1st of July 2009. The Waste Act places a general duty on a holder of waste to avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger the health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening the Act; and prevent the waste from being used for an unauthorised purpose. Section 16 of the NEMWA must also be considered which states the following:

1. A holder of waste must, within the holder's power, take all reasonable measures to-
    a) *"Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*
    b) *Reduce, re-use, recycle and recover waste;*
    c) *Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*

d) *Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*

e) *Prevent any employee or any person under his or her supervision from contravening the Act; and*

f) *Prevent the waste from being used for unauthorised purposes.*"

These general principles of responsible waste management have been incorporated into the requirements in the EMPr to be implemented for this project.

Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. The proposed Mponeng Lower Compartment TSF waste management activities in terms of Category B of GN R. 921 which states that "*a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct an environmental impact assessment process, as stipulated in the environmental impact assessment regulations made under section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as part of a waste management licence application*."

The listed waste activities that are triggered by the Mponeng Lower Compartment TSF, and which form the basis of this waste management licence application, are A14, B7, B10 and B11 presented in **Section 2.3** (**Table 9**).

4.1.8.1 NEMWA WASTE CLASSIFICATION AND MANAGEMENT REGULATIONS, 2013

These regulations pertain to waste classification and management, including the management and control of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation which is relevant to the proposed project. The purpose of these Regulations is to –

Regulate the classification and management of waste in a manner which supports and implements the provisions of the Act;

Establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Licence;

- Prescribe requirements for the disposal of waste to landfill;
- Prescribe requirements and timeframes for the management of certain wastes; and
- Prescribe general duties of waste generators, transporters and managers.

Waste classification, as presented in Chapter 4 of these regulations, entails the following:

- Wastes listed in Annexure 1 of these Regulations do not require classification in terms of SANS 10234;
- Subject to sub regulation (1), all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation;
- Waste must be kept separate for the purposes of classification in terms of sub regulation (2), and must not be mixed prior to classification;
- Waste-must be re-classified in terms of sub regulation (2) every five (5) years, or within 30 days of modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors;
- Waste that has been subjected to any form of treatment must be re-classified in terms of sub regulation (2), including any waste from the treatment process.; and
- If the Minister reasonably believes that a waste has not been classified correctly in terms of sub regulation (2), he or she may require the waste generator to have the classification peer reviewed to confirm the classification.

Furthermore, Chapter 8 of the Regulations stipulates that unless otherwise directed by the Minister to ensure a better environmental outcome, or in response to an emergency so as to protect human health, property or the environment –

- Waste generators must ensure that their waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Act prior to the disposal of the waste to landfill;
- Waste generators must ensure that the disposal of their waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the Act; and
- Waste managers disposing of waste to landfill must only do so in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7 (1) of the Act.

Although Golden Core Trade and Invest prefers an unlined facility due to the minimal difference in impacts with or without the liner owing to the inherent geological profile being largely impervious, the Mponeng barrier system will be determined in consultation with the authorities and will be in compliance with these norms and standards. As indicated in **Section 2.2.1**, the previous hydrogeological studies have indicated very low seepage rates beneath and around the facility, primarily due to the low permeability of the bedrock and the presence of artesian conditions.

4.1.8.2 NEMWA REGULATIONS REGARDING THE PLANNING AND MANAGEMENT OF RESIDUE STOCKPILES AND RESIDUE DEPOSITS AND ASSOCIATED AMENDMENT

These Regulations, which pertain to the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation, were published in 2015 and were amended in 2018. The Regulations and associated amendment relate to the assessment of impacts and the analyses of risks relating to the management of residue stockpiles and residue deposits, and involve the following:

- The identification and assessment of environmental impacts arising from the establishment of residue stockpiles and residue deposits must be done as part of the environmental impact assessment conducted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- A risk analysis based on the characteristics and the classification set out in regulation 4 (characterisation of residue stockpiles and residue deposits) and 5 (classification of residue stockpiles and residue deposits) of these regulations must be used to determine the appropriate mitigation and management measures; and
- A competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of these Regulations.

As stated in **Section 4.1.8.1**, the proposed recommencement of deposition onto Mponeng Lower Compartment TSF will be subject to these regulations. In this regard, the containment barrier design (including requirements for a liner and nature of the liner), will be addressed in accordance with chapter 3 of these Regulations and their associated amendments.

4.1.8.3 NORMS AND STANDARDS FOR DISPOSAL OF WASTE TO LANDFILL (GN5523)

Once the waste has been assessed and waste type determined, these Norms and Standards can be used to determine the minimum requirements for the landfill and containment barrier design. This will distinguish between Class A, Class B, Class C, or Class D landfills and the associated containment barrier requirements. Although these Norms and Standards prescribe the containment barrier or liner design for each determined waste type, the recent amendments in chapter 3 of the regulations to the planning and management of residue stockpiles and residue deposits, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the regulations. The recommendation should be founded on a risk analysis based on the characteristics and classification in regulation 4 and 5 of these Regulations, towards determining the appropriate mitigation and management measures. Subsequently, the applicant is assessing alternative barrier designs suitable to the Mponeng Lower Compartment TSF.

4.1.9 NATIONAL RADIOACTIVE WASTE DISPOSAL INSTITUTE ACT 53 OF 2008

In terms of this Act the generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility. The generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility.

Generators of radioactive waste must:

A) develop and implement site-specific waste management plans based on national policy;

B) provide all relevant information on radioactive waste as required by the chief executive officer;

C) demonstrate compliance with any conditions of a radioactive waste disposal certificate;

D) provide site access to staff of the Institute for inspection against any conditions of the radioactive waste disposal certificate.

The TSF slurry is considered radioactive waste. Generators of radioactive waste remain responsible for all liabilities in connection with such radioactive waste under their control.

4.1.10 THE HAZARDOUS SUBSTANCES ACT, 1973 (ACT NO. 15 OF 1973)

The Hazardous Substances Act, 1973 (Act No. 15 of 1973) in South Africa regulates substances that can cause harm to human health. It categorizes these substances based on their risk level and controls their manufacture, sale, use, and disposal. The Act also provides for inspections, enforcement measures, and penalties for violations. The Act defines hazardous substances as materials or mixtures that can cause harm to human health, ranging from mild irritation to severe illness or death.

The Act addresses the control of substances that can cause injury, ill-health, or death due to their hazardous properties. This includes substances found in mine tailings, which often contain heavy metals like arsenic, lead, and mercury. The Act aims to regulate the handling, use, and disposal of these substances to protect human health and the environment.

4.1.11 THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004

The National Environmental Management Biodiversity Act (Act No. 10 of 2004 – NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA as well as the protection of species and ecosystems that warrant national protection. Within the framework of this act, various regulations are promulgated which provide specific requirements and management measures relating to protecting threatened ecosystems, threatened or protected species as well as the control of alien and invasive species. A summary of these regulations is presented below.

4.1.11.1 **THE LIST OF ECOSYSTEMS THAT ARE THREATENED AND NEED OF PROTECTION, 2011**

The NEMBA provides for listing of threatened or protected ecosystems in one of the following categories:

- Critically Endangered (CR) ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;
- Endangered (EN) ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- Vulnerable (VU) ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and
- Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

Based on the Terrestrial Biodiversity Study (The Biodiversity Company, 2026), according to the Red List of Ecosystems dataset (Skowno & Monyeki, 2021) the study area overlaps with a Least Concerned ecosystem, which is an ecosystem that has been evaluated by the International Union for Conservation of Nature (IUCN) Red List of Ecosystems and is not currently considered threatened with collapse, degradation, or biodiversity loss. These are widespread, relatively undegraded, and stable ecosystems that face a low risk of future decline.

4.1.11.2 THE THREATENED OR PROTECTED SPECIES REGULATIONS, 2007

The purpose of these regulations is to -

(a) further regulate the permit system set out in Chapter 7 of the Biodiversity Act insofar as that system applies to restricted activities involving specimens of listed threatened or protected species;

(b) provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;

(c) provide for the regulation of the carrying out of a specific restricted activity, namely hunting;

(d) provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;

(e) provide for the protection of wild populations of listed threatened species; and

(f) provide for the composition and operating procedure of the Scientific Authority.

Based on the Terrestrial Biodiversity Study (The Biodiversity Company, 2026), Four (4) floral species namely, *Adromischus umbraticola* (cliff adromischus), *Khadia beswickii* (khadiwortel), *Lithops leslie subsp. Lesliei* (Living Stone) and Sensitive Species 1248 expected within the project area are considered as Species of Conservation Concern (SCC). Two (2) species were listed as per the DFFE Screening Tool Report (**Appendix D**). One (1) amphibian SCC (*Pyxicephalus adspersus* (Giant Bull Frog)) is expected to occur within the project area, three (3) reptile species namely, *Chamaesaura aenea* (Coppery Grass Lizard), *Crocodylus niloticus* (Nile Crocodile) and *Homoroselaps dorsalis* (Striped Harlequin Snake) regarded as SCCs are also expected within the study area however, no reptile species were listed by the DFFE Screening Tool Report. Fifteen (15) mammal SCC are expected within the study area. Of these 15 SCCs, 11 have been assigned a low likelihood of occurrence based on the lack of suitable habitat in the project area. Four (4) species have been assigned a moderate likelihood of occurrence and only two (2) species namely the *Crocidura maquassiensis* (Makwassie Musk Shrew) and *Hydrictis maculicollis* (Spotted-necked Otter) were listed by the DFFE Screening Tool Report. Twenty-seven (27) bird species regarded SCC are expected within the study area. The DFFE Screening Tool Report lists three (3) avifauna SCC that could be expected to occur namely, *Tyto capensis* (African Grass Owl), *Hydroprogne caspia* (Caspian Tern) and *Eupodotis senegalensis* (White-bellied Korhaan). Site specific assessment of the species occurrence on site and additional requirements (impact mitigation measures, licensing / permitting) have been outlined in the Terrestrial Biodiversity Impact Assessment and indicated in **Section 8**.

4.1.11.3 THE ALIEN AND INVASIVE SPECIES LIST, 2020

The Alien and Invasive Species Lists are promulgated under the NEMBA with the aim of protecting the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

- *Category 1a Listed Invasive Species*: Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combated or eradicated;
- *Category 1b Listed Invasive Species*: Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled;
- *Category 2 Listed Invasive Species:* Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be; and

- *Category 3 Listed Invasive Species*: Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

The Terrestrial Biodiversity Study (The Biodiversity Company, 2026), the study area is located within the Savanna biome. The Savanna biome of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Most savanna vegetation communities are characterised by a herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006). On a fine-scale vegetation type, the study area is located within the Gauteng Shale Mountain Bushveld vegetation type. This vegetation unit occurs mainly on the ridge of the Gatsrand south of Carletonville-Westonaria-Lenasia. Alien species such as *Mahonia lomariifolia* (Mahonia oiwakensis), *Argemone ochroleuca* (Mexican poppy), *Verbena bonariensis* (Purpletop vervain), *Taraxacum officinale* (Common Dandelion), and *Eucalyptus camaldulensis* (River red gum) are known to occur in or around the Gauteng Shale Mountain Bushveld, often as a result of garden escapees and habitat disturbance from urbanisation, waste dumping, and other anthropogenic activities. Based on the Terrestrial Biodiversity Study, overall, the study areas showed relatively low levels of alien and invasive plant infestation, which was mostly limited to specific, localized spots—often within modified or degraded areas. The ten (10) AIPs noted within the study area were naturalised exotic, category 1b and one (1) category 2 species (**Table 12**).

Table 12: Alien Invasive Plants observed within the study area (The Biodiversity Company, 2026)

Family	*Species*	NEMBA Status
Asteraceae	*Campuloclinium macrocephalum*	1b
Asteraceae	*Erigeron bonariensis*	Naturalised exotic
Asteraceae	*Tagetes minuta*	Naturalised exotic
Cactaceae	*Opuntia ficus-indica*	1b
Fabaceae	*Acacia decurrens*	1b
Fabaceae	*Acacia melanoxylon*	2
Solanaceae	*Solanum mauritianum*	1b
Solanaceae	*Solanum sisymbriifolium*	1b
Verbenaceae	*Lantana camara*	1b
Verbenaceae	*Verbena bonariensis*	1b

Although a permit is required for possession, breeding, growing, transport, sale, or use of Category 2 AIP, such activities associated with alien invasive species do not form part of the project description. However, the Act requires that the landowner of Category 2 AIP control or eradicate listed invasive species on land under their control. Therefore, the identified Category 2 Fabaceae (*Acacia melanoxylon*) commonly known as the Australian blackwood should be controlled through an Alien and Invasives Species Management Plan. Refer to **Figure 21** for illustration of the category 2 AIP species identified on site.

Figure 21: Category 2 AIP Fabaceae (*Acacia melanoxylon*) commonly known as the Australian blackwood https://apps.lucidcentral.org/rainforest/text/entities/acacia_melanoxylon.htm, 2026)

4.1.12 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT, 2004

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEMAQA) is the main legislative tool for the management of air pollution and related activities. The Object of the Act is:

To protect the environment by providing reasonable measures for –

i. the protection and enhancement of the quality of air in the republic;

ii. the prevention of air pollution and ecological degradation; and

iii. securing ecologically sustainable development while promoting justifiable economic and social development; and

iv. Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd November 2013 (Government Gazette No. 37054).

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA Published under GN 893 in GG 37054 of 22 November 2013 were assessed to determine if the proposed development triggers any of the identified activities. The Mponeng Gold Plant comprises of three operational carbon regeneration kilns and a smelter, which falls under listed activities Precious Metals (Sub-category 4.17: Precious and Base Metal Production and Refining). Based on the assessment, the proposed Mponeng Lower Compartment TSF does not trigger any Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA. Furthermore, it is understood that Mponeng Gold Plant has an existing Atmospheric Emissions Licence (AEL). ***The Redeposition of tailings on Harmony Mponeng Lower Compartment Tailings Storage Facility will not result in any changes to the emissions from the Gold Plant operations and***

hence would not require any changes to the AEL. However, any changes to the project description which may trigger such listed activities must be assessed thoroughly for the applicant to check applicability for an Atmospheric Emission Licence (AEL).

4.1.12.1 THE NATIONAL DUST CONTROL REGULATIONS, 2013

Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1970 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust that may be created from the proposed TSF will be managed in accordance with these Regulations.

4.1.12.2 THE NATIONAL GREEN HOUSE GASES EMISSION REPORTING REGULATIONS, 2017

On 14 March 2014, the following six Green House Gases (GHGs) were declared as priority air pollutants in South Africa:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous Oxide (N_2O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulphur hexafluoride (SF_6).

National GHG Emission Reporting Regulations (Government Gazette No. 40762 of 3 April 2017), as amended (General Notice 994 in Government Notice 43712 of 11 September 2020), were published by the DFFE. A person identified as a Category A data provider in terms Annexure 1 of these regulations, must register their facilities using the online South African Greenhouse Gas Reporting System (SAGERS) (https://ghgreporting-public.environment.gov.za/GHGlanding/). Once registered the data provider must submit a GHG emissions inventory, activity data and report in the required format given under Annexure 3 of these regulations on an annual basis. All data must be provided annually, by the 31 March of the following year. Based on the EAPs current assessment, the proposed Mponeng Lower Compartment TSF will not trigger GHG listed activities. However, any changes to the project description which may trigger such listed activities, the applicant would need to quantify and report on the proposed plant's GHG emissions by the 31 March of each year.

4.1.12.3 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Criteria pollutants are considered those pollutants most found in the atmosphere, that have proven detrimental health effects when inhaled and are regulated by ambient air quality criteria. These generally include CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and ground level ozone (O_3).

The initial NAAQS were published for comment in the Government Gazette on 9 June 2007. The revised NAAQS were subsequently published for comment in the Government Gazette on 13 of March 2009. The final revised NAAQS were published in the Government Gazette on 24 of December 2009 (GN 1210, Government Gazette 32816) and additional standards for particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$) were published on 29 June 2012 (GN 486, Government Gazette no. 35463). SA NAAQSs for the criteria pollutants assessed in this study are listed in **Table 13**

Table 13: National Ambient Air Quality Standards

Pollutant	Averaging Period	Concentration (µg/m³)	Permitted Frequency	Compliance Date

			of Exceedance	
$PM_{2.5}$	24-hour	40	4	1 January 2016 till 31 December 2029 (currently enforceable)
	24-hour	25	4	1 January 2030
	1 year	20	-	1 January 2016 till 31 December 2029 (currently enforceable)
	1 year	15	-	1 January 2030
PM_{10}	24-hour	75	4	Currently enforceable
	1 year	40	-	Currently enforceable

4.1.13 THE NATIONAL HERITAGE RESOURCES ACT (NHRA)

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, "*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, MPRDA and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended).

The MPRDA defines 'environment' as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities (Fourie, 2008).

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

(a) ***the construction of a road****, wall, powerline,* ***pipeline****, canal or other similar form of linear development or barrier* ***exceeding 300m in length****;*

(b) ***the construction of a bridge or similar structure exceeding 50 m in length****;*

(c) any development or other activity which will change the character of a site—

(i) exceeding 5 000 m² in extent; or
(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) *the re-zoning of a site exceeding 10 000 m^2 in extent; or*

(e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development*

According to the DFFE Screening Tool Report (**Appendix D**), the proposed development is located within an area of *low* relative archaeological and cultural heritage theme sensitivity. However, an assessment of the NHRA and preliminary project information revealed that the proposed development triggers Section 38(1) of the NHRA. Therefore, a Heritage Impact Assessment was required and has been undertaken by PGS Heritage and attached in **Appendix G**. Based on the Heritage Assessment Report (PGS Heritage, 2026), two archaeological sites were located, which consist of stonewalling (MPnr1) and stonewalling with possible kraals (MPnr2). Both of these sites are rated as having high significance and graded as Grade IIIA. Through further research and investigation of satellite imagery, it was identified that these sites are part of a larger group of stonewalling within the area, on which there has been very little research conducted within the archaeological fraternity to date. Through archival research and further comparisons, it is hypothesised that the baMare-a-Phogole were the most-likely inhabitants of the area from the 1500s to the 1820s. Furthermore, there are various stonewalling circles located adjacent to the study area which need to be taken into consideration. Refer to **Section 7.13** and **Section 8.3** for the detailed archaeological and cultural heritage findings and recommendations.

The South African Heritage Resources Agency (SAHRA), the Provincial Heritage Resources Authority Gauteng (PHRAG) and Association of Southern African Professional Archaeologists (ASAPA) are I&APs in the project and will were provided with a copy of the Scoping Report and specialist report for review and comment. At the time of compilation of this report, no comments were received from SAHRA nor PHRAG. The Agencies have been provided with another opportunity to comment on the project during the public consultation of this EIA Report. Comments received (if any) will be responded to and provided to the competent authority with the final submission.

4.1.14 THE NATIONAL NOISE CONTROL REGULATIONS, 1992

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Provincial noise control regulations have been promulgated in Gauteng, Free State and Western Cape Provinces.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction phase of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as "*a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*."

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person".* The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations.

4.1.14.1 THE NOISE STANDARDS

There are a few South African scientific standards (SABS) relevant to noise from mines, industry and roads. They are:

South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';

- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se.

4.1.15 THE NATIONAL WEB-BASED ENVIRONMENT SCREENING TOOL, 2019

On the 5th of July 2019, the Department of Forestry, Fisheries and the Environment (DFFE) issued a Notice of the requirement to submit a report generated by the National Web-based Environmental Screening Tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and Regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended. The submission of this report is compulsory when applying for environmental authorisation in terms of Regulation 19 and Regulation 21 of the Environmental Impact Assessment Regulations, 2014 effective from the 4th of October 2019. The DFFE Screening Tool Report was generated on the 22nd of July 2024. The Screening report is provided in **Appendix D** of this report. The main findings to be discussed from the screening report are listed below.

The following summary of the study area's environmental sensitivities were identified in the Environmental Screening Report. The environmental sensitivities for the proposed development footprint are indicated on **Table 14**.

Table 14: Environmental Sensitivity of Project Area

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation (Solar PV) Theme			X	
Defence Theme				X
Palaeontology Theme		X		
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

The information collected by the specialists and EAP's assessment may be used to confirm or dispute (as may be applicable) the environmental sensitivity ratings identified by the National Screening Tool. Although the specialist studies were undertaken during the compilation of this EIA Report, the EAP has already undertaken a site sensitivity verification (**Appendix E**) and EAPs assessments/theme and sensitivity ratings identified by the Screening Tool are summarized in **Table 15** below.

Page 7 of 17 on the DFFE Screening Report indicates that certain Specialist Assessments must be undertaken for the proposed development. There is however an allowance of the EAP to motivate for the reasons for not including certain assessments in the assessment report. **Table 16** presents these Specialist Assessments/Studies as well as the motivations behind the EAP's decision of recommending or not recommending the undertaking of certain Specialist Assessments.

Table 15: Specialist Assessments/themes and Sensitivity Ratings identified by DFFE's Web-based Screening Tool

Assessment Theme	Sensitivity Rating (Screening Report)	Sensitivity Rating (Site Verification)	Response
Agriculture Theme	High	Low-Medium	**Disputed**. Relative Agricultural Sensitivity was assessed to be *Medium-Sensitive* by the Site Sensitivity Verification (SSV) attached as **Appendix E** while it was found to be medium to low by the specialist. The only agricultural activity noted within the area was the small-scale grazing. Considering the nature of the proposed activity (redeposition and pipelines), and the limited agricultural activities in the project area, there will be minimal impact expected on agricultural activities. The soil scientist found that considering the soil properties, agricultural potential as well as the current land use of the proposed development area, the overall sensitivity of the proposed project area is categorized as "Low," with marginal "Medium" sensitivity.
Animal Species Theme	Medium	Medium	**Validated**. Relative Animal Species Sensitivity was assessed to be *Medium-Sensitive* by the SSV and terrestrial ecologist. Based on the DFFE Screening Tool Report, several medium sensitive animal species are likely to occur with the study area including species listed on the Red List of South African Species and/or IUCN Red List of Threatened Species such as Aves-Tyto capensis (African grass owl), Aves-*Hydroprogne caspia* (Caspian tern), *Aves-Eupodotis senegalensis* (White-bellied bustard), *Insecta-Lepidochrysops praeterita* (Highveld blue butterfly (endangered)), *Insecta-Lepidochrysops procera* (Potchefstroom blue), *Mammalia-Crocidura maquassiensis* (Makwassie musk shrew), *Mammalia-Hydrictis maculicollis* (Spotted-necked otter (near threatened)), and *Invertebrate-Clonia uvarovi* (Clonia uvarovi (endangered)). Considering that the rocky ridge where the pipelines and associated infrastructure (pipeline bridge) are proposed, is an area of largely intact pristine vegetation, there is a likelihood of these species and other sensitive plants being present as there is a habitat likely suitable to support these animal species. The terrestrial biodiversity impact assessment found that no Species of Conservation Concern (SCC) were observed, however, fauna SCC may potentially move through the area sporadically and use the area for foraging and as a migration corridor. Based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be medium impacts on the animal species provided that the mitigation measures highlighted in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.
Aquatic Biodiversity Theme	Very High	Medium-High	**Disputed**. Relative Aquatic Biodiversity Theme Sensitivity was confirmed to be *High-Sensitive.* Based on the DFFE Screening Tool Report, there are very-high sensitive Channelled valley-bottom wetlands within the study area. Based on the site sensitivity verification, there are several natural and artificial watercourses, wetlands and drainage lines within close proximity of the TSF and pipelines including Elandsfonteinspruit to the east which feeds into the natural dam approximately 150m southeast of the Mponeng Lower TSF. In addition, the study area is located within an Ecological Support Area 2. The aquatic ecologist found that the wetland systems have experienced historical impacts related to mining and impoundments. Even though largely and seriously modified, the wetlands still present functionality and this

Assessment Theme	Sensitivity Rating (Screening Report)	Sensitivity Rating (Site Verification)	Response
			has contributed towards determining the sensitivity ratings. The wetlands have therefore been assigned a 'Medium-High' sensitivity rating. Based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be medium impacts on the aquatic biodiversity and wetlands provided that the mitigation measures highlighted in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.
Archaeological and Cultural Heritage Theme	Low	Medium-High	**Disputed**. Relative Archaeological and Cultural Heritage Theme Sensitivity was assessed to be *Medium-High Sensitive* by the SSV and archaeologist. Based on the DFFE Screening Tool, there are no known heritage features within the assessment area. However, a section of the ridge where the proposed pipelines traverses was found two archaeological sites MPnr1 and MPnr2 which have a high heritage significance and are both graded as Grade IIIA due to their significance as part of a larger stonewalling group, as well as due to the possibility of burials within the kraal space. Provided the rich heritage background of the area (baMare-a-Phogole) and on the aspects of the proposed alignment of the proposed route for the pipelines which deviate around the 15m buffer of these heritage features, it is anticipated that there will be no direct impacts on stonewalling (MPnr1) and stonewalling with possible kraals (MPnr2) as indicated in the Heritage Study (PGS Heritage, 2026) provided that the mitigation measures indicated in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.
Palaeontology Theme	High	Medium	**Disputed**. The Mponeng Lower Compartment TSF study area is underlain by sedimentary and volcanic strata of the Rooihoogte, Timeball Hill, and Hekpoort Formations of the Pretoria Group (Transvaal Supergroup), as well as post-depositional diabase intrusions. According to the South African Heritage Resources Agency (SAHRIS) Palaeosensitivity map, the Rooihoogte and Timeball Hill Formations are classified as High Sensitivity, the Hekpoort Formation has a Moderate Sensitivity, and the diabase is rated as having Zero Palaeontological Sensitivity (Almond *et al.*, 2013; SAHRIS website). A site-specific palaeontological field survey of the proposed assessment area was undertaken on foot and by motor vehicle in August 2025. No fossiliferous outcrops were identified within the assessment area. Based on the outcomes of both the field investigation and supporting desktop research, it is concluded that palaeontological heritage resources of scientific or conservation value are rare within the proposed assessment area. This finding is in contrast to the High Palaeontological Sensitivity rating assigned to the area by both the SAHRIS PalaeoSensitivity Map and the DFFE Screening Tool. The construction phase of the Mponeng Lower Compartment TSF study area has been assigned a Medium to High Palaeontological Significance rating prior to mitigation, which is expected to be reduced to Low Significance following the implementation and adherence of appropriate mitigation measures indicated in **Section 8.3** and the EMPr (**Appendix I**).
Civil Aviation Theme	Medium	Low	**Disputed.** Relative Civil Aviation Theme Sensitivity was assessed to be *Low-Sensitive*. Based on the DFFE Screening Tool Report, the study area is located between 8 and 15 km of other civil aviation aerodrome, a medium sensitive area for Civil Aviation Theme. Based on the site sensitivity verification, there were no civil aviation infrastructure or facilities within or

Assessment Theme	Sensitivity Rating (Screening Report)	Sensitivity Rating (Site Verification)	Response
			near the study area. Based on the project description of redeposition and pipelines, the project will not transect nor reflect light which may have an impact on civil aviation. The proposed activities do not interfere with surface and air transmission and therefore, no anticipated impacts on civil aviation emanating from the project. The proposed development is a TSF in an existing mining area with existing TSFs does not entail the establishment of new high-rise structures in a flat area, use of aboveground high frequency electromagnetic radiation nor reflecting infrastructure. In addition, the area has low air traffic. Therefore, the proposed activities are assessed to have a low impact on Civil Aviation provided that the mitigation measures highlighted in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.
Defence Theme	Low	Low	**Validated.** Relative Defence Theme Sensitivity was assessed to be *Low-Sensitive* as there are no military bases / facilities present within the vicinity of the project site. The nearest military facilities to the site are located in Thaba Tshwane (formerly Voortrekkerhoogte) and Doornkop. Thaba Tshwane, now a military city, houses various units and is known for its historical significance. Doornkop has a military base located 62km east of the study area. There are no anticipated impacts on defence theme emanating from the proposed activities, subsequently, there is no requirement or justification to undertake a Defence Assessment for the project. Therefore, based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be low impacts on defence facilities and/or activities provided that the mitigation measures highlighted in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.
Plant Species Theme	Medium	Low-High	**Disputed**. Relative Plant Species Sensitivity was assessed to be *High-Sensitive.* Based on the DFFE Screening Tool Report, there are sensitive plant species in the area including *Khadia beswickii* (L.Bolus) N.E.Br. listed on the Red List of South African Plants and Sensitive species 1248 (name withheld to protect the species from illegal harvesting and must be protected). Sensitive species, in an ecological context, refers to species that are vulnerable to environmental changes or human impacts and are therefore given special protection or management considerations. Considering that the rocky ridge where the pipelines and associated infrastructure (pipeline bridge) are proposed, is an area of largely intact pristine vegetation, there is a likelihood of these species and other sensitive plants being present. The terrestrial ecologist found three floral SCC within the Rocky Rand Highveld Grassland and one (1) was observed within the Natural Rocky Gauteng Shale Mountain Bushveld. Based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be medium-low impacts on the plant species provided that the mitigation measures highlighted in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.
Terrestrial Biodiversity Theme	Very High	Low-High	**Disputed**. Relative Terrestrial Biodiversity Sensitivity was assessed to be *Low-High Sensitive*. The National Web-Based Screening Tool Report found that the Relative Terrestrial Biodiversity Impact Assessment Theme Sensitivity is Very High-Sensitive. Based on desktop datasets and site sensitivity verification, the pipeline section consists of largely intact pristine

Assessment Theme	Sensitivity Rating (Screening Report)	Sensitivity Rating (Site Verification)	Response
			vegetation. The area is considered to fall within Critical Biodiversity Areas (CBA), Ecological Support Area (ESA) and National Protected Area Expansion Strategy (NPAES). As per the findings of the terrestrial ecologist, there ae sections of the Degraded Gauteng Shale Mountain Bushveld Habitat which exists in a degraded state, with reduced function. ESA 1 areas fall within the boundaries of this habitat type. The ecosystem function has been greatly reduced due to the present disturbances. While for certain sections of the Disturbed Rand Highveld Grassland Habitat, it exists in a disturbed state, with reduced function. ESA 1 areas fall within the boundaries of this habitat type. Is no longer a viable constituent of the VU Rand Highveld Grassland vegetation type. Still provides ecosystem function. However, the Natural Rocky Gauteng Shale Mountain Bushveld exists in a natural state, providing important ecological functions. ESA 1 falls within the boundaries of this habitat type wile Rocky Rand Highveld Grassland habitat exists in a natural state, providing important ecological functions. CBA 2 and ESA 1 overlap this habitat type. Is a viable constituent of the VU Rand Highveld Grassland vegetation type. It is up to the relevant departmental authorities to decide whether these areas are classified as intact CBA. Based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be medium-low impacts on terrestrial biodiversity provided that the mitigation measures highlighted in **Section 8.3** and the EMPr (**Appendix I**) are adhered to.

Table 16: Summary of discussions regarding the undertaking of specialist Assessments

SPECIALIST ASSESSMENT	DICUSSION AND MOTIVATION
Agricultural Impact Assessment	The only agricultural activity noted within the area was the small-scale grazing. Considering the nature of the proposed activity (redeposition and pipelines), there will be minimal impact on agricultural activities. However, based on the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources (GN 320, 2020, as amended), an Agricultural Compliance Statement as a minimum must be undertaken for the application. The **EAP recommended that a Soils and Agricultural Impact Assessment for the project**.
Archaeological and Cultural Heritage Impact Assessment	Based on the DFFE Screening Tool, there are no known heritage features within the assessment area. A section of the ridge where the pipelines traverses appeared to be stone walling. Provided the rich heritage background of the area (baMare-a-Phogole), it is likely that these could be heritage features. In addition, the proposed activity triggers Section 38 of the National Heritage Resources Act, therefore, **a Heritage Impact Assessment was required and recommended by the EAP** in terms of the Minimum Standards for Heritage Specialist Studies in terms of Section 38 of the National Heritage Resources Act (No. 25 of 1999).
Palaeontology Impact Assessment	Although no fossiliferous outcrops were noted within the assessment area, due to the extent of the development footprint and the high palaeo-sensitivity rating by the DFFE Screening Tool Report, it is consequently the EAPs recommendation that a Palaeontological Assessment be undertaken for the project. In addition, according to the DFFE Guidance on the Preparation of a Palaeontological Impact Assessment, Palaeontology resources are widely dispersed and can

	occur on any development site in South Africa. Therefore, Palaeontological Impact Assessments (PIAs) must be undertaken for all developments as per the PalaeoSensitivity Map provided on SAHRIS1, irrespective of the sensitivity shown on the palaeontology theme layer. Based on the SAHRA PalaeoSensitivity Map, the study area is located within insignificant/zero sensitivity (no palaeontological studies are required), moderate sensitivity (desktop study is required) and high sensitivity (desktop study is required and based on the outcome of the desktop study, a field assessment is likely). Therefore, **the EAP recommended a full PIA for the project**.
Terrestrial Biodiversity Impact Assessment	The National Web-Based Screening Tool Report found that the Relative Terrestrial Biodiversity Impact Assessment Theme Sensitivity is Very High-Sensitive. Based on desktop datasets and site sensitivity verification, the pipeline section consists of largely intact pristine vegetation. The area is considered to fall within Critical Biodiversity Areas (CBA), Ecological Support Area (ESA) and National Protected Area Expansion Strategy (NPAES). Therefore, a **Terrestrial Biodiversity Impact Assessment was recommended by the EAP** to be undertaken in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN 320, 2020 as amended) to confirm presence of Flora or Fauna, Avifauna, SCC, or protected species within the development site, verify site terrestrial biodiversity sensitivity and provide necessary mitigation measures.
Plant Species Assessment	Similarly, to the rationale above, the EAP recommends that a Terrestrial Biodiversity Assessment be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site. The **Plant Species Assessment is covered by the Terrestrial Biodiversity Impact Assessment**.
Animal Species Assessment	Similarly, to the rationale above for Terrestrial Biodiversity Impact Assessment, the EAP recommends that a Terrestrial Biodiversity Assessment be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site. The **Animal Species Assessment is covered by the Terrestrial Biodiversity Impact Assessment**.
Aquatic Biodiversity Impact Assessment	Based on the DFFE Screening Tool Report, there are very-high sensitive Channelled valley-bottom wetlands within the study area. Based on the site sensitivity verification, there are several natural and artificial watercourses, wetlands and drainage lines within close proximity of the TSF and pipelines including Elandsfonteinspruit to the east which feeds into the natural dam approximately 150m southeast of the Mponeng Lower TSF. Subsequently, **an Aquatic Biodiversity Assessment was recommended by the EAP** to be undertaken in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (GN 320, 2020 as amended) to amongst others, provide a description of the aquatic biodiversity and ecosystems on the site, the threat status of the ecosystem and species as identified by the screening tool, an indication of the national and provincial priority status of the aquatic ecosystem, a description of the ecological importance and sensitivity of the aquatic ecosystem and a detailed assessment of the potential impacts of the proposed development and buffer requirements.
Hydrology Assessment	The proposed development entails the establishment of a medium-high hazardous waste facility which its integrity can be influenced by hydrological conditions and inversely, it can impact the hydrological conditions. Provided that hydrological analysis can assist in analysing the scope of the flood, position the runoff pollution sources, and predict geomorphological change on runoff, the **EAP recommended a Hydrology Assessment be undertaken for the project**.
Noise Impact Assessment	A noise impact assessment (NIA) predicts the impact that noise, from a proposed development, is likely to have on the surrounding area. An NIA is usually associated with large industries or developments with excessive noise generation such engineering companies, printing presses, textile mills, and metal works which immensely generate noise pollution. The noise from the machine's mechanical pneumatic drills, saws, and rotating belts usually produces intolerable

	sounds and are a nuisance to the public. Considering that the proposed development is for a TSF within an area used for similar activities and no excessive noise impacts are anticipated, the EAP **did not recommend a Noise Impact Assessment be undertaken for the project.**
Traffic Impact Assessment	A traffic impact study or traffic impact assessment is a study which assesses the effect that a particular development has on the transportation network. New developments are one of the major causes of traffic congestion in many of the major cities of developing countries, due to the absence of adequate mitigation measures. Developments usually increases and/or contributes to the traffic in the area during the construction phase as a result of construction vehicles going to and from the development site and traffic control measure such as 'Stop and Go'. It is anticipated that the proposed development of the TSF will not largely increase the traffic congestion as minimal construction vehicles will be used during the construction and operation phases. Based on the EAPs assessment during the site sensitivity verification, the existing road network was noted to be currently sufficient for the anticipated minimal additional traffic load mainly during construction and no major congestions were noted. Therefore, the EAP **did not recommend a Traffic Impact Assessment be undertaken for the project.**
Health Impact Assessment	Health impact assessment (HIA) is a tool that can help communities, decision makers, and practitioners make choices that improve public health. HIA can be used to evaluate objectively the potential health effects of a project or policy before it is built or implemented. HIA is usually undertaken for projects which can have health impacts on the surrounding communities. Based on the proposed project description, the establishment of the TSF can be associated with health impacts especially cumulative health impacts considering the existing TSF's in the area. Therefore, the EAP **recommended a Health Impact Assessment be undertaken for the project. This is covered by the Health Risk and Radiological Assessment.**
Socio-Economic Assessment	The overarching aim of undertaking a Socio-Economic Assessment of a projects is to develop an understanding of the current social and economic environment and aims to assess or assesses the potential impact of the project on the socio-economic environment. Socio-Economic Assessment are usually undertaken for projects which have an impact and/or affect the social and/or economic structures such as low-cost housing projects, mixed-use developments, upgrading of informal settlements, linear projects transecting different communities, etc. Based on the project information and the purpose of the development largely relating to the nature of the project being the same activity already undertaken on the site, minimal socio-economic influence / change is anticipated. Therefore, the **EAP did not recommend a Socio-Economic Assessment** for the project due to the minimal anticipated changes / impacts on the surrounding social structures and potential cumulative socio-economic impacts which may emerge from the project.
Ambient Air Quality Impact Assessment	Air Quality Impact Assessment (AQIA) is an evaluation, using approved computer models, of the ambient air quality impacts that the public may be expected to be exposed to due to air pollution emissions from one or more facilities. AQIA is an important technique for determining the relative contribution to ground level pollutant concentrations of specific current or future source emissions at receptor sites. AIQA is usually undertaken is for projects which will potentially emit and/or increase pollutant concentrations during construction and/or operational phases. Based on the project information, the EAP **recommended an Air Quality Impact Assessment** for the project as it will potentially emit and/or increase pollutant concentrations in the area.
Additional Specialist Assessments Identified by the EAP	
Geohydrology Assessment	Hydrogeological assessments consider how proposed developments may be affected by groundwater and nearby surface water, in terms of potential flood risk and impact on structural foundations. Provided that the nature of the proposed development is a hazardous waste facility and it may affected and/or be affected by groundwater and the pre-identified nearby wetlands, the **EAP recommended a Geohydrology Assessment be undertaken for the project**.

Landscape/Visual Impact Assessment	Although the development is a TSF proposed within an area used for similar land uses, the specific area was abandoned in the very early stages (approximately 25m) and the redeposition of tailings up to 60m high will therefore re-affect the visual impression. Therefore, a **Landscape / Visual Impact Compliance Statement was recommended** by the EAP.
Financial Provisions Closure and Rehabilitation Plan	Financial provision plan is a form of security assessment. Before mining companies undertake mining activities, mining companies must assess what it will cost to rehabilitate the impact of their operations on the environment, and then they must set aside and secure the amount of money needed to cover that cost until the money is needed for rehabilitation. Therefore, a **Financial Provisions Closure and Rehabilitation Plan was recommended** by the EAP.
Health Risk and Radiological Assessment	A Health Risk Assessment is the process to estimate the nature and probability of adverse health effects in humans who may be exposed to harmful environmental conditions emanating from a specific source. A Radiological assessment is defined as the process of estimating dose and risk to humans from radioactive materials in the environment. Considering that the proposed development entails the storage of tailings which likely contain gold and uranium isotopes which are radioactive, the project poses a health risk to the staff and surrounding communities. Therefore, a **Health Risk and Radiological Assessment was recommended** by the EAP.
Climate Change Impact Assessment	Climate change impact assessments seek to characterize, diagnose, and project risks or impacts of environmental change on people, communities, economic activities, infrastructure, ecosystems, or valued natural resource. The need to undertake Climate Change Impact Assessments as part of a EIA Projects which may influence climate change has been on the rise as competent authorities seek to assess how the project has considered climate change. The EAP **recommended that a Climate Change Impact Assessment be undertaken** to evaluate how the TSF will impact on climate change.

4.1.16 THE NATIONAL VELD AND FOREST FIRE ACT, 1998

While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Mponeng Lower Compartment TSF, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

4.1.17 THE NATIONAL FORESTS ACT, 1998

A licence is required for the removal of protected trees in terms of the NFA, (Act 84 of 1998). It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. This is covered by the Terrestrial Biodiversity Impact Assessment with findings, implications and recommendations are discussed in **Section 8.3**.

4.1.18 THE SUB-DIVISION OF AGRICULTURAL LAND ACT, 1970

In terms of the Subdivision of Agricultural Land Act (Act 70 of 1970), any application for change of land use must be approved by the Minister of Agriculture, and while under the Conservation of Agricultural Resources Act (Act 43 of 1983) no degradation of natural land is permitted.

4.1.19 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA)

The law on Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld; The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Potential impacts on the soil, biodiversity and water resources have been identified with regards to the proposed Mponeng Lower Compartment TSF, and mitigation and management measures recommended in **Section 8.3**.

4.1.20 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA)

The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promote optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes (LUS); and municipal planning tribunals. Furthermore, the SPLUMA strengthens the position of mining right holders when land needs to be re-zoned for mining purposes. Although the Mponeng Lower Compartment TSF is no longer in operation and is currently utilised as a Holding Dam and a portion used as a Landfill Facility (authorised) with the approved 2012 EMPr stating that the Lower Compartment TSF will no longer be used for tailings storage but rather be used as a Holding Dam, rezoning of properties is not anticipated for this project as it is still a mining activity and the area was not reassigned any other zoning.

4.2 OTHER APPLICABLE ACTS AND GUIDELINES

Other applicable acts and guidelines include the Interim Guidance on The Management of Naturally Occurring Radioactive Material (NORM) Tailings and Waste Rock from the National Nuclear Regulator (NNR), Global Industry Standard on Tailings Management, Gauteng Conservation Plan (C-Plan v4), Gauteng Province Environmental Management Framework and Guideline (GPEMF), Gauteng Ridges Guideline. In addition, the municipal planning documents such as West Rand District Municipality Regional Growth and Development Strategy, The Merafong City Local Municipality Spatial Development Framework, and The Merafong City Local Municipality Solid Waste Management Plan are also applicable to the project and are discussed briefly in this report.

4.2.1 INTERIM GUIDANCE ON THE MANAGEMENT OF NORM TAILINGS AND WASTE ROCK FROM THE NATIONAL NUCLEAR REGULATOR

The National Nuclear Regulator (NNR) exercises regulatory control related to nuclear safety and security for all the activities and facilities as defined in the NNR Act. The process waste generated at a mining and minerals processing facility, also known as slurry, is naturally radioactive because of the associated radionuclides in the uranium and thorium decay series that accompany the metals that are mined. The slurry, also referred to as Naturally Occurring Radioactive Material (NORM) residue, is pumped to containment areas for permanent or temporary storage and thus qualifies as radioactive waste facilities named NORM tailings dams, also interchangeably referred to as Tailings Storage Facilities (TSF).

This document provides guidance for the implementation of the requirements as set out in the draft General Nuclear Safety Regulations on the management of NORM tailings and waste rock. Due to the lengthy promulgation process for regulations, and the fact that the guidance provided is based on draft regulations, the Executive has resolved to issue this document as interim guidance.

The guidance is applicable to all NORM facilities which carry out activities and operations involving NORM tailings and waste rock containing uranium, thorium and their progeny. This guide extends to both authorised facilities regulated by the NNR and prospective applicants who wish to handle, process and dispose of NORM tailings and waste rock in terms of the provisions of the NNR Act and associated regulations.

This guideline contains information that provide guidance in terms of best practice in terms of EIA aspects that is related to mining and specifically mineral processing. While the best practice guidance must to be taken into account, this document does not take the place of legal advice in a specific situation governed by legislation.

Key aspects of an NNR-approved Closure Plan include:

- Decommissioning Strategy: The plan specifies the methods for dismantling the facility, removing or treating radioactive materials, and decontaminating equipment and site surfaces.

- Environmental Protection: It includes measures to prevent or mitigate environmental damage from decommissioning activities, such as controlling dust, managing waste, and protecting water resources.
- Public and Worker Safety: The plan outlines procedures for protecting the health and safety of workers involved in decommissioning and the public who may be affected by the process.
- Long-Term Stewardship: The plan addresses the long-term management of any residual risks or contamination, ensuring that the site remains safe for the future.
- Financial Assurance: It demonstrates that sufficient financial resources are available to implement the closure plan and manage any long-term liabilities.
- Regulatory Compliance: The plan must be developed in accordance with the NNR's regulations and guidance documents.

4.2.2 THE GLOBAL INDUSTRY STANDARD ON TAILINGS MANAGEMENT (GISTM) AND SOCIAL PERFORMANCE

The Global Industry Standard on Tailings Management (GISTM) is organised around six Topic areas, 15 Principles and 77 auditable Requirements. The aim of the standard is to adopt an integrated approach to tailings management. Social performance spans all six Topic Areas of the Standard, with specialist components defined in 14 (18 %) of the Standard's 77 Requirements, with a further 18 Requirements (23 % of the Standard) requiring operators to integrate social performance inputs into processes, systems, and decisions about tailings facility management (Joyce & Kemp, 2020).

Under Topic I (**Figure 22**), Affected Communities there are four explicit social performance requirements namely consideration of human rights throughout the lifecycle of the TSF, Free, Prior, Informed Consent of indigenous and tribal people, meaningful engagement, and a grievance mechanism. Topic II, Integrated Knowledge Base package social, environmental, and local economic conditions together. Understanding of local context, human exposure and vulnerability is important in this topic. Impact assessment and mitigation plans fall under this topic. Although Topic III, Design, Construction, Operation and Monitoring deals mainly with technical aspects, social requirements are included when additional steps to minimise consequences are considered, and in the mention that international standards should be followed if involuntary resettlement is required.

Topic IV, Management and Governance requires the establishment of a tailings governance framework and confirms the Environmental and Social Management System (ESMS) as an integral component as indicated in **Figure 22**. This topic nominates one or more Accountable Executive(s) as responsible for, amongst other matters, avoiding or minimising the consequences of a tailings facility failure for local people. Other requirements include multi-disciplinary risk assessments, and the review and audit of the ESMS as it relates to the tailings facility.

Figure 22: Summary of Global Industry Standard on Tailings Management (Joyce & Kemp, 2020)

Topic V, Emergency Preparedness and Recovery is critically important from a social performance perspective. It requires meaningful engagement with employees and contractors in the development of Emergency Preparedness and Response Plans, and ‘locks in’ the role of project-affected people in the co-development of community-focused emergency preparedness measures. Topic V also cover the long-term recovery of people and the environment in the event of a catastrophic failure event – a topic that is not covered in any other tailings or social performance standard. Requirement 14.1 asks operators to take reasonable steps, before a failure event, to meaningfully engage with public sector agencies and other organisations that would participate in medium- and long-term social and environmental post-failure response strategies. These agencies are likely to be quite different to the first responder groups engaged. Topic V would involve post hoc impact assessments, and stakeholder engagement to develop and implement plans that enable the participation of affected people in restoration and recovery works and ongoing monitoring activities.

The documents listed under Topic VI, Public Disclosure and Access to Information will likely be in the hands of other functions, such as external affairs and legal, many of these concerns fall within the purview of social performance. Regularly publishing and updating information and responding to reasonable requests for additional information is fundamental to meaningful engagement at the local-level, and for generating trust across the stakeholder spectrum (Joyce & Kemp, 2020). Golden Core Trade and Invest aims to align their operations with the requirements of the GISTM.

4.2.3 PROVINCIAL CONSERVATION PLAN – THE GAUTENG CONSERVATION PLAN

Bioregional plans are one of a range of decision support tools provided for in the Biodiversity Act that can be used to enable biodiversity conservation in priority areas. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity (Desmet et al., 2013). The purpose of the conservation plans is to inform land-use planning and development on a provincial scale and to aid in natural resource management, with one of the outputs being a map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These are classified into different categories, namely Protected Areas, CBA1 areas, CBA2 areas, ESA1 areas, ESA2 areas, Other Natural Areas (ONAs) and areas with No Natural Habitat Remaining (NNR) based on biodiversity characteristics, spatial configuration and requirements for meeting targets for both biodiversity patterns and ecological processes.

Critical Biodiversity Areas (CBAs) – Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems. Ecological Support Areas (ESAs) - Areas are required to support and sustain the ecological functioning of Critical Biodiversity Areas (CBAs). For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas. They are however required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and which also contributes significantly to the maintenance of Ecological Infrastructure

The Gauteng C-Plan focuses on the mapping of biodiversity priority areas within the Gauteng Province, as compiled by the Gauteng Department of Agriculture and Rural Development (GDARD). The C-Plan was consulted in order to determine the location of areas of increased ecological or conservation importance and sensitivity within the vicinity of the study area. This is done by providing a map of biodiversity priority areas, referred to as CBAs and ESAs. According to information obtained from SANBI, CBAs are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services. The primary purpose of a map of CBAs and ESAs is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector’s input into multi-sectoral planning and decision-making processes.

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The Conservation plan delineates CBAs, Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state. The conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017). According to the latest Gauteng Conservation Plan (C-Plan v4), the Mponeng Lower Compartment TSF site falls within areas of CBA 2 and ESA 1 (**Figure 23**).

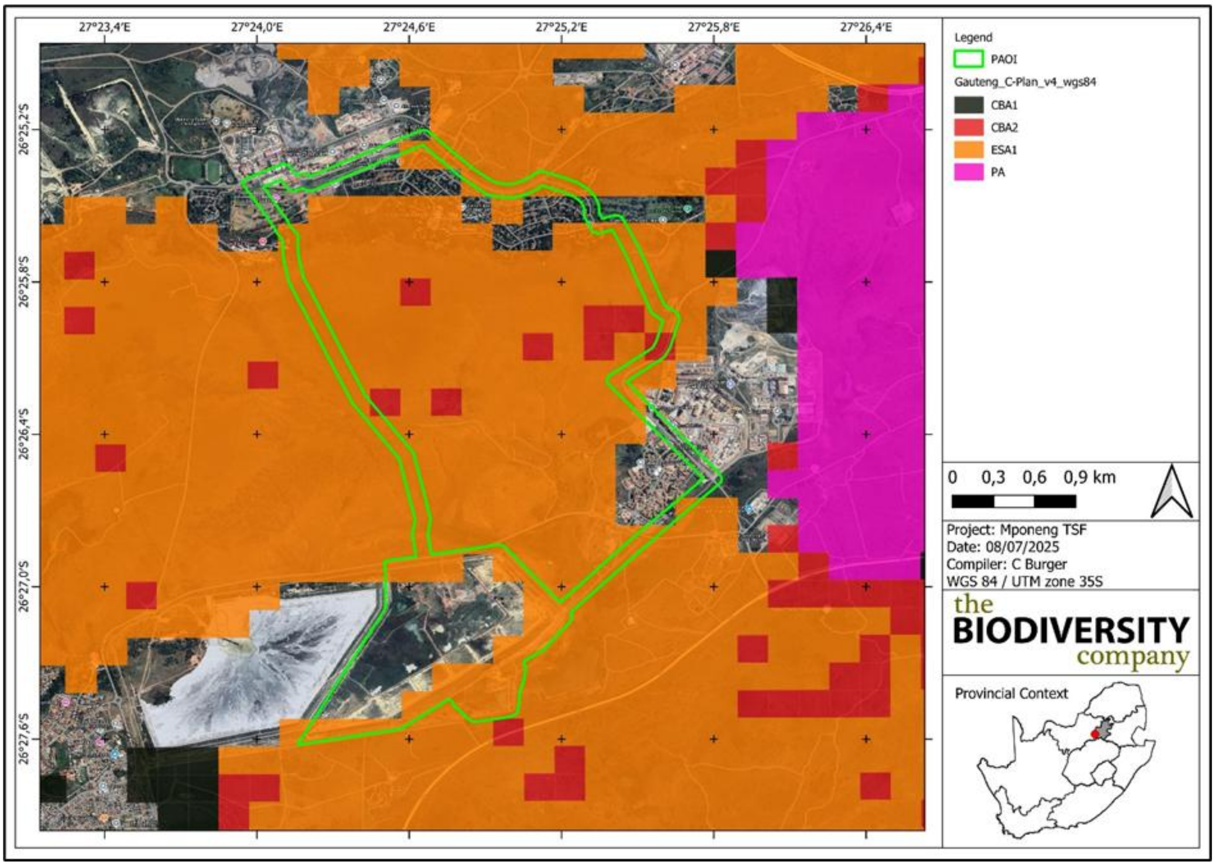


Figure 23: Map illustrating the study area in relation to the Gauteng Conservation Plan (The Biodiversity Company, 2025)

A site visit undertaken by the EAP indicated that the TSF site and sections of the pipeline and access road have been largely modified. A few sections along the pipeline routes were observed to be intact and/or less modified and potentially sensitive. Terrestrial Biodiversity Impact Assessment has been undertaken to identify and assess potential sensitive flora and fauna in the area, impacts and mitigation measures.

4.2.4 THE GAUTENG ENVIRONMENTAL MANAGEMENT FRAMEWORK TOOL

The Gauteng Department of Agriculture and Rural Development have developed an *Environmental Management Framework Tool* to streamline the requirements for an environmental impact assessment (EIA) (reduce EIA requirements), reduce timeframes for approvals and to contribute towards reducing the cost of doing business in Gauteng. In this tool, a number of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) listed activities are excluded from the requirement to obtain an environmental authorisation (EA). This exclusion is currently only applicable to activities that fall within Environmental Management *Zones 1 and 5* of the Gauteng Provincial Environmental Management Framework Zones (GPEMF). **Table 17** indicates the various zones of the GPEMF including Zones 1 and 5.

Table 17: Gauteng Provincial Environmental Management Framework Zones

Zone	Intention
Zone 1: Urban development zone	The intention with this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas.

Zone	Intention
Zone 2: High control zone (within the urban development zone)	This zone is sensitive to development activities. Only conservation should be allowed in this zone. Related tourism and recreation activities must be accommodated in areas surrounding this zone.
Zone 3: High control zone (outside the urban development zone)	This zone is sensitive to development activities and in several cases also have specific values that need to be protected. Conservation and related tourism and recreation activities should dominate development in this zone.
Zone 4: Normal control zone	This zone is dominated by agricultural uses outside the urban development zone. Agricultural and rural development that support agriculture should be promoted.
Zone 5: Industrial and large commercial focus zone Intention	The intention with Zone 5 is to streamline non-polluting industrial and large-scale commercial (warehouses etc.) activities in areas that are already used for such purposes and areas that are severely degraded but in proximity to required infrastructure.

Review of the latest GPEMF v12 (GDARD, 2022), the study area falls within Zones 1, 2, 3 and 4 of the GPEMF. Considering that Site falls within Zones 2, 3 and 4, the site is not exempted from the process of an EA through the GPEMF. In addition, as indicated in Section **4.2.3**, the study area is located within CBA 2 and ESA1 which triggers Listing Notices 3 which are activities not exempted from an EA process through the GPEMF. Therefore, an EA application will be required for these activities.

4.2.5 THE GAUTENG RIDGES GUIDELINE

The quartzite ridges of Gauteng are one of the most important natural assets in the northern provinces of South Africa. This is because these ridges, and the area immediately surrounding the ridges, provide habitat for a wide variety of fauna and flora, some of which are Red List, rare or endemic species or, in the case of certain of the plant species, are found nowhere else in South Africa or the world. The ridges also fulfil functions that are necessary for the sustainability of ecosystems such as the recharging of groundwater, wetlands and rivers, wildlife dispersal and providing essential habitat for pollinators. Ridges also have a socio-cultural role in that they provide aesthetically pleasing environments that are valued by residents, tourists and recreational users. Human activities such as urbanization, mining and the planting of alien vegetation may undermine the contribution that ridges make to the environment.

The environmental right, which is set out in section 24 of the Constitution, requires government to take - "….reasonable legislative and other measures that –

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

The conservation of ridges therefore falls within the ambit an environmental right. The guidelines were first promulgated in 2001, updated in 2019 and recently in June 2025. The guideline applies to all ridges in Gauteng. For the purposes of the report, a ridge includes hills, koppies, mountains, kloofs and gorges and/or a landscape type or topographic feature that is characterized by two or more of the following features - a crest, plateau, cliff or footslope. In addition, ridges are characterized by slopes of 5° or more (that is equivalent to slopes of > 8.8% or > 1: 11 gradient) when modelled in a Geographic Information System digital elevation model that is based on 20m contour intervals at a scale of 1:50 000.

The general objective of GDARD is that the ecological and socio-cultural value of ridges must be conserved. The ridges have, however, undergone different degrees of habitat loss due to human activities such as urban development and quarrying. The approach which the Department has adopted to realizing its general objective is to provide for the maximum feasible conservation of a ridge within the existing constraints of the habitat loss that has already taken place. In order to give practical effect to this policy, the Department has classified all ridges in Gauteng into one of four classes, based on the existing extent and percentage of area converted to urban development or other human activities. The classes are as follows -

a) Class 1 ridges include ridges of which 5% or less of their surface area has been converted to urban development, quarries and/or alien vegetation. (Approximately 58% of ridges currently fall within Class 1, including the Suikerbosrand and parts of the Magaliesberg.)

b) Class 2 ridges are those in respect of which 5-34% of the ridge area has been irreversibly transformed by human activity. (Approximately 23% of ridges currently fall within Class 2, including parts of the Magaliesberg, ridges falling within the Cradle of Humankind World Heritage Site, the Klipriviersberg, the Bronberg and the Skurweberg).

c) Class 3 ridges are those that have been transformed by 35-65%, as a result of human activity (Approximately 8% of ridges currently fall within Class 3, including the Northcliff, Roodepoort and Krugersdorp ridges).

d) Class 4 are those that have been transformed as a result of human activity by 65% or more. (Approximately 11% of ridges currently fall within Class 4, including the Melville Koppies and the Linksfield Ridge).

A review of the latest Gauteng Ridges dataset from GDARD indicated that the study area is located within a Class 1 Ridge Buffer Zone and a Class 2 Ridge (**Figure 24**). **It should be noted that portions on the northern section of the pipelines are located within a transformed area of the Class 2 Ridge as per the dataset (Figure 25). The development / transformation noted include Savuka Plant mining activities, Western Deep Levels Hospital, Western Deep Levels Residential Area, reservoirs, pipelines, etc. Therefore, the proposed activities will be within a transformed Class 2 Ridge and will be linear infrastructure i.e., pipelines and pipeline bridge**. Based on the Sensitive Ridge datasets from GDARD, there are Class 1 and Class 2 sensitive ridges and associated buffer areas within the study area. The guidelines which are applicable to the use and development of the Class 1 and Class 2 ridges are set out below:

a) Class 1 ridges:

No development within the 200m buffer zone is preferred by the Department, although, low impact activities with an ecological footprint of 5% or less in the 200m buffer zone of the ridge may be considered to deter edge-effect. No development will be permitted on the ridge itself.

b) Class 2 ridges:

Development activities and uses that have significant environmental impact on a Class 2 ridge will not be permitted. Only low impact activities might be permitted. Low impact development activities, such as tourism facilities, which comprise of an ecological footprint of 5% or less of the property may be supported. (The ecological footprint includes all areas directly impacted on by a development activity, including all paved surfaces, landscaping, property access and service provision). Low impact development activities on a ridge will not be supported where it is feasible to undertake the development on a portion of the property abutting the ridge.

Considering that the proposed development within these sensitive ridges are pipelines and access road along already disturbed area with existing pipelines and access roads, the potential impact is anticipated to be low and as such, the activities are likely to be supported by the relevant department (GDARD). The following requirements for applications that must follow an environmental impact assessment process will apply:

a) Applications involving activities on a ridge that must be subjected to an environmental impact assessment in any form must, in addition to any other requirements of law, be supported by a study or studies which, as a minimum, describe –

i. the ecological conditions – including the functional, hydrological and compositional aspects – of the ridge,

ii. flora and fauna – including any mammals, birds, reptiles, amphibians and invertebrates - that are present on the ridge,

iii. the impacts of the proposed activity on ecology conditions, flora and fauna,

iv. the stability of the slope and any implications thereof for the application, and

v. the cultural, historical, open space and visual value aspects as well as the current use and value of the ridge for social purposes and the extent to which the proposed activity will impact on these uses or values

b) **Applications involving developments on a ridge falling within Class 1, 2 or 3 must also be supported by a study on service provision and access. The study on service provision and access must, as a minimum, describe the location of access roads to the site; what services are available; and - if no services are available - how the site will be serviced and the impact that any new infrastructure contemplated may have on the ridge**.

An ecological management plan must accompany an application which sets out the measures and responsibilities in respect of the management the ecological integrity of the property, other than the specific area where the development activity is proposed. GDARD must and have been consulted in the initial stages of this application. At the time of compilation of this report, no comments or requirements from GDARD were received by the EAP. GDARD has been consulted further during the public review and comment period of this EIA Report. Comments / requirements (if any) will be captured, responded to and provided to the competent authority for decision making.

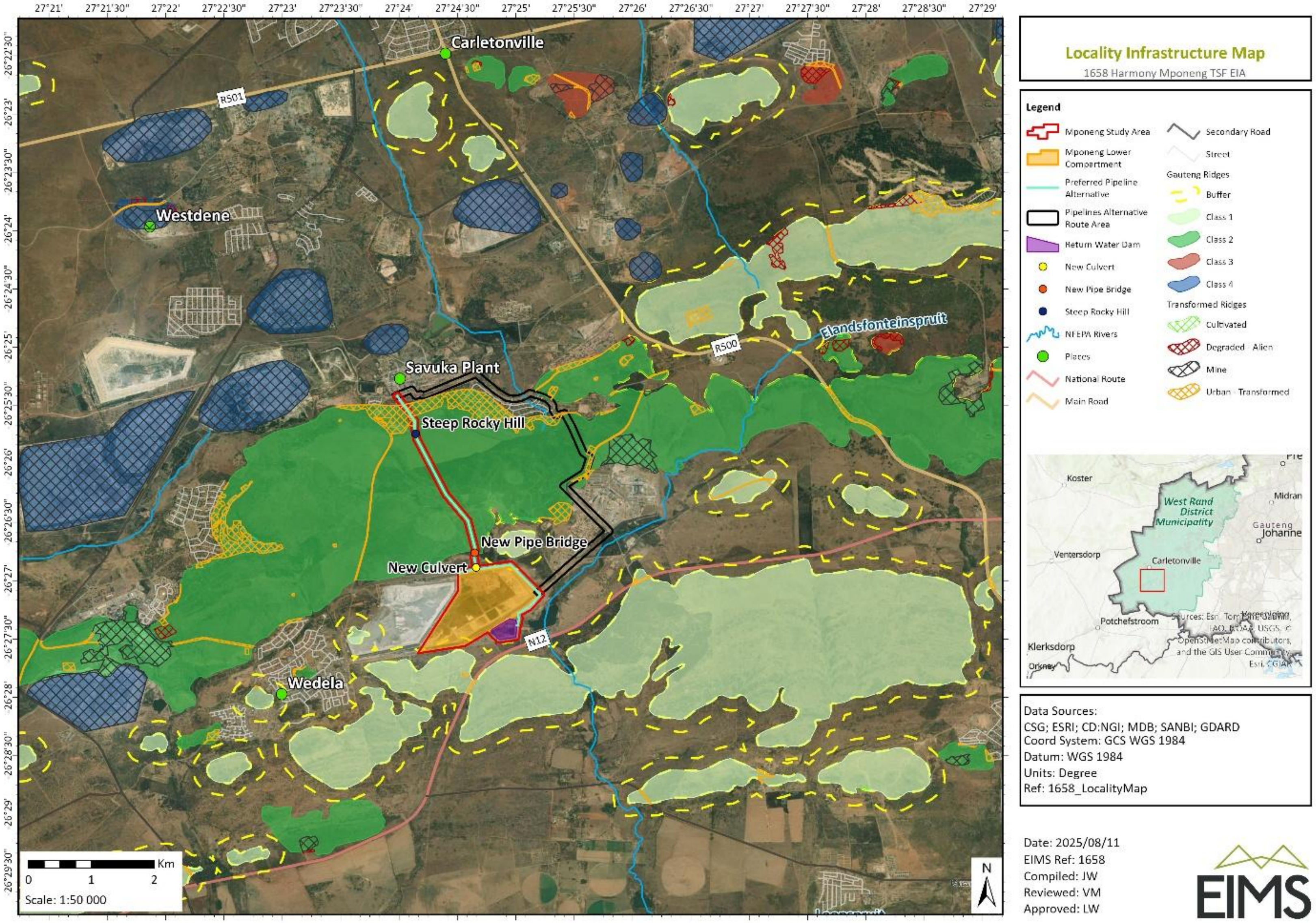


Figure 24: Map illustrating the study area in relation to the Gauteng Ridges

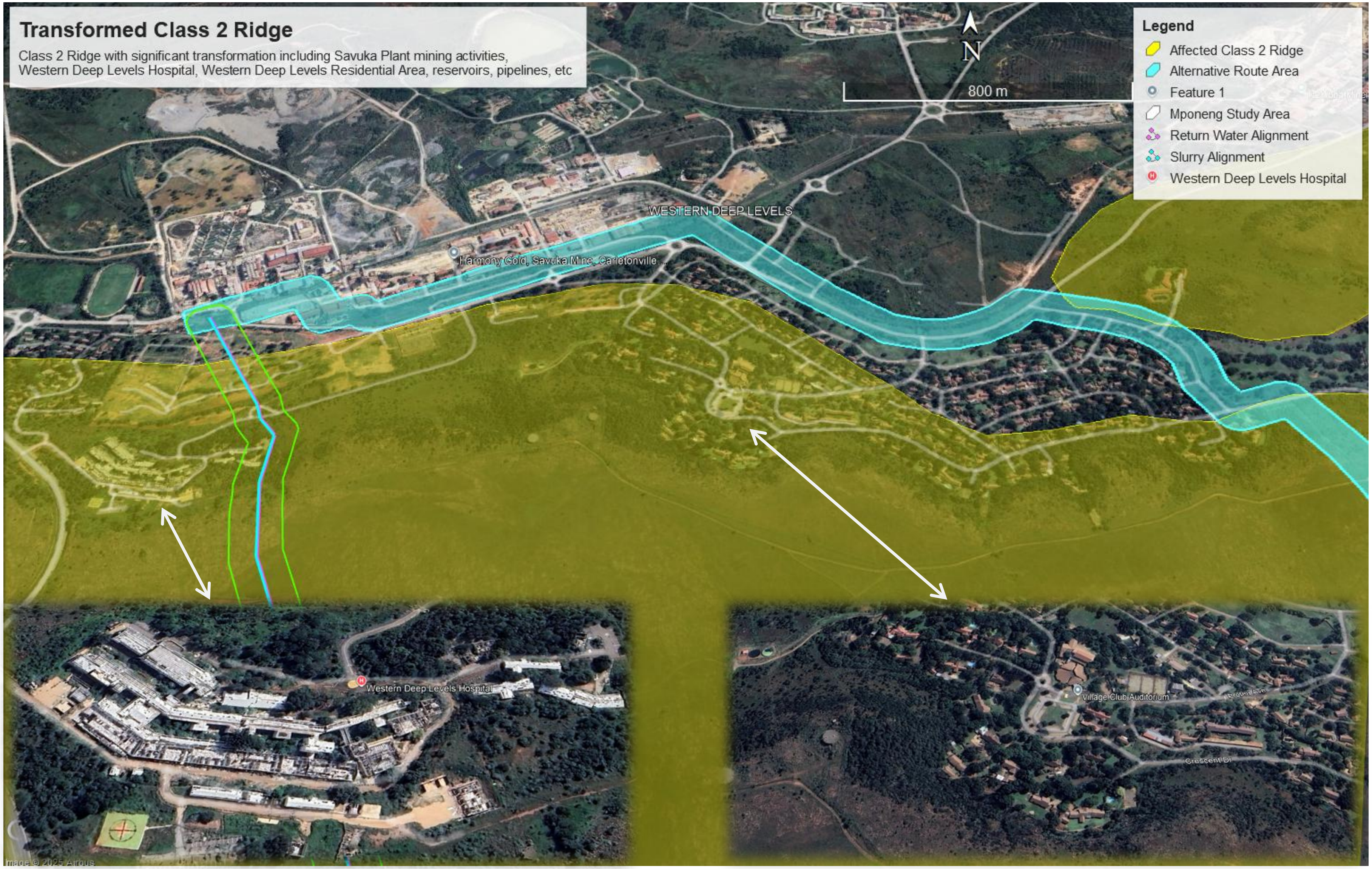


Figure 25: Aerial view map illustrating transformed state of the affected Class 2 Ridge.

4.2.6 WEST RAND DISTRICT MUNICIPALITY REGIONAL GROWTH AND DEVELOPMENT STRATEGY

The vision of the West Rand District Municipality Regional Growth and Development Strategy is to "develop and sustain an integrated, socio-economically and economically thriving and green environment with a unified society." In order to achieve the above Vision, the Regional Growth and Development Strategy identified the following critical requirements:

- Ensure the WRDM is connected – with more people enjoying the benefits of flourishing activity centres where shops, jobs, services and recreation are within walking and travelling distance of their homes, with fast and reliable travel to and from local centres and regional opportunities, with a comprehensive, efficient and networked public transport system and pedestrian routes and access to rural and tourism areas.
- Ensure the WRDM is attractive – with quality urban and rural areas that are well-maintained, new developments which comply with high design standards, clean and safe environments and well-preserved heritage and natural areas.
- Ensure the WRDM is sustainable – with resources well managed and planned for, viable and cost-effective service provision; and where the environment is valued as a vital resource and meaningful open space is provided for all.
- Ensure the WRDM is well managed – where development decisions are predictable, fair and cost-effective, partnerships are developed, planning takes place on a continuous basis, formal systems for data collections are in place, and data is used to support and improve planning.

The WRDM Green IQ was compiled in (2012) and is a commitment to make the West Rand District the greenest district in South Africa and an African example of how sustainable development should be conducted. The Green IQ is a comprehensive strategy, built on 5 pillars, namely:

- PEOPLE: To create a place where people come first, a place characterized by equity, dignity and possibility; where everyone has the opportunity to build a better life for themselves, their children.
- ECONOMY: To restructure the economy to seize future development opportunities; to foster local resilience; to serve the people of the West Rand and to be an example of participatory prosperity.
- ENVIRONMENT: To make the precious natural resources available for future generations; create a low-carbon built environment dedicated to quality of life; and regenerate rural areas with a new sense of purpose.
- ENERGY: To facilitate the creation of new independent power producers to generate renewable, affordable and reliable energy to power new industries and create competitive advantages.
- INNOVATION: To establish itself as a centre of excellence in green technology and green living; attract the best minds; and encourage and support the industries of the future.

The redeposition activity on an already disturbed footprint to allow the continuation of mining activities is in line with the WRDM Green IQ.

4.2.7 MERAFONG MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK

In terms of chapter 5 of the Municipal Systems Act, 2000 (Act 32 of 2000), the municipality's Integrated Development Plan "…must reflect a Spatial Development Framework which must include the provision for basic guidelines for a Land Use Management System for the municipality". The Merafong Municipal Spatial Development Framework (MSDF), forms part of a hierarchy of plans feeding into the Integrated Development Plan (IDP). The Spatial Development Framework serves as an input into the IDP and concentrates on the spatial aspects of development planning, whereas the IDP focuses on broader developmental issues. Following the SDF in the hierarchy are Sector Plans.

The MSDF aims to guide the future spatial development of the Merafong City municipality by focusing on integrating segregated urban areas, restructuring the urban form for efficiency, and prioritizing the development of a connected network of towns while considering factors like infrastructure provision, mobility, and settlement viability, particularly within mining communities, to create a more accessible and business-friendly environment for residents and businesses alike; essentially aiming to achieve a balanced and sustainable urban landscape through strategic land use planning. Overall, the Merafong MSDF serves as a roadmap for the municipality's future development, aiming to create a more inclusive, efficient, and sustainable urban environment by strategically managing land use and infrastructure investments. The study area is located in area identified / earmarked for mining in the MSDF. It can be considered that the proposed Mponeng Lower Compartment TSF project aligns with the MSDF as a better and more sustainable development to redeposit mining waste on an existing mining waste facility than to deposit waste on an undisturbed area.

4.2.8 INTEGRATED WASTE MINIMISATION PLANS

The West Rand District Municipality's Integrated Waste Minimisation Plan is a strategy designed to reduce the amount of waste generated within the district by promoting waste reduction, reuse, and recycling initiatives, aiming to achieve sustainable solid waste management practices across the municipalities of Randfontein, Mogale City, Westonaria, and Merafong City, all while adhering to national environmental legislation and minimizing environmental impact; key aspects include community awareness campaigns, improved waste collection systems, and collaborating with businesses and industries to minimize waste at its source.

The Merafong City Local Municipality Solid Waste Management Plan aims to address the issue of waste disposal in the area by implementing a comprehensive strategy that includes waste reduction, recycling initiatives, proper collection systems, and a designated landfill site, with a strong focus on community engagement to promote sustainable waste management practices, while also considering the unique challenges posed by the region's mining history and potential environmental impacts. Waste management for Mponeng Lower Compartment TSF shall align with these Integrated Waste Minimisation Plans.

5 PROJECT ALTERNATIVES

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. An alternative is defined as "…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

(a) property on which or location where it is proposed to undertake the activity;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity;

(e) operational aspects of the activity; and

(f) Includes the option of not implementing the activity."

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EIA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection. In order to ensure full disclosure of alternative activities, it is important that various role players contribute to their identification and evaluation. Stakeholders have an important contribution to make during the EIA Process and each role is detailed as follows:

The role of the environmental assessment practitioner is to:

- encourage the proponent to consider all feasible alternatives;
- Identify reasonable alternatives;
- provide opportunities for stakeholder input to the identification and evaluation of alternatives;
- document the process of identification and selection of alternatives;
- provide a comprehensive consideration of the impacts of each of the alternatives; and
- document the process of evaluation of alternatives.

The role of the proponent is to:

- assist in the identification of alternatives, particularly where these may be of a technical nature;
- disclose all information relevant to the identification and evaluation of alternatives;
- be open to the consideration of all reasonable alternatives; and
- be prepared for possible modifications to the project proposal before settling on a preferred option.

The role of the public is to:

- assist in the identification of alternatives, particularly where local knowledge is required;
- be open to the consideration of all reasonable alternatives; and
- recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

Table 18 outlines the various alternative types that must be considered for each development. The extent of the applicability of each of these is further presented. It must be highlighted that the alternatives presented in the table are derived from both the EIA Regulations (2014) as amended as well as the Department of Environmental Affairs and Tourism's (now Department of Forestry, Fisheries and the Environment (DFFE)) 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA. Where the alternative is applicable to the project, it is further discussed in this EIA Report. The alternatives discussed further in this SR are as follows:

- The No-Go Option;
- Process alternatives;
- Design alternatives; and
- Routing alternatives.

Table 18: Project alternatives as per NEMA EIA Regulations, 2014 as amended

Alternative	Comment
No-go Option	The 'no-go' alternative is sometimes referred to as the 'no-action' alternative (Glasson *et al.,* 1999) and at other times the 'zero-alternative'. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. This alternative must be discussed on all projects as it allows for an assessment of impacts should the activity not be undertaken. **This alternative is discussed in this report.**
Activity alternatives	These are sometimes referred to as project alternatives, although the term activity can be used in a broad sense to embrace policies, plans and programmes as well as projects. Consideration of such alternatives requires a change in the nature of the proposed activity. This would entail a process where a different project is proposed instead of the Mponeng Lower Compartment TSF. Based on project information, there is one proposed activity and no other activity alternative. **Therefore, this alternative is considered <u>not</u> feasible and will not be discussed in this report**.
Location / property alternatives	Location alternatives could be considered for the entire proposal or for a component of a proposal, for example the location of a processing plant within the property boundary. The latter is sometimes considered under site layout alternatives. A distinction should also be drawn between alternative locations that are geographically quite separate, and alternative locations that are in proximity. In the case of the latter, alternative locations in the same geographic area are often referred to as alternative sites. Based on the project description, there were other alternative TSF locations considered by the applicant. The high-level assessment identified the height extension of Savuka 7a and 7b and the recommencement of deposition on Mponeng Lower Compartment TSF as the viable options. However, due to the high-level nature of the alternative site screenings, minimal information is available for a detailed site alternative assessment. In addition, it must be noted that the Savuka 7a & 7b TSF height extension and Mponeng Lower Compartment TSF projects actually form part of the alternative deposition sites currently being assessed by the applicant. The EA for the height extension of Savuka 7a and 7b was undertaken in a parallel process to this Mponeng Lower Compartment TSF. **The location/property alternatives are being considered and are currently being assessed in separate processes for the West Wits Reclamation Project**. **Currently available information is assessed / presented in this report. Therefore, it is**

	concluded that site alternatives are not considered feasible in this report or as part of this specific application.
Process alternatives	Various terms are used for this category, including technological alternative and equipment alternative. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. An industrial process could be changed, or an alternative technology could be used. These are also known as **technological and equipment alternatives and are considered feasible and are discussed in this report as they are applicable to the Mponeng Lower Compartment TSF**.
Demand alternatives	Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. This is applicable to the demand for a product or service. An example of this would be where there is a need to provide housing units. Examples of alternatives can be through managing demand through various methods or providing additional housing through either single dwelling residential units or mixed-use developments. Specific to the proposed project, **alternatives regarding the demand are considered <u>not</u> feasible and will not be discussed in this report**.
Scheduling alternatives	These are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise several components, which can be scheduled in a different order or at different times and as such produce different impacts. Considering that the construction activities will be minimal and that it recommended to avoid construction activities during rainy / wet days, **these alternatives are considered <u>not</u> feasible to the project as there will be no significant impact variation due to scheduling.**
Input alternatives	By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. Considering that the proposed development is a TSF which does not involve the conversion of raw materials into finished products, **these alternatives are considered <u>not</u> feasible to the project and will not be discussed further**.
Routing alternatives	Consideration of alternative routes generally applies to linear developments such as power lines, transport, and pipeline routes. There are two pipeline route alternatives assessed as part of this study. Therefore, **routing alternatives are feasible and applicable to this development and are discussed within this report.**
Site layout alternatives	Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity. One layout with two pipeline routes has been proposed for the Mponeng Lower Compartment TSF. Based on this, **site layout alternatives are considered currently <u>not</u> feasible but may be applicable in a later phase of the project phase.**
Scale alternatives	In some cases, activities that can be broken down into smaller units can be undertaken on different scales. For example, a housing development within an overall mixed-used development could have the option of 1 000, 2 000 or 4 000 housing units. Each of these scale alternatives may have different impacts. However, the proposed TSF cannot be broken down into smaller units. For this reason, **scale alternatives are considered <u>not</u> feasible and will not be discussed further**.

Design alternatives	This entails the consideration of different designs for aesthetic purposes or different construction materials to optimise local benefits, and sustainability would constitute design alternatives. Different designs are assumed to have different impacts. Generally, the design alternatives could be incorporated into the project proposal and so be part of the project description and need not be evaluated as separate alternatives. **It should be noted that the current designs are phase 2 (preliminary phase), final engineering designs are currently underway in the parallel engineering investigation and assessment**. **Design alternatives are considered feasible and have been discussed in this report based on available information**.
Operational alternatives	The Operational Alternative is where you can specify controls on the operational aspects of the project such as pressure pipes, pumps, as well as valves. In the case of the proposed TSF, **feasible operational alternatives were not identified and are not discussed further**.

As this application relates only to a TSF which is proposed on the disturbed footprint of a an existing TSF currently used as a holding dam and landfill, there are limited feasible and/or reasonable alternatives that can be considered, and which are described and motivated below.

5.1 DESIGN ALTERNATIVES

Design alternatives are the consideration of different designs for technical efficiency, aesthetic purposes or different construction materials in an attempt to optimise local benefits and sustainability. The following design alternatives were considered for the project.

Tailings can be stored in a variety of ways: which way depends on numerous factors, for instance the local topography, how much rainfall an area gets, whether there is regular or irregular seismic activity recorded, the type of metal or mineral being mined and how close the mine is to populated areas. There is no one-size-fits-all solution, each tailings storage facility is unique. Considering that the engineering designs are still in progress, the assessment made in this report is based on the following TSF designs aspects which are discussed below:

(a) **Wall construction designs**:

i) Downstream;

ii) Upstream; and

iii) Centreline.

(b) **Lining Desings**:

i) Lined TSF; and

ii) Unlined TSF.

5.1.1 WALL CONSTRUCTION DESIGNS

5.1.1.1 DOWNSTREAM

Downstream designs start with an impervious starter dam. Tailings are then discharged into the dam and as the embankment is raised, each new wall is constructed and supported on top of the downstream slope of the previous section, so the dam crest moves downstream with each raise (refer to **Figure 26**). The downstream design was developed for areas with seismic activity and high rainfall or water collection.

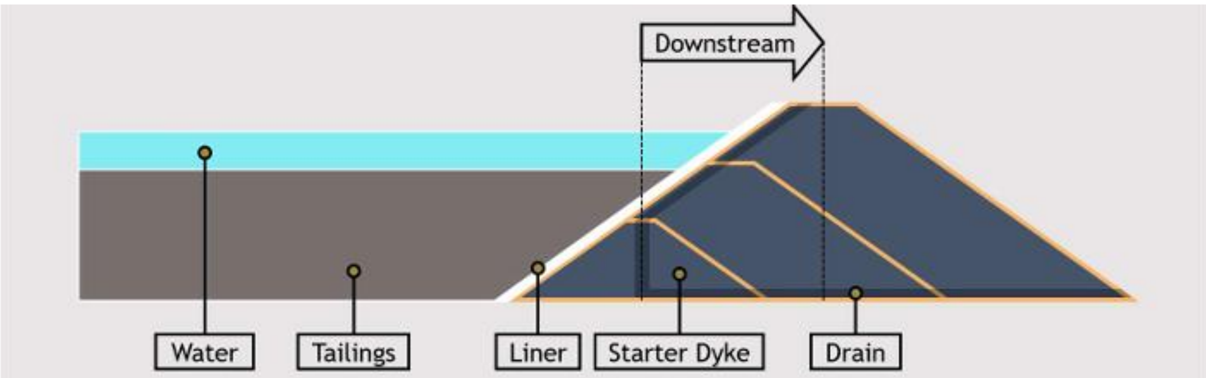


Figure 26: Downstream Tailing Storage Facility design (Yanama Gold, 2023)

Downstream tailings dams resemble typical water retaining structures but are raised in stages during operations. Downstream tailings dams are raised following a downstream direction, starting at the starter dyke, and growing away from the initial impoundment area. Tailings slurry discharged behind each new section of the dam is not used to support successive raises of the dam.

5.1.1.2 **UPSTREAM**

Upstream construction begins with a starter dam. The tailings are then discharged into the facility where they form a tailings beach. The deposited tailings adjacent to the dam wall is allowed to drain and then can be compacted to be used to form the foundation for subsequent levels of the wall as the dam is raised. As such, the crest of the dam moves upstream with each raise. Upstream tailings dams need to be raised slowly, to allow the solid tailings time to dry and consolidate enough to support a new level of the dam (refer to **Figure 27**). These are suitable for facilities in areas of low rainfall and low seismic activity.

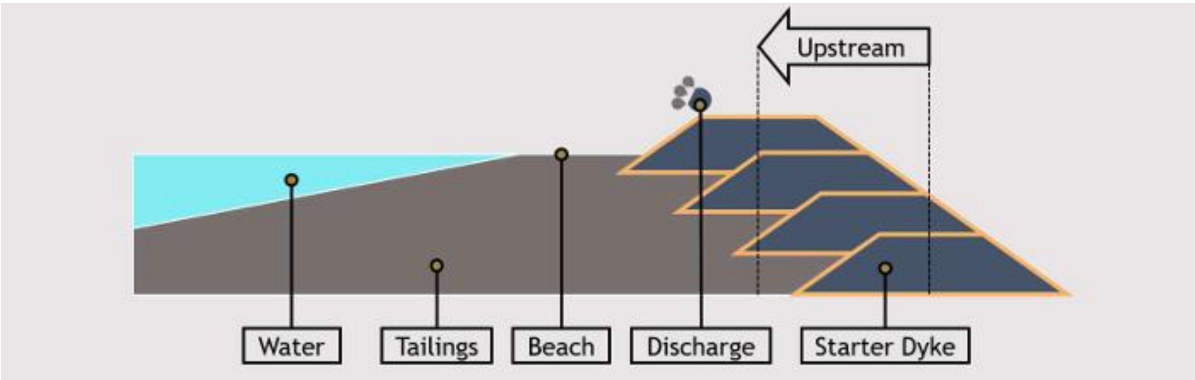


Figure 27: Upstream Tailing Storage Facility design (Yanama Gold, 2023)

An upstream tailings dam is raised in the upstream direction of the starter dyke. Tailings discharged from the starter dike are deposited at an angle away from the dam crest and allowed to drain, forming a dry beach that is used as a partial foundation for the construction of a successive embankment raise. This process is continued in stages until the dam is raised to its ultimate elevation. Adequate water management is important in this design to create a beach area close to the embankment and keep water as far as possible from the embankment. The use of thickeners and other dewatering technologies is common.

5.1.1.3 **CENTRELINE**

The centreline method is a hybrid of upstream and downstream designs. In centreline construction, the dam is raised vertically from the starter dam. The dam crest therefore remains fixed relative to upstream and downstream directions as the dam is sequentially raised (refer to **Figure 28**). Internal drainage can be incorporated to improve stability.

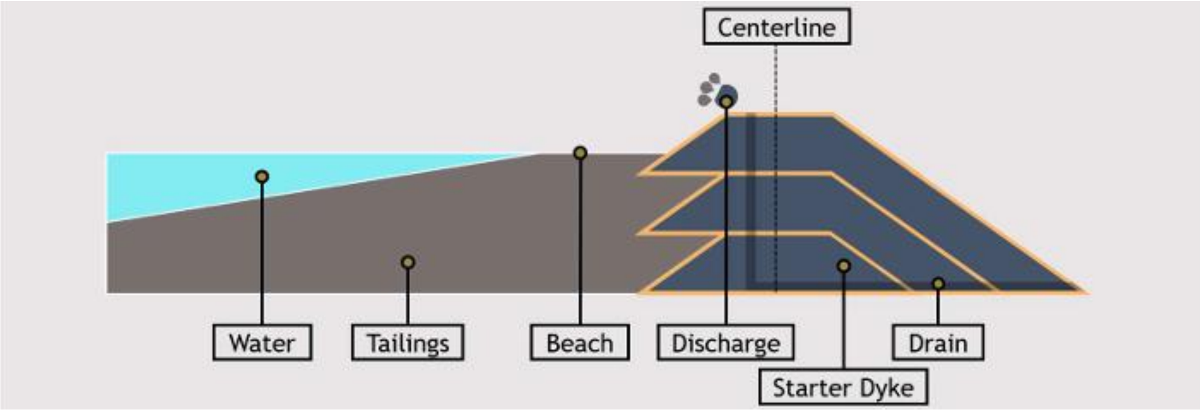


Figure 28: Centreline Tailing Storage Facility design (Yanama Gold, 2023)

A centerline tailings dam is raised vertically and its construction combines the principles of both downstream and upstream design concepts. Similar to the upstream construction method, tailings are discharged behind each dam section and allowed to dry to form a beach. This tailings beach later supports the upstream slope of the successive embankment raise. Dewatering technologies such as thickening are commonly used to improve the construction of these structures.

5.1.1.4 FILTERED TAILINGS OR DRY STACKING

Following crushing, grinding and chemical leaching to separate the target mineral from the ore, tailings are dewatered in a plant, using a thickening tank followed by filters. Most of the process water in the tailings is recovered and returned to the plant for reuse in the processing of new ore material. The unsaturated filtered tailings, also known as filter cake, are deposited and compacted to form a stable dry stack (refer to **Figure 29**). Dry stack tailings do not require the construction of a tailings dam, as these structures do not retain any slurry or water.

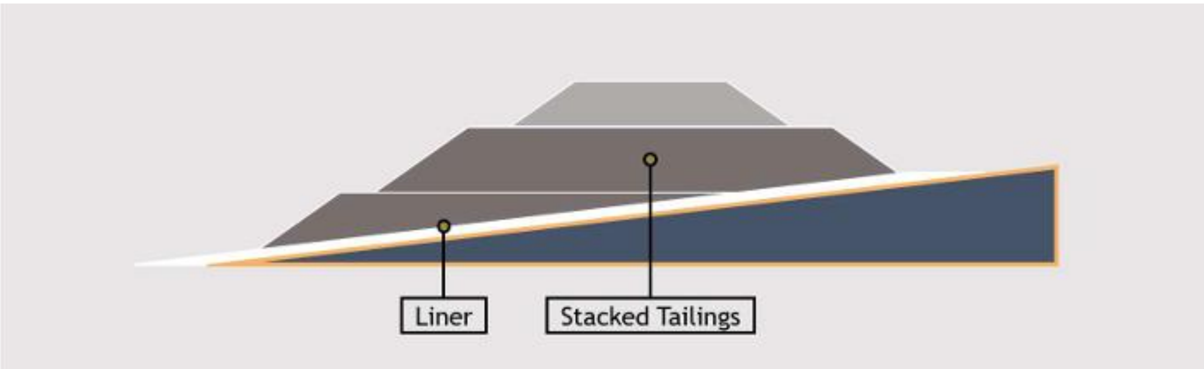


Figure 29: Filtered / Dry Stacking Tailing Storage Facility design (Yanama Gold, 2023)

The advantages and disadvantages of each of the TSF designs are indicated in **Table 19**.

Table 19: Advantages and disadvantages different TSF Designs (ICCM, 2022 & Yanama Gold, 2023)

ADVANTAGE	DISADVANTAGE
Downstream	
Downstream design can have unrestricted heights due to each raise being structurally independent of the tailings.	This construction method requires larger areas and greater volumes of construction materials
Downstream tailings dams are considered the most stable.	Method requires larger areas and greater volumes of construction materials

Upstream	
Upstream tailings dams generally require less construction materials.	Upstream method is the most common design to fail causing huge environmental consequences.
Upstream method is the lowest initial cost and most popular design for a raised tailings embankment in low-risk seismic areas.	Upstream embankments are not suited to areas of seismic activity as the risk of liquefaction increases.
The construction process is relatively simple, as it often uses the coarse fraction of the tailings themselves to build the embankment, usually supported by an initial starter.	Long-term stabilization and rehabilitation are critical at the end of the facility's life.
Centreline	
More stable than upstream tailings dams and require less construction material than downstream tailings dams	A centreline dam cannot be used as a large water retention facility solely due to the subsequent raises being partially built on consolidated tailings.
Free water can encroach closer to the dam crest than the upstream method without the worry of increasing the phreatic surface and causing a potential failure risk.	A suitable decant system needs to be installed to prevent the free water submerging the beach around the dam crest.
Filtered Tailings/Dry-Stack Tailings	
Dry stack tailings do not require the construction of a tailings dam.	Filtration technology generally makes this method more complex to operate.
Most of the process water in the tailings is recovered and returned to the plant for reuse in the processing of new ore material.	Requires close monitoring for dust management and clay content in the tailings materials.
Generally, occupies a smaller footprint and allows for improved water management.	Requires strict quality control regarding moisture content; if the material is too wet, it may not behave as a "dry" stack and can become prone to flow failure
Filtered tailings can also support concurrent reclamation.	The lower saturation, while good for stability, increases oxygen exposure, which can accelerate the oxidation of sulphide minerals, leading to higher acid generation potential if not managed

Based on the advantages and disadvantages indicated in **Table 19** above, each deposition method has its own pros and cons. Overall, Filtered Tailings / Dry-Stack Tailings appear to be the more favourable designs. Based on the Engineering Design Report (**Appendix F**), the upstream construction with hydrocyclone deposition is proposed. There is no fatal flaw with the proposed designs and considering that the method was previously used for the existing tailings as well as being the commonly used deposition method in the area, the history, knowledge and track record can be motivated to the proposed redeposition. The engineering and implementation teams should ensure that necessary measures are in place to ensure structural integrity of the TSF during and post closure is maintained in a safe manner.

5.1.2 DESIGN LINING OPTIONS

5.1.2.1 UNLINED TAILINGS STORAGE FACILITY

As indicated in **Section 2.2.1.1**, GCS Water & Environmental Consultants conducted hydrogeological investigations for the Mponeng TSF in January 2019 and April 2025 to support designs for water management.

The January 2019 report concluded that seepage rates are currently low—ranging from 12 to 20 mm/year—but are expected to increase moderately with the proposed elevation of the TSF. Seepage rates will remain fairly low for gold tailings, due the foundation geology (shales and andesites) and characteristics of the tailings material. Furthermore, most monitoring points show sulphate levels below 100 mg/L, with only two boreholes exceeding 500 mg/L. A calibrated groundwater model predicted a sulphate plume of 200-600mg/L remaining largely confined to the TSF and return water dam areas by the year 2060. However, the Aquatic Dam is already showing elevated sulphate levels, which could rise further if seepage is not effectively managed.

The Hydrogeological Assessment for The Proposed Tailings Redeposition on The Harmony Mponeng Lower Compartment Tailings Storage Facility undertaken by MvB Consulting (2025) found that groundwater occurrences in the study area are predominantly restricted to the weathered and fractured rock aquifer in the Transvaal Formations and Dolomitic and Karst Aquifers. Although the dolomite aquifer is the most prominent aquifer in the region, it does not play any role in the activities at the Mponeng Lower Compartment TSF. The dolomite is ±400m below surface at the Mponeng Lower Compartment TSF site. Evidence has shown that there is no connectivity between the weathered / fractured aquifer and the underlying dolomite aquifer. Even in compartments where the dolomite aquifer is dewatered the groundwater levels in the weathered / fractured aquifer remains unaffected. Groundwater recharge in the fractured aquifer is estimated at 31mm / annum with water occurring in the shallow weathered zone and water bearing fractures only. This is equal to approximately 4% of mean annual precipitation. The study found that the TSF is possibly impacting on the baseflow of the Elandsfonteinspruit. This stream is the only down-gradient receptor that may be directly impacted on by the current and proposed tailings deposition.

Both reports confirmed that the spring is a natural groundwater discharge point, distinguished by its ambient water quality and surface flow. However, the spring water currently mixes with contaminated TSF seepage in a downstream control dam, raising environmental concerns. The GCS Water and Environmental Consultants April 2025 report recommended three key mitigation strategies:

- Implementing a spring capture system to divert clean groundwater away from the TSF;
- Diverting clean stormwater runoff from the northern area to prevent it from entering the seepage control infrastructure;
- And installing a series of scavenger boreholes along the TSF’s southern toe to intercept contaminated seepage caused by groundwater mounding.

These interventions aim to significantly reduce the environmental impact of the TSF during both operational and post-closure phases. The reports concludes that most test pits on the original ground level showed no seepage during the geotechnical investigation, except TP32, which may be influenced by the upper compartment’s embankment. Moderate to strong seepage was observed at the base of the landfill site due to its permeable waste material, though downstream test pits showed no seepage, suggesting localized infiltration. Additionally, significant seepage was found at the southeast corner of the starter wall, potentially sourced from the lower compartment’s catchment area or along bedrock lineations. In conclusion, the previous hydrogeological studies have indicated very low seepage rates beneath and around the facility, primarily due to the low permeability of the bedrock and the presence of artesian conditions. Additionally, tailings have already been deposited on the proposed footprint below the level that a liner can be safely installed. For these reasons, Golden Core Trade and Invest prefers an unlined facility. Only if the licence application for an unlined facility is unsuccessful will the lined option be pursued.

The MvB Baseline Hydrogeological Report (**Appendix G**) developed a numerical groundwater flow and mass transport model. The groundwater model was used to simulate contaminant migration and the effectiveness of recommended management options. The latter includes, but not restricted to, the following:

- Lining of the proposed tailings facility.
- Cut-off trench on the down-gradient side of the TSF.
- Scavenger boreholes to intercept and contain the contaminant plume.

- Phyto-remediation.

The 2060 result is presented in **Section 8.3** and plume movement is in a south easterly direction towards the Elandsfontein Spruit. Based on the current impact using the 600 mg/L SO_4 Impact Area (m^2) impact matrix, the TSF in its current condition with no additional deposition, it was modelled to have 2 049 823 m^2 impact area whereas the additional deposition with no liner will have an impact area of 2 843 514 m^2 per 600 mg/L SO_4 , only 793 691 m^2 more impact, considered moderate by the specialist.

5.1.2.2 **LINED TAILINGS STORAGE FACILITY OPTION**

Under current environmental legislation in South Africa, tailings are viewed as potentially hazardous waste that needs to be disposed of in compliance with the appropriate minimum requirements. Traditionally, tailings in South Africa have been built on top of the *in-situ* soils. The use of composite liners is relatively new in tailings dam construction in South Africa and brings with it its own set of challenges. The requirement for a barrier system in South Africa regulations were promulgated under the National Environmental Management Act - Regulations 632, 634, 635 and 636. These are currently administered by the Department of Water and Sanitation (DWS). Under these regulations waste, including tailings, is assessed under Waste Acceptance Criteria for Disposal to Landfill, which determines the requirements for disposal of different types of waste. Under these regulations, many mineral residue deposits are found to require a barrier system, which typically includes a geomembrane. It is usually not practical, and currently not mandatory, to retrofit a barrier system to existing tailings dams. However, there is an increase in the number of new tailings dams being constructed to include a barrier system.

The Department (DWS) no longer condones South Africa's philosophy of the past 20 years, in terms of which dilution of water contamination and dispersion relying on attenuation was regarded as acceptable (Legge, 2019). Protection of water resources, and prevention of contamination in the first place (source) is now being sought in preference to mitigating contamination spread (pathway) and pollution cleanup (receptor). Apart from preventing polluted leachate from seeping into the groundwater, an additional benefit of lining a tailings dam is that more water in the tailings system can be captured and returned to the plant. This is useful in a water-scarce country such as South Africa. Since the tailings industry has not always included barrier systems in design or construction, there are learnings to be acquired, even by seasoned tailings consultants and contractors, on how to work with these systems. A proposed amendment to Regulation 632 (2016) has been drafted whereby there could in future be a relaxation of the regulations on a case-by-case basis, following a risk-based approach. However, such regulations have yet to be promulgated into law. In the meantime, the current regulations apply to the disposal of tailings in the same way they apply to the disposal of any other waste to landfill.

The alternatives relate to the liner design for the TSF and the RWD. However, the liner requirements are based on the waste classification of the material, geohydrological modelling and risk assessment. Tailings use liners to prevent the release of concentrated mine chemicals into the environment. Many regulatory agencies request lined Tailings Storage Facilities in hopes of better protecting groundwater resources. Liners are not always necessary; however, tailings solution containment is critical to meeting environmental requirements and the necessary assessments and measures must be undertaken to ensure best environmental practices. The necessity of liners for TSF and/or RWD are subject to the type, nature and surrounding geohydrological conditions in consultation with the 2013 regulations published in terms of the National Environmental Management: Waste Act, notably GN R. 634 to GN R. 636 relevant to Waste Classification and Management, National Norms and Standards for the Assessment of Waste for Landfill Disposal and National Norms and Standards for Disposal of Waste to Landfill.

For important reasons, hazardous waste landfills are the most closely regulated and structured landfills. They are specifically designed to hold hazardous wastes in a way that virtually eliminates the chance of it being released into the environment. In addition to these design requirements, hazardous waste landfills are often inspected multiple times a year to make sure that the facility is up to code and the standards are top-notch. Some of the design requirements for hazardous waste landfills include:

- Double liners;
- Double leachate collection and removal systems;

- Leak detection systems;
- Run on, runoff and wind dispersal controls; and
- Construction quality assurance programs.

As indicated in **Section 2.2.1.2**, an inverted barrier system with equivalent performance to a Class C barrier can be motivated for implementation if the TSF needs to be lined. It is important to note that this barrier system will reduce contamination from newly deposited tailings on the Lower Compartment but will not reduce contamination from the tailings already placed on the facility nor from the existing Upper Compartment. The inverted barrier system substantially reduces the seepage areas as well as the seepage rate by changing the seepage flow from orifice flow to Darcian flow. This is achieved by placing the geomembrane on top of a SANS 10409 (2020) compliant receiving face of reworked foundation soil (consisting of existing tailings) instead of a clay layer and sliming fine tailings over the geomembrane. A Class C performance barrier system has been opted for the RWD. The geomembrane was changed from a general Class C 1.5 mm HDPE to a 2 mm HDPE to improve the liner performance as well as to negate the use of a clay layer below. Seepage losses through a traditional Class C barrier is primarily determined based on the number of holes intersecting wrinkles as reflected in the Casagrande lecture 2012 by RK Rowe. For the inverted barrier, seepage losses change from orifice flow controlled by the Bernoulli equation at wrinkles (with Darcian flow through the area beneath the wrinkle) to Darcian flow through the tailings at the discontinuity in the geomembrane. Furthermore, this barrier system substantially reduces the risk of damage to the liner when placing above liner ballast and gravel by mechanical means and increases stability by eliminating the low strength expansive clay and its interface with the geomembrane in the outer wall zone between the toe wall and starter wall (Eco Elementum, 2025).

5.1.2.3 UNLINED TAILINGS STORAGE FACILITY WITH PHYTOREMEDIATION

Phytoremediation is a green, cost-effective technology that uses plants to remove, degrade, or stabilize contaminants from soil, water, or air. It works by plants absorbing pollutants through their roots, storing them in their tissues, converting them to less harmful substances, or releasing them as vapors. This process includes methods like phytoextraction (storing metals in plants) and rhizofiltration (using roots to filter pollutants from water). Phytoremediation is proposed as a cost-effective plant-based approach of environmental remediation that takes advantage of the ability of plants to concentrate elements and compounds from the environment and to detoxify various compounds without causing additional pollution. The concentrating effect results from the ability of certain plants called hyperaccumulators to bioaccumulate chemicals. The remediation effect is quite different. Toxic heavy metals cannot be degraded, but organic pollutants can be and are generally the major targets for phytoremediation. Phytoremediation is effective for a wide range of contaminants, including:

- Heavy Metals: such as arsenic, cadmium, and lead.
- Organic Compounds: including petroleum hydrocarbons, pesticides, and solvents.
- Radionuclides: radioactive elements found in contaminated soil and water.
- Landfill Leachates: liquids that seep from landfills.

Although attractive for its cost, phytoremediation has not been demonstrated to redress any significant environmental challenge to the extent that contaminated space has been reclaimed. The advantages and disadvantages of lined, unlined TSFs and unlined TSF with Phytoremediation are indicated in **Table 20**.

Table 20: Advantages and disadvantages Lined, Unlined TSF and Unlined TSF with Phytoremediation

Advantage	Disadvantage
Lined TSF	
According to the Geohydrological Model indicated in the Geohydrological Assessment Report (**Appendix G**), lining the TSF will result in an impact of 1 720 106 m^2 per 600 mg/L SO_4 which is an improvement of 1 123 408 m^2 (39.5%) based on the current modelled impact of the existing TSF.	The lining of the Mponeng Lower Compartment TSF could affect the stability of the TSF as it is an existing facility which has been inactive for years. The installation of the liner could therefore affect the stability as it will be a liner on top of old tailings. Liners can be difficult to install especially on top of an existing TSF Facility which has been inactive for years.
A lining under a tailings also allows more water in the tailings system to be captured and returned to the plant for reuse.	Liners need to be properly installed for maximum pollution prevention.
A geomembrane liner, such as high-density polyethylene (HDPE), prevents leachate (polluted liquid) from seeping into the groundwater and surrounding soils	Requires artificial drainage systems and rigorous monitoring for stability and performance.
By containing contaminated liquids, liners protect both the environment and local water resources from pollution.	Prone to damage and localized leakage, necessitating strict quality control during installation.
Aligned with the current DWS requirement for the use of liners for the safe disposal of tailings.	The introduction of a liner can alter the interface between the tailings and the underlying materials, requiring new methods to assess and ensure the stability of the facility.
Unlined TSF	
According to the Geohydrological Model indicated in the Geohydrological Assessment Report (**Appendix G**), the TSF in its current condition with no additional deposition, it was modelled to have 2 049 823 m^2 per 600 mg/L SO_4 impact area whereas the additional deposition with no liner will have an impact area of 2 843 514 m^2, only 793 691 m^2 more impact, considered moderate by the specialist.	No pollution prevention. May pose significant environmental risks due to potential seepage of toxic contaminants into groundwater and soil.
Unlined facilities require less initial investment as they don't involve the cost of lining materials or the increased complexity of a lined system, which can also make them easier to operate and maintain	Water use inefficiency - No recycling of water. More water in the tailings system escapes and not returned to the plant for reuse.
The absence of liners and associated complex systems simplifies the design and construction process, making them quicker to build and deploy.	Seepage through unlined facilities can lead to the contamination of aquifers and soil, affecting water sources for communities and ecosystems downstream of the mine site
The lining of the Mponeng Lower Compartment TSF could affect the stability of the TSF as it is an existing facility which has been inactive for years. The	Without a liner, there is a greater risk of uncontrolled leakage or, in the worst case, a complete failure of the

Advantage	Disadvantage
installation of the liner could therefore affect the stability as it will be a liner on top of old tailings. Therefore, an unlined facility will affect the stability of the TSF less as it will not separate the two layers (old and new) of tailings	facility, which could release vast quantities of toxic slurry and debris into the surrounding environment
Based on the pre-feasibility report, the Mponeng Lower Compartment TSF have already been deposited on the proposed footprint below the level that a liner can be safely installed. Therefore, an unlined TSF would be safer.	Closing and rehabilitating an unlined facility presents significant challenges, as long-term containment of potential contaminants in the natural environment is more difficult to achieve and can be very expensive.
Unlined TSF with Phytoremediation	
According to the Geohydrological Model indicated in the Geohydrological Assessment Report (**Appendix G**), the TSF was modelled to have 1 767 158 m^2 per 600 mg/L SO_4 impact area with no liner but phytoremediation which is an improvement of 1 076 356 m^2 (37.9%), almost equivalent to installation of a liner.	Phytoremediation is limited to the surface area and depth occupied by the roots.
Phytoremediation can be as effective / equivalent to lined TSF.	With plant-based systems of remediation, it is not possible to completely prevent the leaching of contaminants into the groundwater (without the complete removal of the contaminated ground, which in itself does not resolve the problem of contamination).
It preserves the topsoil, maintaining the fertility of the soil. Increase soil health, yield, and plant phytochemicals.	
The use of plants also reduces erosion and metal leaching in the soil.	The survival of the plants is affected by the toxicity of the contaminated land and the general condition of the soil.
Dust and visual disruption are usually less than with alternative methods.	Some plants are too hard to cultivate or too slow growing to make them viable for phytoremediation despite their status as hyperacumulators.
The cost of the phytoremediation is lower than that of traditional processes both *in situ* and *ex situ*.	

Based on the advantages and disadvantages indicated in **Table 20** above, **Lined TSF's can be considered as favourable designs. However, the benefit is minimal when comparing it to the phytoremediation option, which achieves similar environmental conditions for significantly lesser financial costs. This option is therefore recommended by the geohydrologist and engineers as a suitable management option**. The installation of a liner and / or scavenger boreholes may improve the rehabilitation of the groundwater, but it is considered unnecessary as the phytoremediation is effective on its own. **Subsequently, alternative barrier designs are considerably recommended to the liner alternative.**

5.1.3 PIPELINE DESIGNS

In order to allow for slurry deposition on Mponeng Lower Compartment TSF from either of the operational plants, new residue deposition pipelines will be required (**Figure 7**). The residue deposition pipelines will have a NB diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths. Slurry pipelines can be made of many different materials such as carbon steel, alloy steel, hardened steel, stainless steel, abrasion resistant lined pipes, and non-ferrous pipes, HDPE etc. The material of the pipeline is generally selected based on the application, material being pumped, and cost. The assessment of slurry pipelines design alternative on this report is based on relative location to the ground; aboveground and underground. Based on the analysis of the same type of pipelines proposed for the project, the advantages and disadvantages of the pipeline in relation to the ground is provided in **Table 21**.

Table 21: Advantages and disadvantages Pipelines Design

ADVANTAGE	DISADVANTAGE
Above-Ground Pipelines	
Above-ground pipelines are much easier and cheaper to build and install.	Can be easily damaged, requires constant monitoring and maintenance.
Above-ground pipelines are much easier and cheaper to monitor and maintain.	Generally, have a shorter lifespan.
Above-ground pipelines allows for quicker and effective repairs, reducing the amount of pollution	Easily accessible, there is also the concern of vandalism and the chance that damage may lead to leaks and impacts on the environment.
Above-ground pipelines have lesser environmental impacts as there are shallow distal excavations and no deep excavations or blasting requirements.	
Below-Ground Pipelines	
Security: Below-ground pipelines are less likely to be affected by weather phenomenon and/or vandalism.	Pipelines are more difficult and expensive to build and install.
Below-ground pipelines generally require less frequent monitoring and maintenance.	Pipelines are more difficult and expensive to maintain.
The land above the pipeline can be rehabilitated to blend in with the surrounding landscape / land use.	Pipelines have more environmental impacts as there is a need for excavations and/or blasting requirements. Any leak directly contaminates the environment and may be only recognized after a period of time.

Based on the advantages and disadvantages indicated in **Table 21** above, it is the **EAPs opinion that above-ground pipelines are the more favourable designs**. Based on the project description, the proposed Mponeng Lower Compartment TSF will follow the above-ground pipelines design.

5.2 PROCESS ALTERNATIVES

5.2.1 CONVENTIONAL DISPOSAL METHODS

There are various deposition techniques which are applicable to tailings storage facilities. Once the tailings slurry (dilute or paste consistency) has arrived at the tailings storage area, there are several possible ways it can be deposited. These include the spigotting method, cyclone deposition and the paddocking method.

5.2.1.1 SPIGOTTING METHOD

Spigots are multiple outlets along a delivery pipeline. They are used when it is easily possible to cause a gravitational grading split between the coarse and the tailings' fine fractions. Reticulation along the TSF embankment is achieved through spigot pipes extending from delivery stations located on the pre-constructed embankment crest (**Figure 30 left**). The spigot pipes are laid along the main wall, allowing deposition to occur from any point on the crest. In the course of a deposition cycle, a batch of adjacent spigots is opened, sufficient to cater for the slurry flow rate (**Figure 30 right**). Spigots break up the tailings delivery stream into smaller streams, thus causing a drop in stream velocity. This velocity drop lets the coarser fractions settle close to the deposition point. As the beach fills, spigots at one end of the batch are opened while the equivalent number at the other end is closed so that the deposition gradually moves along the spigot pipe and around the tailings dam.

Figure 30: Example of spigot deposition. Spigot at a pre-constructed embankment crest (left) and spigot pipes laid along the main wall (right) (Goldfields, 2023)

A variation to this method is where the spigot pipeline is located on the embankment crest, and the perimeter bund is raised to coincide with the tailings deposition cycle. The spigot lines usually have a series of nozzles located along the delivery pipeline at intervals of 2 m to 3 m. During each deposition cycle, a section of the spigot pipe is dismantled and moved to one side to allow the perimeter bund's raising, which is usually constructed of the beach tailings.

5.2.1.2 PADDOCK OR DAYWALL DEPOSITION

The daywall is so-called as it is that portion of the dam used during the day when there is supervision available and daylight to see what is going on. The conventional daywall is used to deposit uniformly graded tailings through an open-ended discharge located at one end of the paddock daywall (**Figure 31 left**). The principle of a paddock or daywall is to create or form small impoundments or containment berms with dried-out tailings borrowed from the previous layer deposited around the perimeter or edge of the paddock (**Figure 31 right**). These shallow paddocks are then filled preferentially with dilute (± 30-50 % solids) slurry. The tailings solids settle out of suspension, releasing clear water, the bulk of which can be decanted from the surface of the paddock into the basin via a drain or "vent" pipe. The resulting layer of slimes continues to dry out through some seepage, but mainly through evaporation resulting in shrinkage cracking of the surface.

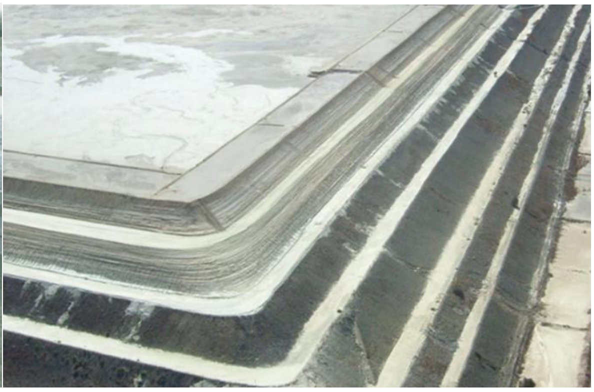


Figure 31: Example of daywall deposition. An open-ended discharge at one end of the paddock daywall (left) and small impoundments with dried-out tailings (right) (Goldfields, 2023)

Since each subsequent layer deposited is formed on top of the previous layer, a paddock or daywall can essentially only be developed in an upstream manner. By definition, the upstream wall development stability depends on the strength of the earlier deposited underlying layers. Thus, it is essential to develop a daywall facility in thin layers (maximum 200 mm) to allow consolidation.

5.2.1.3 **CYCLONE DEPOSITION**

In **cyclone deposition** is a cyclone deposition device consisting of conical housing equipped with a feed pipe that enters the cone at its larger diameter closed end. A second pipe enters the cone and intrudes into the body of the cone. The slurry feed enters under pressure and is forced to swirl with a spiral motion towards the smaller end. In the process, centrifugal forces cause the larger particles in the slurry to move down and away from the axis, towards the narrow exit of the cone. The net effect is that the finer particles and most of the water leave the cyclone through the vortex finder and form the "overflow," while the partially dewatered larger particles leave at the opposite end as the coarser "underflow (**Figure 32**). The purpose of using a cyclone is to create underflow material that has good geotechnical characteristics, i.e., high permeability, fast consolidation and strength gain rate than the original tailings so that the underflow can be used to form an impoundment wall to the tailings storage facility. Effective operations of a cyclone TSF can also result in high water recoveries.

Figure 32: Example of cyclone deposition (Goldfields, 2023)

Currently cyclone deposition is the vastly preferred method of deposition for the majority of Harmony's current TSF operations due to the reasons described above. The environmental impacts associated with each deposition method are similar, however **cyclone deposition has higher water recovery rates and is also preferred from a geotechnical perspective**.

5.2.1.3.1 HYDROCYCLONE

Golden Core Trade and Invest proposes to implement the hydrocyclone deposition method. The hydrocyclone is a widely used classifier in the mineral-processing industry. It is installed in close circuit between the grinding and conditioning paths for flotation of complex base metal ore. It consists of a cylindrical section at the top connected to a feed chamber for continuous inflow of pulp, which is then expelled through an overflow pipe. The unit continues downward as a conical vessel and opens at its apex to the underflow of coarse material (**Figure 33**). The feed is pumped under pressure through the tangential entry that imparts a spinning motion to the pulp. The separation mechanism works on this centrifugal force to accelerate the settling of particles. The velocity of slurry increases as it follows in a downward centrifugal path from the inlet area to the narrow apex end. The larger and denser particles migrate nearest to the wall of the cone. The finer/lighter particles migrate toward the center axis of the cone, reverse their axial direction, and follow a smaller diameter rotating path back toward the top. The oversized discharge fractions return to the mill for regrinding, while the undersized fractions move to the conditioning tank for flotation. Hydrocyclones perform at higher capacities relative to their size and can separate at finer sizes than other screening and classification equipment.

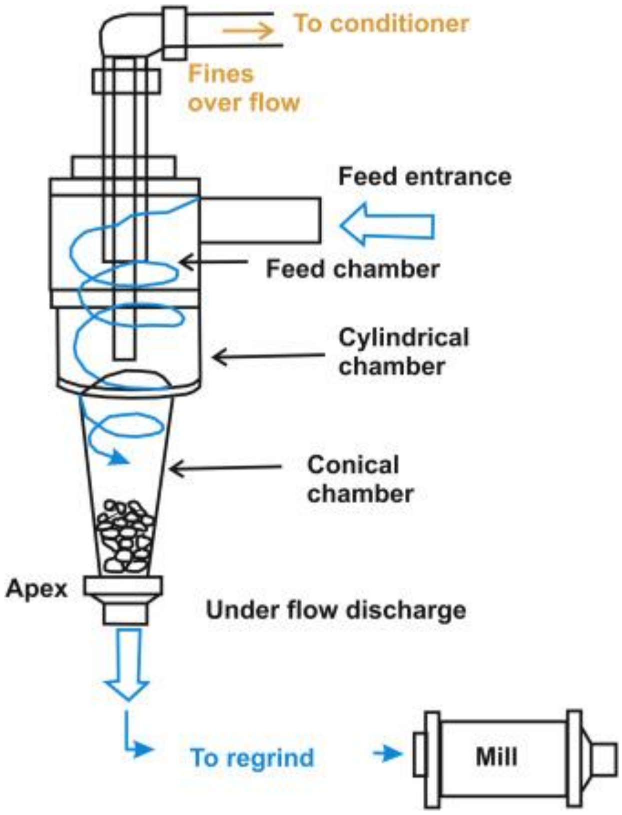


Figure 33: Sketch diagram showing the working principle of a hydrocyclone in close circuit classification (Haldar, 2018)

With no moving parts, hydrocyclones are inherently simple and robust, leading to lower initial investment and reduced maintenance needs. They can be compact and occupy less space, and multiple units can be arranged in parallel or series to handle large volumes. Hydrocyclones can process large volumes of material, making them efficient for high-capacity applications. They can operate at high temperatures and can handle both liquid mists and dry materials, depending on the application. However, a significant drawback is their high energy requirement due to the pressure drop across the unit, leading to high operating costs. Their efficiency drops significantly for very fine particles (under 5-10 micrometers) and can be poor at less-than-capacity flow. While simple, the abrasive nature of the slurry can cause wear and tear on the cyclone's materials over time. They are also unsuitable for processing sticky or adhering materials, which can clog the cyclone.

5.2.2 ALTERNATIVE TAILINGS DISPOSAL DETHODS

Despite technological advances in mineral processing, mining companies still face challenges in how to best manage tailings materials. In addition, mining of lower grades of ore has resulted in increased water use per unit of production; at certain sites, water availability is the single greatest constraint on mine development. In some cases, alternative tailings disposal (ATD) has been viewed as a 'silver bullet' that will address all tailings management issues, especially water concerns. In addition, in some cases ATD technologies also promise a smaller footprint and reduced environmental impact and risks. Despite the perceived advantages, there are a number of factors that determine whether an ATD technology including:

- Energy supply: removing water from a slurry requires significant energy, with increased energy, expenditure comes with additional costs;
- Production rates: conventional tailings deposition remains the only proven technology at mines with high production rates;
- Project economics: a reduced footprint and less water used come at the expense of higher initial capital;
- Operational predictability: mines operating under narrow production constraints may be prohibited from employing ATD technologies because of the possibility of operational instability;
- Topography: some ATD technologies lend themselves to flat topographies and are usually not feasible (without embankment support) at sites with even moderately steep terrain; and
- Water: in many cases, the water saved by the ATD technology is only marginally better than conventional disposal methods.

Based on the above listed challenges, Conventional Disposal Methods are preferable over the Alternative Tailings Disposal methods.

5.3 PIPELINE ROUTING ALTERNATIVES

Consideration of alternative routes generally applies to linear developments such as power lines, transport and pipeline routes. In route investigations, various corridors are investigated and compared in terms of their impacts. Although the project is largely a footprint development and route alternatives are usually not applicable to such developments, route alternatives are applicable to this project due to the proposed residue pipeline from Savuka Plant to Mponeng Lower Compartment TSF which has two optional routes (refer to **Figure 34**).

- Savuka Plant to Mponeng Lower Compartment TSF proposed pipeline route:
    - The proposed slurry and return water pipes extend from the south of Savuka Plant at starting point 26°25'24.95"S; 27°23'58.94"E, extending southwards, parallel to each other until reaching the northern extent of Mponeng TSF where they split. Thereafter, the slurry pipeline extends to west before connecting to Mponeng TSF while the return water pipeline extends east then south around the TSF to the return water dam.
    - The slurry pipeline is approximately 3.36km long extending from the Savuka Plant at 26°25'24.77"S; 27°23'58.84"E and ending at the Mponeng Lower Compartment TSF northern edge at 26°26'57.60"S; 27°24'31.59"E.
    - The return water pipeline is approximately 4.85km long extending from the Savuka Plant at 26°25'24.77"S; 27°23'58.84"E and ending at the Mponeng Lower Compartment TSF return water at 26°27'23.09"S; 27°25'0.37"E.
    - **It should be noted that there are heritage features (stonewalling) on this alternative at 26°25'43.88"S; 27°24'8.47"E which the engineers have deviated around the 15m buffer to avoid impacting on the heritage features**.
- Savuka Plant to Mponeng Lower Compartment TSF pipeline route alternative:
    - There alternative slurry and return water pipeline route extends to the east through Western Deep Levels then south along Mponeng Gold Mine before heading to the west where it connects to Mponeng.
    - The alternative slurry and return water pipelines route follow the same path. Both commence at the Savuka Plant at 26°25'24.77"S; 27°23'58.84"E and connect to the Mponeng Lower Compartment TSF on the southeastern section at 26°27'6.62"S; 27°25'10.61"E where the slurry pipeline ends while the return water pipeline extends slightly further to connect to the

return water dam at 26°27'23.09"S; 27°25'0.37"E.. Subsequently, the alternative slurry pipeline is 6.73km long while the alternative return water pipeline is 7.4km long.

The residue deposition pipelines will have a NB diameter of 250 - 300mm with a peak throughput of 913 m^3/h (254 ℓ/s) while the return water pipeline will also have a NB diameter of 250-300mm with a peak throughput of 323 m^3/h (90 ℓ/s). The pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths. The advantages and disadvantages of each route are presented on **Table 22**.

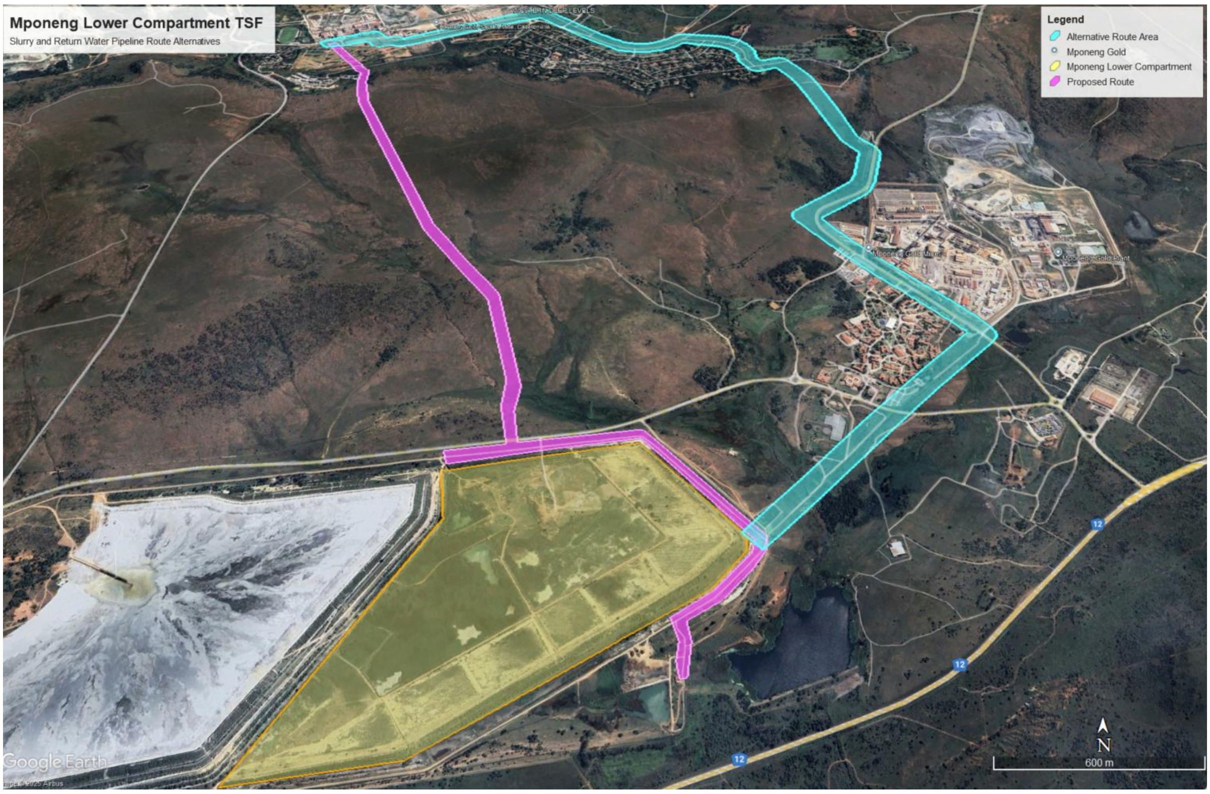


Figure 34: Aerial view of the pipeline route alternatives

Table 22: Advantages and disadvantages of pipeline routes

Advantage	Disadvantage
Savuka Plant to Mponeng Lower Compartment TSF proposed pipeline route	
Shorter: slurry pipeline is approximately 3.36km and return water pipeline is approximately 4.85km long. Making it cheaper to install the pipes. However, it should be noted that the construction of the bridge and culvert may result in this option becoming more expensive	Requires new culvert for the road section and requires new pipe bridge for the channelled valley bottom wetland section Anticipated to have more construction related impacts on the watercourse (i.e., construction of the bridge and the culvert within the channelled valley bottom wetlands
As per the Heritage Impact Assessment (**Appendix G**), the preliminary proposed route intersected two archaeological sites: stonewalling (MPnr1) and stonewalling with possible kraals (MPnr2). Both of these sites are rated as having high significance and	As per the Heritage Impact Assessment (**Appendix G**), the preliminary proposed route intersected two archaeological sites: stonewalling (MPnr1) and stonewalling with possible kraals (MPnr2). Both of

Advantage	Disadvantage
graded as Grade IIIA. However, as indicated in **Section 2.2.2** and in the Heritage Impact Assessment, the revised proposed route deviates around the identified heritage features. In addition, as indicated in **Section 8.3** and EMPr (**Appendix I**), a 15m buffer around the heritage features is to be adhered to during construction and operation of the project resulting in no direct impact on the heritage features, thus making the route viable.	these sites are rated as having high significance and graded as Grade IIIA.
As per the Terrestrial Biodiversity Impact Assessment (**Appendix G**), several SCCs were found along the route which will be impacted upon without implementation of the mitigation measures. However, as indicated in **Section 8.3** and EMPr (**Appendix I**), a search and rescue (relocation) prior to the construction activities is required which will result in no direct impact on the species, thus making the route viable.	As per the Terrestrial Biodiversity Impact Assessment (**Appendix G**), several SCCs were found along the route which will be impacted upon without implementation of the mitigation measures.
Savuka Plant to Mponeng Lower Compartment TSF pipeline alternative route	
Along largely disturbed footprint, lesser environmental impacts. No deviations required.	Longer: the alternative slurry pipeline is 6.73km long while the alternative return water pipeline is 7.4km long. Making it more expensive to install the pipelines. However, it should be noted that this option does not include any construction of a bridge and culvert which may ultimately result in this option becoming less expensive
Largely follows existing pipelines with existing access and maintenance routes	As per the Terrestrial Biodiversity Impact Assessment (**Appendix G**), one SCCs was found along the route which will similarly to the proposed route, will be impacted upon without implementation of the mitigation measures. Therefore, this route would still require a search and rescue (relocation) for the SCC.
Appears not to require any additional crossing structures such as a bridge and/or a culvert	Based on the engineering assessment, this route would be significantly more expensive to construct and maintain, making it financially not viable.

Based on route analysis, **the proposed route is preferable provided the mitigation measures indicated in this report and the EMPr are adhered to**.

5.4 NO GO ALTERNATIVE

The no go alternative would imply one of two scenarios; either continue deposition on the other nearby TSF which are already nearing their capacity or stop the operations. The first option would result in overburdening the Mponeng Upper Compartment TSF and/or Savuka TSFs. The aforementioned TSFs are already nearing their carrying capacity and would therefore make the TSFs unstable and unsafe and possibly breaking their walls. As indicated above, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits Region exceed the available deposition capacity of these TSFs. The Savuka tailings facility has reached the end of its lifecycle and is undergoing a short-term extension of two years.

Following this period, tailings from Savuka will need to be diverted to an alternative facility. The second option would mean once the Mponeng Upper Compartment and Savuka TSFs reach their carrying capacity and approved height, deposition would stop which would mean the mining activities would come to a halt. That would negatively affect the future viability of Harmony's West Wits mining operations and massive socio-economic impacts would emanate due to lack of deposition space. This would also negatively affect the company's financial closure and rehabilitation plans. Subsequently, the No-Go Alternative, would have a significant financial impact on not only Harmony, but also have a direct negative impact on the workforce on the mine and surrounding businesses and communities that are directly or indirectly linked to the operations. As such, **the no go alternative is considered <u>not</u> feasible or reasonable** for this project.

5.5 LOCATION / PROPERTY ALTERNATIVES

The proposed activity is to recommence deposition (extend the height of existing Mponeng Lower Compartment TSF) and it is therefore anticipated to have no additional extensive impact on the current location apart from new infrastructure such as pipelines, culvert and pipe bridge. Additional footprints on the same or surrounding property/ies that have been considered are described in the sections below. These are however, not assessed in the impact assessment, as they have been eliminated based on a feasibility study. Reasons are provided below.

5.5.1 HEIGHT EXTENSION OF DEELKRAAL TSF

This scenario includes re-utilising the existing and dormant Deelkraal TSF (refer to **Figure 35**) by extending the height of the TSF. This TSF is located further away than the proposed alternative to the Savuka Plant and is not connected to the plant. In considering the environmental permitting requirements for the height extension of these TSFs, the following aspects need to be considered:

- The facility is dormant.
- It is assumed that the facility is at its final design height.
- It is assumed that new deposition pipelines will be required.
- The pipelines from Savuka Plant may cross, or be within 500 m of wetlands or watercourse.

This option would require additional infrastructure including *inter alia* pipelines from the TSF to the Savuka Plant to pump tailings to the TSF and these pipelines will have to cross water courses and or wetlands. Therefore, based on the nature of the activity and its potential environmental and economic impacts, this option has not been considered in the EIA Process.

5.5.2 OLD DRD TAILINGS STORAGE FACILITY

- This option proposes to re-deposit on the footprint of the Old DRD TSF (refer to **Figure 35**). The Old DRD TSF is located approximately 6km north-east of the Mponeng Lower Compartment TSF. This option would firstly require engagements with the owner of this footprint as Harmony is not the owner of the property. In addition, this option would also require additional infrastructure including *inter alia*, TSF and starter wall, solution trenches, Return Water Dam, pipelines and access roads. Therefore, based on the nature of the activity and its potential environmental and economic impacts, this option has not been considered in the EIA Process.
- It should be noted that there is also DRD Gold Mega Tailings Storage Facility, located approximately 20km to the southeast of the Mponeng Operations. This Mega TSF is designed to accept third party tailings on a toll disposal basis. It must be noted that Mega Dump site was considered, and Harmony had previously engaged Sibanye to acquire deposition space. However, Sibanye informed Harmony that their plans have changed and that they could no longer accommodate any Harmony tailings on the RTSF. Therefore, this option is not feasible and could not be assessed as an alternative.

5.5.3 OLD SAVUKA TAILINGS STORAGE FACILITY

This option proposes to re-deposit on the footprint of the Old Savuka TSF (refer to **Figure 35**). The Old Savuka TSF is located immediately north-east of the proposed alternative and TSF 5a & 5b. This option would require additional infrastructure including *inter alia*, TSF and starter wall, solution trenches (existing and extension of existing), Return Water Dam (existing), pipelines and access roads. In addition, the mine is currently reclaiming this footprint, which means that there would not be sufficient space available to start redepositing on this footprint for some time. Therefore, based on the nature of the activity and its potential environmental and economic impacts, this option has not been considered in the EIA process.

5.5.4 SAVUKA VALLEY TAILINGS STORAGE FACILITY

This option proposes to deposit within the valley between the Savuka 5b TSF and the Savuka 7a TSF (refer to **Figure 35**). This option would require additional infrastructure and would not provide sufficient space for the required deposition. Therefore, this option has not been considered in the EIA Process.

5.5.5 HEIGHT EXTENSION OF SAVUKA 7A&7B TSFS

This scenario includes continuing to deposit tailings onto the existing and operation Savuka 7a & 7b TSFs (refer to **Figure 35**) by extending the height of the approved height of the TSFs. These TSFs is located the closest to the Savuka Plant and is connected to the plant. The TSFs are included in the 2014 EMPr amendment. The facility is further included in the current Water Use Licence (WUL). In considering the environmental permitting requirements for the height extension of these TSFs, the following aspects need to be considered:

- The facility is already operational and connected to the plant.
- It is mentioned in the EMPr as an active facility.
- No new infrastructure is required to keep the facility operating.
- The facility is licensed in the Water Use License.

This option would not require additional infrastructure and will therefore, not have additional impacts on the surrounding environmental, except for slight increases in existing impacts e.g. in air quality, mainly due to the increased height and duration of the operation of the TSFs. Therefore, based on the nature of the activity and its potential environmental and economic impacts, this option was considered and assessed through a separate Basic Assessment Process as an additional (not alternative) deposition site. However, the height extension of Savuka 7A and 7B is a temporary activity for the Savuka-Mponeng operations and additional deposition space will still be required. Subsequently, the Mponeng Lower Compart TSF has been identified as potential suitable deposition space.

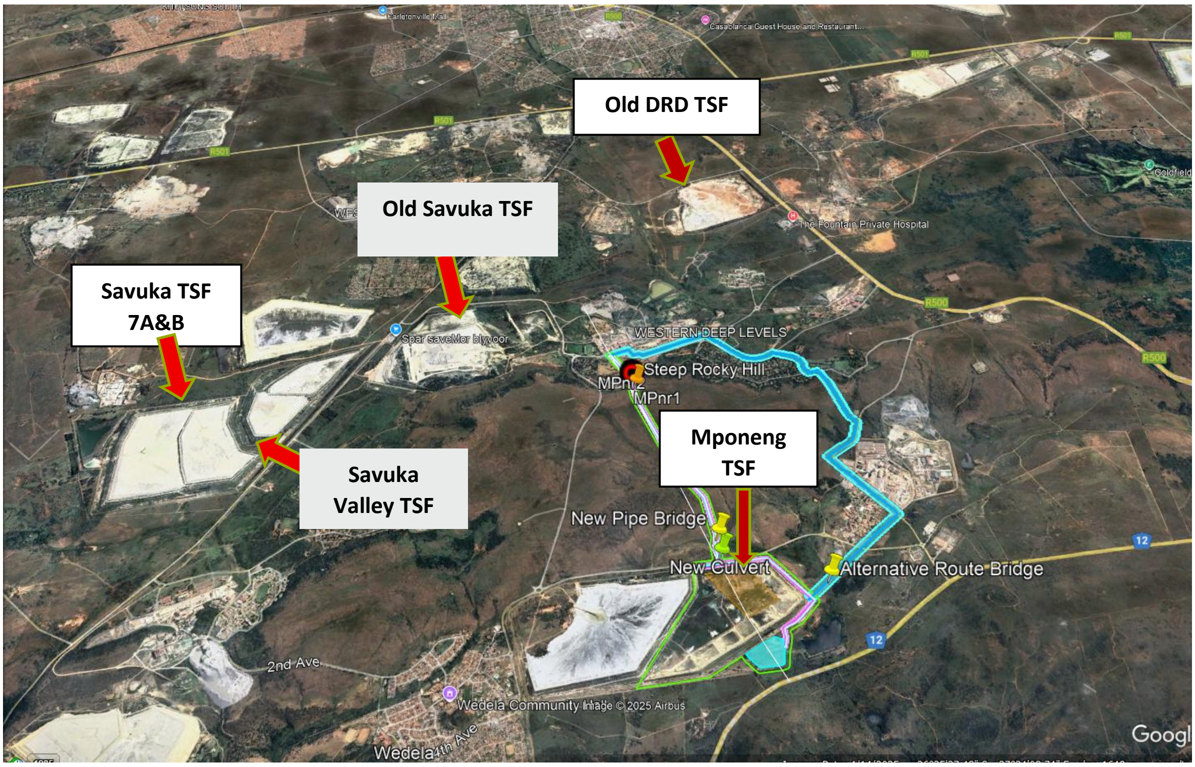


Figure 35: Location of alternative TSF sites

6 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their comments are considered, and a record included in the reports submitted to the Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Introduce the proposed project;
- Explain the authorisations required;
- Explain the environmental studies already completed and yet to be undertaken (where applicable);
- Solicit and record any issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximize and/or promote positive environmental impacts associated with the project.

6.1 PRE-CONSULTATION WITH THE COMPETENT AUTHORITY

A pre-application meeting with the Competent Authority (CA) for the Integrated Environmental Authorisation Application, the Department of Mineral and Petroleum Resources Gauteng Region was requested by the EAP on the 15th of August 2025. The pre-application meeting was held on the 29th of August 2025. The purpose of the pre-consultation was to provide the authorities with background information of the proposed project, confirm NEMA EIA and NEMWA triggered listed activities, the process to be followed and plan of study for the EIA such as specialist studies and public participation. It should also be noted that that a pre-application meeting with the other CA for the Water Use Authorisation Application, the Department of Water and Sanitation was requested by the EAP and was held on the 9th of October 2025. The purpose of the pre-consultation was to provide the authorities with background information of the proposed project, confirm NWA triggered listed activities, the process to be followed and details to be included in the WULA such as specialist studies.

6.2 GENERAL APPROACH TO PUBLIC PARTICIPATION

The PPP for the proposed project is undertaken in accordance with the requirements of the MPRDA and NEMA EIA Regulations (2014), and in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project and have their views considered and included as part of project planning.

An initial I&AP database has been compiled based on known key I&AP's, Windeed searches, and stakeholder databases provided by the applicant consisting of key stakeholders within the Harmony West Wits Mining operations area. The I&AP database includes amongst others, landowners, ward councillors, communities, regulatory authorities and other special interest groups.

6.2.1 LIST OF PRE-IDENTIFIED KEY STAKEHOLDERS / I&APS

6.2.1.1 **ORGANS OF STATE IDENTIFIED AND NOTIFIED**

The following authorities have been identified and notified, but not limited to:

- Merafong City Local Municipality;
- West Rand District Municipality;
- The Department of Mineral and Petroleum Resources;
- National Department of Forestry, Fisheries and Environment;
- National Department of Water and Sanitation;
- National Department of Rural Development and Land Reform;
- National Nuclear Regulator;
- Gauteng Department of Agriculture and Rural Development;
- Gauteng Department of Roads and Transport;
- Gauteng Department of Health;
- Gauteng Department of Community Safety;
- South African Resource Heritage Agency (SARHA);
- Agricultural Research Council; and
- South Africa Civil Aviation Authority.

6.2.1.2 **LIST OF PRE-IDENTIFIED KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED**

The following key stakeholders have been identified and notified of the proposed activity:

- Birdlife South Africa;
- Endangered Wildlife Trust;
- Eskom Holdings SOC Limited;
- Federation for a Sustainable Environment;
- Local Ward Councillors.
- Mining Affected Communities United in Action;
- Mining and Environmental Justice Community Network of South Africa
- South African National Roads Agency Ltd; and
- Wildlife and Environment Society of South Africa.

6.2.1.3 **LIST OF SURROUNDING SURFACE RIGHTS HOLDERS/LANDOWNERS IDENTIFIED**

The following surrounding surface rights holders/landowners of the area under application have been identified as part of this application:

- Blyvooruitzicht Gold Mining Co Ltd;
- Anglogold Ashanti Ltd;
- Blywonder Trust (Pty) Ltd;

- Deelkraal Behuising Trust;
- Eskom Holdings SOC Ltd;
- Gauteng Provincial Government;
- Gold Fields Limited;
- Howden Group South Africa Limited;
- Jocapari Trust;
- Carleton Midas;
- Morgan Creek Sewerage Plants;
- Rand Water;
- Randfontein Estates Ltd (Care of Harmony Gold);
- Republic of South Africa;
- Welverdiend Township Development Company Ltd; and
- Other private individuals

Refer to **Appendix C** for the full list of I&APs.

6.2.2 INITIAL NOTIFICATION

The PPP commenced on the 15th of August 2025 with an initial notification and call to register on the project. The notification was given in the following manner:

6.2.2.1 REGISTERED LETTERS, FAXES AND EMAILS

Notification letters (English, Afrikaans and Setswana), faxes, and emails were distributed to all pre-identified key I&APs including government organisations, NGOs, relevant municipalities, ward councillors, landowners and other organisations that might be affected.

The notification letters included the following information to I&APs:

- List of anticipated activities to be authorised;
- Scale and extent of activities to be authorised;
- Information on the intended mining operation to enable I&APs to assess/surmise what impact the activities will have on them or on the use of their land;
- The purpose of the proposed project;
- Details of the affected properties (including details of where a locality map could be obtained);
- Details of the relevant NEMA Regulations;
- Initial registration period timeframes;
- Scoping Report commenting and Review period; and
- Contact details of the EAP.

6.2.2.2 NEWSPAPER ADVERTISEMENTS / GOVERNMENT GAZETTE

Advertisements describing the proposed project and EIA process were placed in the local newspaper with circulation in the vicinity of the study area. The initial advertisement was placed in the Carletonville Herald (in English, Afrikaans and Setswana) on the 21st of August 2025. The provincial Gazette was advertised on the 3rd of September 2025. The advertisements included the following information:

- Project name;

- Applicant name;
- Project location;
- Nature of the activity and application
- Availability of Scoping Report; and
- Relevant EIMS contact person for the project.

6.2.2.3 SITE NOTICE PLACEMENT

A1 Correx site notices in English, Afrikaans and Setswana were placed at 23 locations within the local project area on the 21st of August 2025. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person for the project.

6.3 AVAILABILITY OF SCOPING REPORT

Notification regarding the availability of the Scoping Report for public review was given in the following manner to all registered I&APs (which includes key stakeholders and landowners):

- Registered letters (only where no other communication method could be established with the I&AP) with details on where the scoping report can be obtained and/or reviewed, public meeting date and time, EIMS contact details as well as the public review comment period;
- Facsimile notifications with information described above;
- Email notifications with a letter attachment containing the information described above;
- Site notices and posters placed at and around the vicinity of the site and surrounding communities;
- Newspaper advertisement in the Carletonville Herald.

The scoping report was made available for public review from the 30th of September 2025 to the 31st of October 2025 for a period of 31 days. Proof of notification of the availability of the scoping report is provided in **Appendix C**.

6.4 PUBLIC MEETING / FOCUS GROUP MEETING

Notification regarding the scoping phase public meeting during the public review and comment period of the scoping report was given in the following manner to all registered I&APs (which includes key stakeholders and landowners):

- Registered letters with details on the date, time and venue of the scoping phase public meeting as well as EIMS contact details for any inquiries;
- Facsimile notifications with public meeting information above;
- Email notifications with a letter attachment containing the information described above;
- Site notices and posters placed at and around the vicinity of the site and surrounding communities;
- Newspaper advertisement in the Carletonville Herald.

It is important to note that there was no I&AP that attended the public meeting, the attendance register is provided in **Appendix C**. A Focus Group Meeting was however held with Federation for a Sustainable Environment (FSE) representative on the 10th of October 2025. Proof of notification of the scoping phase public meeting as well as focus group meeting minutes are provided in **Appendix C**.

6.5 PUBLIC PARTICIPATION PROGRESS

Comments raised to date have been addressed in a transparent manner and included in the Public Participation Report (**Appendix C**). To date, summary of comments received are as follows:

- Requests to register as I&AP;
- Requests for locality map and site kml files;
- Request for project reports; and
- Confirmation from stakeholders that they are not affected by the proposed project.
- Focus group meeting with Federation for a Sustainable Environment:
    - Request for indication on the responsible party for Closure and Rehabilitation.
    - Inquiry of site / location alternative assessment
    - Inquiry on lining plans of the TSF and Return Water Dam
    - Request for details of the spring and proposed diversion plans.
    - Inquiry on the Risk Classification of the TSF.
    - Inquiry on the risk measures for potential pipeline spillages.
    - Request for presentation of the project to the local Catchment Management Forum.
    - Emphasis on the Water Quality Monitoring.
    - Inquiry on Dust Management Plan.

All comments received to date including those received during the review of the Scoping Report have been captured and responded to through a Comments and Response Report that included in this EIA Report (**Appendix C**). I&APs have been provided with another opportunity to submit their comments during the public review and comment period of this EIA Report. Refer to see **Appendix C** for all Public Participation related documents**.**

6.6 REVIEW AND DECISION OF THE SCOPING REPORT BY COMPETENT AUTHORITIES

DMPR as the competent Authority for the listed activity must, within 43 days of receipt of the Final Scoping Report that has been subjected to 30 days of public review as a Draft Report, accept the Final Scoping Report and Plan of Study for EIA in writing should no amendments be required, or shortcomings be identified therein. Upon acceptance of the Scoping Report, the Environmental Assessment Practitioner (EAP) may then proceed with the tasks contemplated in the Plan of Study for EIA.

The authority can also reject the Scoping Report for not following legislative procedure if any of the required steps were not undertaken. In terms of Regulation 22 (b) of Government Notice R. 982, the Scoping Report may be amended and resubmitted by the EAP should it be rejected. On receipt of the amended Scoping Report and Plan of Study for EIA, the competent authority will then reconsider the application. Should the Scoping Report be approved, the amended Scoping Report will then be made available for public review and comment prior to submission to the Competent Authority. The authority may also advise the EAP of matters that may hinder the success of the EIA application or matters that may prejudice the success of the application. The Scoping Report and EIA Plan of study was accepted by the Competent Authority (DMPR) on the 27th of November 2025.

6.7 AVAILABILITY OF THE EIA REPORT

Notification regarding the availability of this EIA Report for public review was given in the following manner to all registered I&APs (which includes key stakeholders and landowners) in line with the accepted plan study:

- Registered letters (only where no other communication method could be established with the I&AP) with details on where the EIA Report can be obtained and/or reviewed, public meeting date and time, EIMS contact details as well as the public review comment period;
- Facsimile notifications with information described above;
- Email notifications with a letter attachment containing the information described above;
- Site notices and posters placed at and around the vicinity of the site and surrounding communities;
- Newspaper advertisement in the Carletonville Herald.

The hardcopy of the report has been placed at Deelkraal Library and Carletonville Public Library while a softcopy version has been placed on the EIMS website (www.eims.co.za/public-participation). Comments / concerns should be submitted to EIMS the by no later than **27 March 2026.** The comments / concerns should be directed to EIMS at:

Contact Person: Mbali Tshabalala

EIMS Reference Number: 1658

Postal Address: P.O. Box 2083; Pinegowrie; 2123

Telephone: (011) 789 7170

Fax: (086) 571 9047

E-mail: mponengtsf@eims.co.za

Comments raised during the EIA Report public review will be addressed in a transparent manner and will be included in the Final EIA Report to be submitted to the Competent Authority.

6.8 REVIEW AND DECISION OF THE EIA REPORT BY COMPETENT AUTHORITIES

In line with Regulation 24 of the NEMA EIA Regulations, 2014 as amended, the DMPR as the competent Authority for the listed activity:

1. (1) must within 107 days of receipt of the environmental impact assessment report and EMPr, in writing, -
    a. grant environmental authorisation in respect of all or part of the activity applied for; or
    b. refuse environmental authorisation.
2. (2) to the extent that authorisation is granted for an alternative, such alternative must for the purposes of sub-regulation (1) be regarded as having been applied for, consulted on and its impacts investigated.

6.9 APPEAL PERIOD

After a decision has been reached by DMPR, Chapter 2 of the National Appeal Regulations 2014 makes provision for any affected person to appeal against the decision. Within 20 days of being notified of the decision by the competent authority, the appellant must submit the appeal to the appeal administrator. An appeal panel may be appointed at the discretion of the delegated or organ of state to handle the case and it would then submit its recommendations to that organ of state for a final decision on the appeal to be reached. EIMS will communicate the decision of the Provincial Authority and the way appeals should be submitted to the Minister and to all I&APs as soon as reasonably possible after the final decision has been received.

7 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

This section of the EIA Report provides a description of the environment that may be affected by the proposed project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from existing information available for the area as well as baseline information received from certain specialist's assessments. The DFFE screening tool was also used to inform this section, and a copy of the screening report is included in **Appendix D**.

7.1 LOCATION

The project area falls within the West Rand District Municipality in Gauteng Province. Development area falls within Wards 11, 14 and 27 of Merafong City Local Municipality administrative area. The Mponeng Lower Compartment TSF is located at 26°27'10.53"S; 27°24'39.93"E in Wadela, immediately north of the N12. The site is approximately 7km northwest of Fochville, 10km south of Carletonville central and 20km west of Westonaria.

7.2 TOPOGRAPHY AND LANDSCAPE

The area north of the Mponeng TSF is characterized by a series of parallel hills that form the Gatsrand and have an elevation of approximately 1 770 metres above mean sea level (mamsl) (**Figure 36**). The Mponeng Lower Compartment TSF is located at approximately 1 538 mamsl. The difference in elevation of approximately 230mamsl symbolizes the ridge between the TSF and the Savuka Plant.

The study area features a varied aesthetic and visual landscape, with mining activities predominating the western and northern sections of the study area and savannah-covered grassland and agriculture in the southern regions. The northwestern and western sections consist of gently undulating land that slopes westward and southward towards drainage lines that generally flow west and northwest. The topography rises in the central parts of the study area immediately north of the Project site, which is mostly undeveloped and composed of gentle rolling grassland. Residential areas, linked to the mines, are situated immediately west (Wedela), northwest (Harmony housing), and north of the Project site (Western Deep Levels housing). South of Wedela and the Project site is a grassland area with savannah-covered slopes. These areas are primarily used for grazing. The far southern sections of the study area comprise agricultural lands

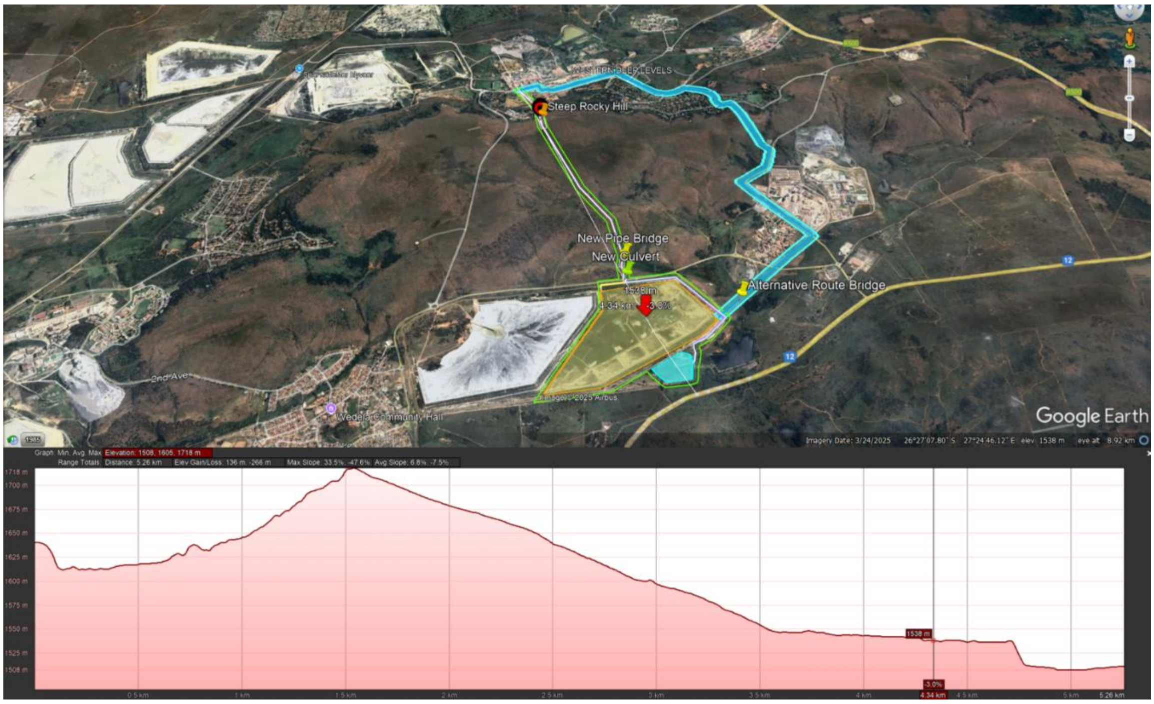


Figure 36: General topography of the study area

7.3 GENERAL SITE CONDITIONS / LAND-USES

The proposed Mponeng Lower Compartment TSF development is situated within an area consisting mainly of mining activities, grazing and naturally occurring dams. Residential areas, waterbodies, wetlands, mines and ridges are also located within and surrounding the study area. The larger area surrounding the proposed plant is classified as industrial in nature.

The study area can be distinguished into two sections: the southern (TSF) section and the northern (pipelines) section. The TSF section is a disturbed area consisting of mining residue, holding dam, landfill, two return water dams (north dam and south dam) and gravel access and maintenance roads. This area consists of an area previously disturbed and vegetation re-establishing itself with significant alien infestation present. The pipeline section is largely an undisturbed area consisting of a rocky ridge, uniform vegetation, tributaries and Eskom powerlines. The vegetation in this section is largely intact and uniform with the exception of the first part of the pipeline routes where the pipes extend from the Savuka Plant on an area where there were demolitions of buildings / infrastructure including the Western Deep Levels Hospital resulting in disturbance of the vegetation. There was evidence of some alien species along the section. Refer to **Figure 37** to **Figure 47** for the site conditions.

Figure 37: Mponeng Upper Compartment TSF immediately west of Mponeng Lower Compartment TSF

Figure 38: View of the Mponeng Lower TSF from the Mponeng Upper Compartment TSF.

Figure 39: View of the current holding dam on the Mponeng Lower TSF.

Figure 40: View of the existing landfill site on the Mponeng Lower TSF.

Figure 41: Steep embarkment of the Mponeng Lower TSF with alien vegetation and maintained gravel access road.

Figure 42: Current conditions of Mponeng Lower TSF Return Water Dam.

Figure 43: Natural (aquatic) dam approximately 150m southeast of the Mponeng Lower TSF (Young, 2025). The image also shows some of the grazing activities in the area.

Figure 44: Google Earth view showing the close proximity of the (aquatic) dam southeast of the Mponeng Lower TSF. The dam is fed by the Elandsfonteinspruit.

Figure 45: Northern boundary of the Mponeng Lower TSF showing the steep embarkment and vegetation including alien invasive trees and a potential wetland.

Figure 46: Northern view of the pipeline section showing a channelled valley bottom wetland, uniform vegetation of low-lying grass and sections of trees and shrubs within the rocky ridge.

Figure 47: Current conditions of the rocky ridge.

The proposed pipelines traverse through a Class 2 Ridge (Gauteng sensitive quartzite rocky ridge) from the main road along the alternative pipeline section (**Figure 47** left). The area consists of medium high grass and thick vegetation comprising of trees and shrubs. One of the Eskom Powerlines within this section can be seen on the image. There are also several Harmony Gold pipelines running along the road and across this section. View of the transformed area currently under rehabilitation on the northern section of the ridge (**Figure 47** right image). The area consisted of a Western Deep Levels Hospital which has since been demolished

7.4 CLIMATE

7.4.1 CURRENT CLIMATIC CONDITIONS

According to Köppen-Geiger Climate classification, Carletonville has a Subtropical steppe climate (Classification: BSh). The summers are long, warm, and mostly clear and the winters are short, cold, dry, and clear. Over the course of the year, the temperature typically varies from 2°C to 27°C and is rarely below -2°C or above 31°C. **(Figure 48**). Carletonville experiences significant seasonal variations in monthly rainfall, average monthly rainfall reaching 96 mm in January and being as low as 2mm in July. Evaporation data was sourced from the South African Atlas of Climatology and Agrohydrology (Schulze and Lynch, 2006) in the form of A-Pan equivalent potential evaporation. The average monthly evaporation distribution is presented in **Figure 48** and shows the site has an annual potential evaporation of 2,240mm.

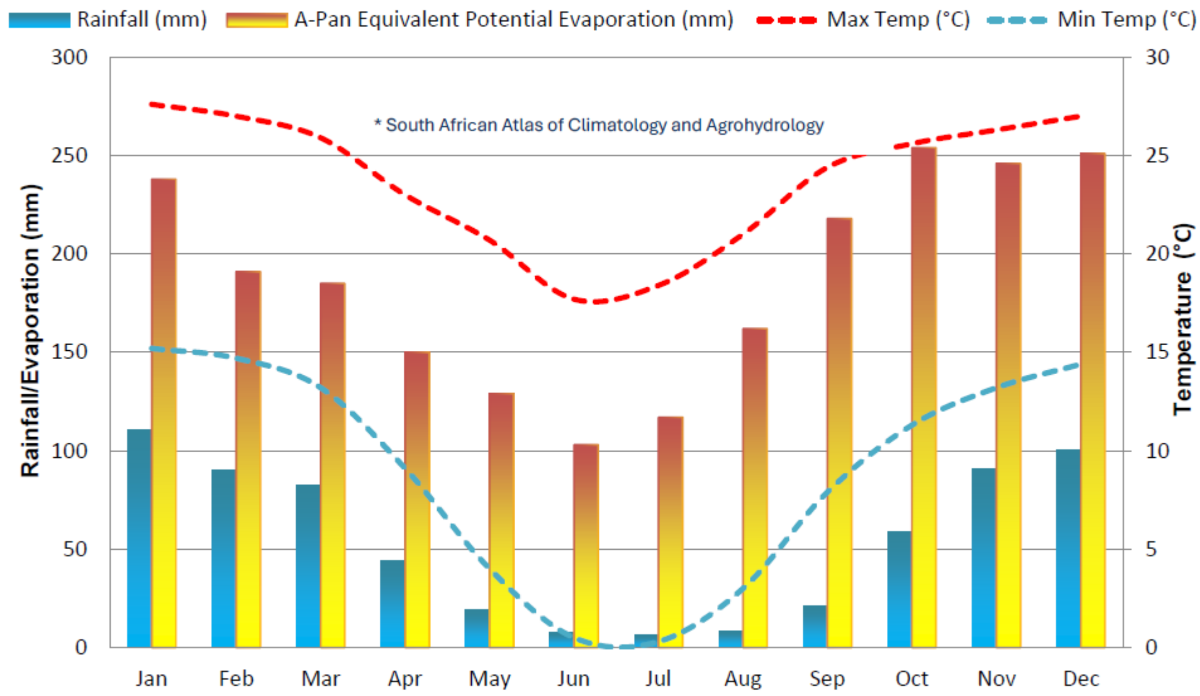


Figure 48: Average climatic conditions (Hydrological Consulting, 2025)

The climate is a typical Southern African Highveld climate with warm to hot summers and warm sunny winter days with frosty nights. Rainfall occurs predominantly during the summer months because of thunderstorm activity. The mean annual precipitation ranges from 565 mm to 697 mm per annum depending on the location of the weather station. Rainfall data was obtained from several sources, including mine data and data from the South African Weather Service. The rainfall for the region is summarised in **Table 23**.

Table 23: Rainfall Summary (MvB Consulting, 2025)

Period	**1927-2000**	**1962-2008**	**1983-2004**	**1966-2012**	**1900-2000**	**1958-2011**	**Regional Average**
Station Name	**Fochville**	**Carltonville**	**Wes Driefontein**	**Westonaria**	**Zuurbekom (RWB)**	**Randfontein**	
Station Number	**474899**	**4746809**	**04747421**	**04751744**	**475528**	**04753389**	
Month	**Average Monthly Rainfall (mm)**						

Period	1927-2000	1962-2008	1983-2004	1966-2012	1900-2000	1958-2011	Regional Average
Station Name	**Fochville**	**Carltonville**	**Wes Driefontein**	**Westonaria**	**Zuurbekom (RWB)**	**Randfontein**	
Station Number	**474899**	**4746809**	**04747421**	**04751744**	**475528**	**04753389**	
January	104	118	98	130	113	126	**115**
February	81	86	74	85	98	92	**86**
March	80	77	70	81	78	83	**78**
April	45	52	33	48	46	52	**46**
May	18	14	14	13	17	12	**15**
June	9	7	8	6	6	7	**7**
July	5	3	2	3	5	2	**3**
August	7	7	8	10	7	6	**7**
September	23	19	18	21	19	20	**20**
October	56	70	69	72	68	69	**67**
November	95	87	80	100	100	99	**94**
December	97	111	92	129	111	104	**107**
Total	**620**	**651**	**565**	**697**	**668**	**672**	**646**

7.4.2 CLIMATE CHANGE / RISK PROFILE

According to DEA (2018), a key feature of the projected climate change futures of South Africa is that temperatures are to increase drastically under low mitigation scenarios. For the far-future period of 2080-2099, temperature increases of more than 4 °C are likely over the entire South African interior, with increases of more than 6 °C plausible over large parts of the western, central and northern parts. Such increases will also be associated with drastic increases in the numbers of heat-wave days and very hot days, with potentially devastating impacts on agriculture, water security, biodiversity and human health. The model projections are indicative that a modest-high mitigation pathway can still significantly decrease the amplitude of this warming – most projections suggest that under Representative Concentration Pathway 4.5(RCP4.5), for example, temperature increases over the interior can be constrained to 2.5 to 4 °C. Nevertheless, it should be realised that South Africa is plausibly committed to relatively large (compared to the global average) increases in near-surface temperatures, even under high-mitigation futures.

South Africa is expected to experience:

- Increase in mean, maximum and minimum temperatures.
- Increase in very hot days – above 35 °C and the frequency of heat wave events.

- Drier conditions in the future, with regional variation.
- Slight increases in rainfall towards the north-eastern region.
- A strong drying signal over the southwestern region, which could result in reductions in rainfall of more than 40 mm per year.
- Increase in the frequency of extreme rainfall events (20 mm of rain falling within 24 hours) over eastern parts during the summer months.
- Sea level rise and an increase in the frequency and intensity of sea storms, accompanied by increases in wave heights
- Increase in the number of high fire danger days over north-eastern region and along the Cape south coast and the south-western Cape.

Climate Risk Profile report for the West Rand District Municipality (WRDM) was compiled by the Council for Scientific and Industrial Research (CSIR) in 2024. The Climate Risk Profile report, as well as the accompanying Climate Change Adaptation Plan, were developed specifically for the WRDM, to support its strategic climate change response agenda. Both documents are primarily informed by the GreenBook, which is an open-access, online planning support system that provides quantitative scientific evidence in support of local government's pursuit in the planning and design of climate-resilient, hazard-resistant settlements.

An ensemble of very high-resolution climate model simulations of present-day climate and projections of future climate change over South Africa has been performed as part of the GreenBook. The regional climate model used is the Conformal-Cubic Atmospheric Model (CCAM), a variable-resolution Global Climate Model (GCM) developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CCAM runs coupled to a dynamic landsurface model CABLE (CSIRO Atmosphere Biosphere Land Exchange model). GCM simulations of the Coupled Model Inter-Comparison Project 5 (CMIP5) and the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), obtained for the emission scenarios described by Representative Concentration Pathways 4.5 and 8.5 (RCP 4.5 and RCP 8.5) were first downscaled to 50 km resolution globally. The simulations span the period 1960– 2100. RCP 4.5 is a high mitigation scenario (assuming a reduction in CO_2 emissions into the future), whilst RCP 8.5 is a low mitigation scenario (assuming "business as usual" emissions). After completion of the 50 km resolution simulations described above, CCAM was integrated in stretched-grid mode over South Africa, at a resolution of 8 x 8 km (approximately 0.08° degrees in latitude and longitude). The findings of the report which may affect the proposed activity are indicated below:

a) **Temperature**: The WRDM experiences average annual temperatures ranging between 16 and 18 °C, with lower averages found along the lower southeastern parts of Mogale City and the upper northeastern parts of Rand West City Local Municipality. The projections show average annual temperature increases of 2.5 °C across the district into the future including the study area, under a low mitigation, "business as usual" emissions scenario.

b) **Rainfall**: The WRDM experiences current GCM derived average annual rainfall of between 800 and 1200mm, with lower averages found along the central parts of the district, particularly in Rand West City's settlements of Azaadville, Randfontein and West Rand. Future projections show an average annual rainfall increase of between 100 and 200 mm, with most of the increase expected to occur in the southern parts of the district including the study area, under a low mitigation, "business as usual" emissions scenario.

c) **Heat**: Under baseline climatic conditions, there are no more than 10 very hot days experienced within the district. The number of very hot days are projected to increase by between 0 and 30 into the future, under an RCP8.5 emissions scenario. Most heatwaves days are likely to take place in the southern parts of the district, under baseline conditions mostly affecting Merafong City Local Municipality. Conversely, most of the increase in the number of heatwave days is projected to occur in the northern parts of West Rand, affecting large parts of Mogale City and the northern parts of Rand West City. The study area is expected to have low heat risk likelihood of increase in extreme heat.

d) **Flooding**: The flood hazard index is based on the catchment characteristics and design rainfall, averaged at the Quinary catchment level. There is some variation of the flood hazard index across the district. Most parts of the district have a medium flood hazard index, with pockets of low, high, and very high flood hazard index. The settlements of Glen Harvie and Hills Haven in Rand West City are amongst those facing a high risk of flooding into the future, while the majority of settlements could face a low to moderate flood risk. The study area is predicated to have moderate flood risk likelihood.

The engineering designs are anticipated take into consideration the climate change impacts to ensure there is less likelihood of structural / dam failure and/or risk of the TSF.

7.5 GEOLOGY

The geology of the study area has been described in detail by several authors and mine geologists. The following section describes the regional and local geology abstracted from the Hydrogeological Assessment for The Proposed Tailings Redeposition on The Harmony Mponeng Lower Compartment Tailings Storage Facility (MvB Consulting, 2025).

The regional surface geology includes, in chronological order:

- Witwatersrand Supergroup.
- Ventersdorp Supergroup.
- Transvaal Supergroup.
- Karoo Supergroup.

The surface geology is presented in **Figure 49**.

7.5.1 WITWATERSRAND SUPERGROUP

Truswell (1977) describes the geology of the Witwatersrand Basin as follows:

The Witwatersrand Basin is a thick sequence of shale, quartzite and conglomerate. There are two main divisions, a lower predominantly argillaceous unit, known as the West Rand Group and an upper unit, composed almost entirely of quartzite and conglomerates, known as the Central Rand Group.

The West Rand Group is divided into three subgroups namely the Hospital Hill, Government Reef and Jeppestown. These rocks comprise mainly shale, but quartzite, banded ironstones, tillite and intercalated lava flows are also present. The rocks were subjected to low - grade metamorphism causing the shale to become more indurated and slaty. The original sandstone was recrystallised to quartzite.

The Central Rand Group is divided into the Johannesburg and Turffontein Subgroups and is composed largely of quartzite, within which there are numerous conglomerate zones. The conglomerate zones may contain any number of conglomerate bands, with individual bands interbedded with quartzite. The upper conglomerates are usually thicker with coarser fragments. An argillaceous zone known as the Booysens Shale (also known as the Kimberley Shale) separates the Johannesburg and Turffontein Subgroups.

The economic gold placers (reefs) are restricted to the Central Rand Group of the Witwatersrand Supergroup. A primary economic horizon that is mined in all the mines in the region is the Ventersdorp Contact Reef (VCR), at the base of the Ventersdorp lava. The Carbon Leader is also mined extensively in the region. Mponeng exploits the Ventersdorp Contact Reef (VCR) via a twin-shaft system to depths of between 2 800m and 3 400m below surface (AngloGold Ashanti, 2018).

7.5.2 VENTERSDORP SUPERGROUP

The younger Ventersdorp Supergroup overlies the Witwatersrand rocks. Although acid lavas and sedimentary intercalations occur, the Ventersdorp is composed largely of andesitic lavas and related pyroclastics. The Ventersdorp Supergroup consists of the Platberg Group and the Klipriviersberg Group. The Klipriviersberg Group consists of the Alberton and Westonaria Formations.

The Ventersdorp lava plays an important role in terms of groundwater ingress into the underground workings. As a rule of thumb, areas that have less than 50 m of lava have a greater risk of water ingress. This is especially the case were mining takes place above the Witwatersrand strata, such as mining of the VCR at the base of the Ventersdorp succession. The lava acts as an impermeable barrier, largely preventing water from the overlying dolomite aquifer entering the mine.

7.5.3 TRANSVAAL SUPERGROUP

Overlying the Ventersdorp Lavas are the Black Reef quartzite and dolomite of the Transvaal Supergroup. The Black Reef quartzite comprises coarse to gritty quartzite with occasional economically exploitable conglomerates (reefs). The entire area was peneplained in post-Ventersdorp time and it was on this surface that the Transvaal Supergroup was deposited, some 2200 million years ago. The deposition commenced with the Kromdraai Member with the Black Reef at its base. The Black Reef has eroded the Witwatersrand outcrop areas and as a result contains zones (reef) in which gold is present. The occurrence of the gold is not as widespread as in the Witwatersrand and mainly restricted to north-south trending channels. The Black Reef is overlain by a dark, siliceous quartzite with occasional grits or small pebble bands. The quartzite grades into black carbonaceous shale. The shale then grades into the overlying dolomite through a transition zone of approximately 10 m thick.

Overlying the Kromdraai Member is the dolomite of the Malmani Subgroup of the Chuniespoort Group. The dolomites vary between 200 m and 1 500 m in thickness. According to Parsons (1991) only the two lower formations of the Malmani Subgroup are present in the study area. The lowermost is the Oaktree Formation, which is succeeded southward by the Monte Christo Formation. The Oaktree Formation consists of chert-poor homogenous dark-grey dolomite containing interbeds of carbonaceous shale, which decrease in frequency and thickness from the base of the formation upwards. Columnar stromatolytes are numerous within this sequence and the formation follows conformably on the Black Reef Formation with a transitional mixed zone consisting of carbonaceous and calcareous argillaceous and arenaceous sediments (Parsons, 1991).

The Monte Christo Formation follows conformably on the Oaktree Formation. The Monte Christo Formation consists of alternating chert-rich and chert-poor, dark to light-grey dolomite and has an estimated thickness of 700 m (Brink, 1979). A 1.5 m thick chert layer, consisting of 10 cm to 15 cm thick layers of chert separated by manganese-rich bands, is present towards the base of the formation. Layers of crystalline, coarse-grained dark dolomite, laminated calcareous shale, shaley dolomite and fine-grained white dolomite occur in the sequence, parts of which are chert-rich, containing numerous chert layers, 10 cm to 20 cm in thickness (Parsons 1991).

The Pretoria Group rocks overlie the dolomite aquifer and is also the surface geology at Mponeng mine. The Rooihoogte Formation forms the basal member of the Pretoria Group, consisting of the Bevets conglomerate, shale and quartzite. The Bevets conglomerate varies in thickness between 3 m and 60 m (Parsons and Killick, 1985). Overlying the Bevets conglomerate is shale and sporadically developed quartzite, referred to as the Pologround quartzite. Where developed the Pologround quartzite is overlain by 150 m – 200 m of pink to purple shales, forming the basis of the Timeball Hill Formation. The shale is overlain by quartzite, which forms the linear north-westerly trending ridges in the central portion of the study area.

Further south is the Hekpoort and Strubenkop Formations. These formations consist predominantly of andesite lava (Hekpoort Formation) and ferruginous shale (Strubenskop Formation). The weathering of the shale and the lava results in grey to dark grey silty sand and clay. The Hekpoort Andesite Formation is visible through a number of scattered lava outcrops, giving it an uneven landscape. The quicker erosion of the softer tuffaceous sediments, interbedded between the amygdaloidal lava flows is believed to be the cause of the topographical features. The weathering of the Hekpoort Andesite results in dark to reddish – brown silty sand. These can contain fragments of lava and quartz ranging between pebble to cobble size.

The Strubenkop Formation achieves a maximum thickness of 130 m and consists predominantly of ferruginous shale. The contact between the Hekpoort and Strubenkop Formations is difficult to identify in the field, especially in view of the fact that localised intrusions of younger dolerite occur. Most of these rocks, especially in the lower lying areas, are concealed beneath a cover of younger sedimentary rocks, residual soils and alluvium. There is also a significant accumulation of hillwash and transported sediments. The floodplains of the Loopspruit and its tributaries contain grey, silty to clayey soils.

7.5.4 KAROO SUPERGROUP

The Karoo Supergroup was deposited approximately 345 million years ago. It commenced with glacial period during which most of South Africa was covered by a thick sheet of ice. This ice cap slowly moved towards the south, causing extensive erosion as a result of accumulated debris at the base. This debris was eventually deposited as the Dwyka tillite. The Dwyka, which generally form an impermeable barrier to the downward percolation of groundwater, is absent in most parts of the study area. Younger superficial deposits cover the Karoo in places. The Karoo strata filled the extremely rugged paleo-topography of the underlying karst dolomite to form a relatively even topography that is visible today.

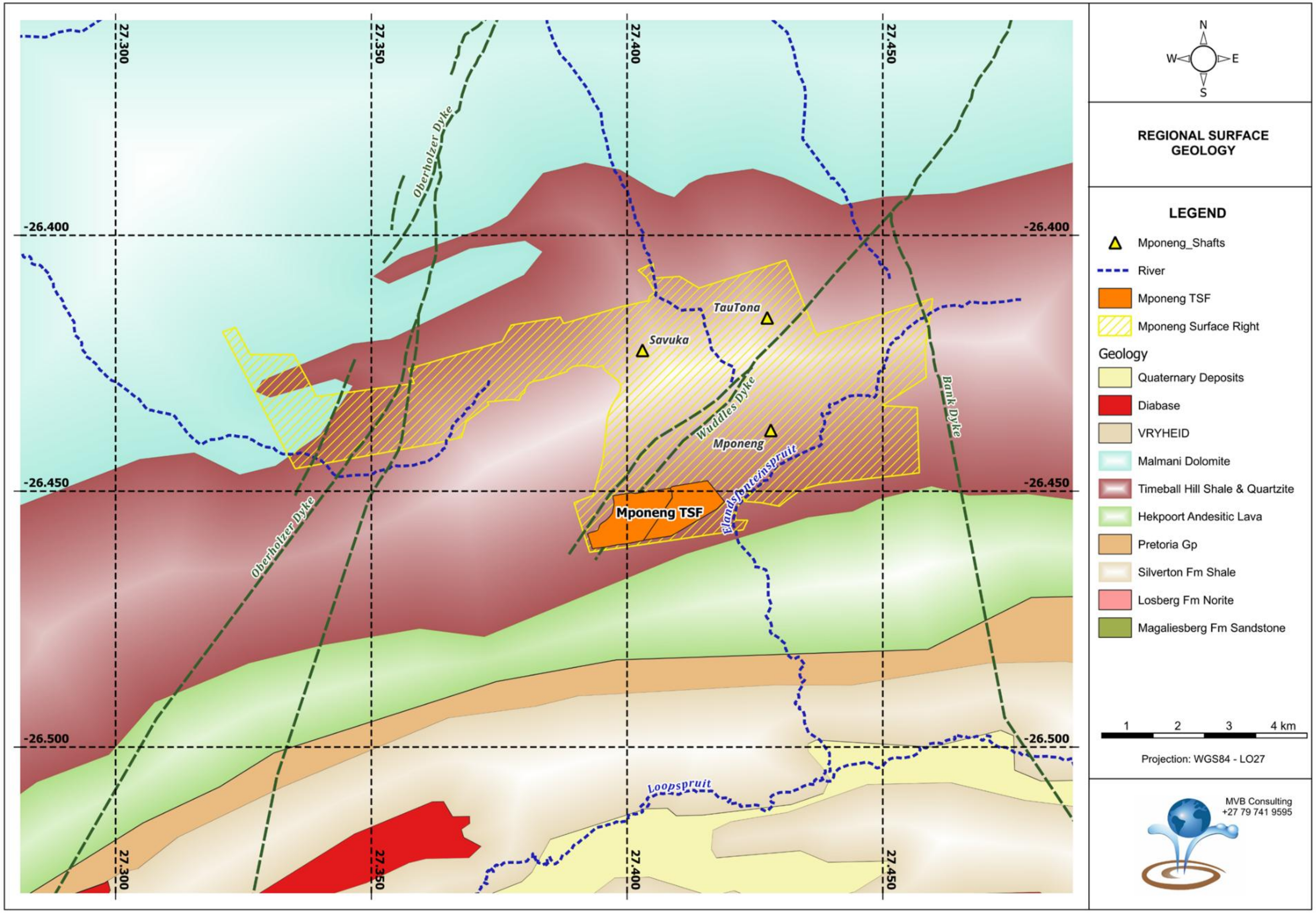


Figure 49: Regional surface geology (MvB Consulting, 2025)

7.6 SOILS AND AGRICULTURAL POTENTIAL

Based on the Soil and Agricultural Report for the proposed Mponeng Lower Compartment Tailings Storage Facility (The Biodiversity Company, 2026), the geology of the area includes the sedimentary rocks such as the shale and andesite from the Pretoria Group (Transvaal Supergroup). The area is also underlain by Malmani dolomites of the Chuniespoort Group (Transvaal Supergroup). The area is characterised by land type Fb and Ib, with shallow Mispah soils forms. According to the land type database (Land Type Survey Staff, 1972 - 2006) the assessment area to be focused on mainly falls within the Fb 5 and Fb 15 land types (**Figure 50**). The Fb 5 and Fb 15 land types consist of Mispah, Glenrosa, Hutton, Arcadia, Rensburg, Oakleaf and Dundee soil forms according to the Soil classification working group (1991), with the occurrence of other soils and rocky areas within the landscape. The Fb land types are characterised with shallow soils such as Glenrosa and Mispah soil forms. Lime is usually rare in the upper landscape but generally present in the lower terrains. The land terrain units for the featured land types are illustrated in **Figure 51** and **Figure 52**, with the expected soils listed in **Table 24** and **Table 25**.

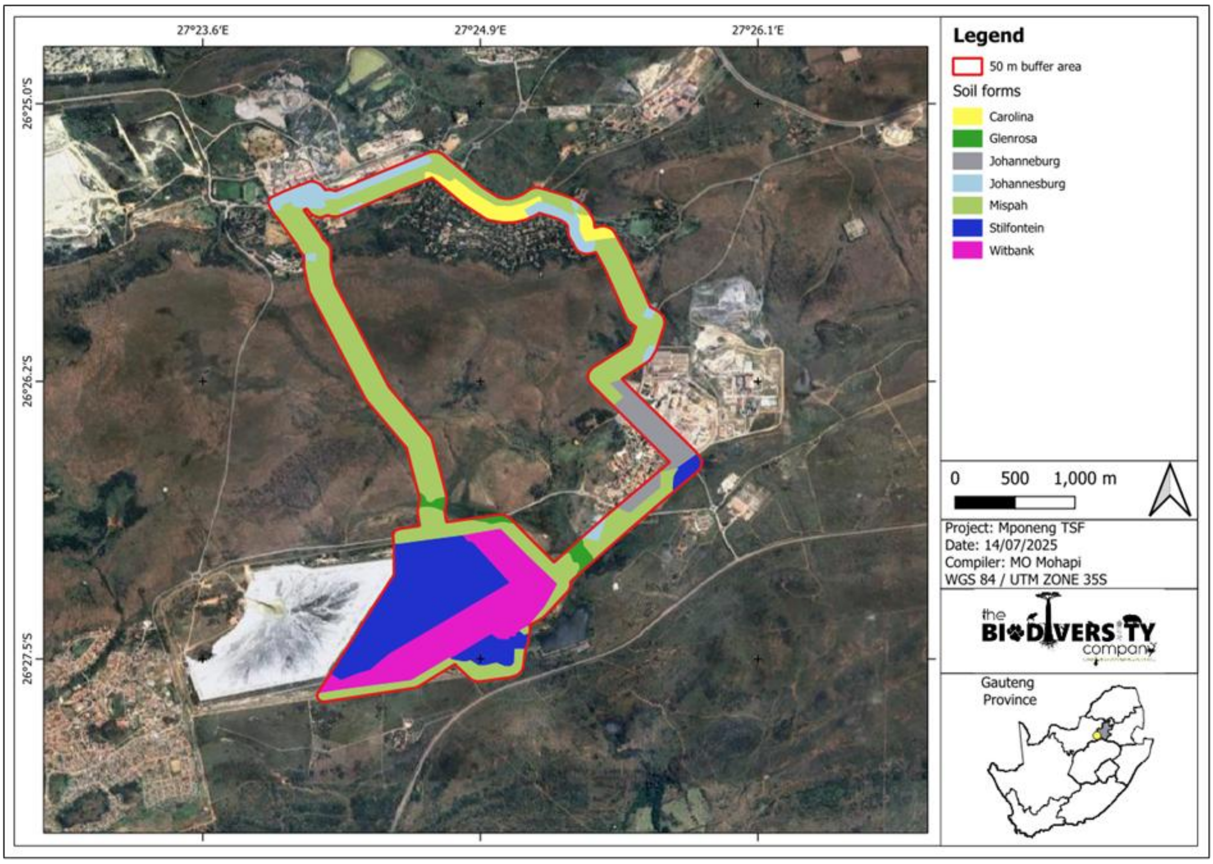


Figure 50: Soil forms found within the proposed project area (The Biodiversity Company, 2026)

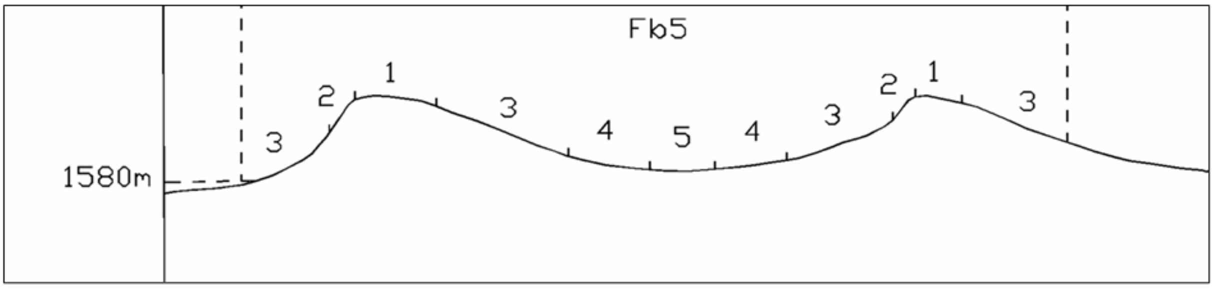


Figure 51: Illustration of land type Fb 5 terrain units (Land Type Survey Staff, 1972 – 2006)

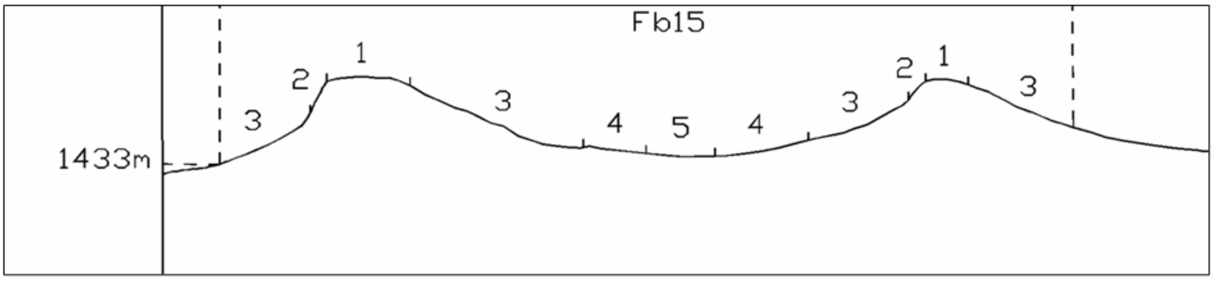


Figure 52: Illustration of land type Fb 15 terrain units (Land Type Survey Staff, 1972 – 2006)

Table 24: Soils expected at the respective terrain units within the Fb 5 land type (Land Type Survey Staff, 1972 - 2006)

TERRAIN UNITS									
1 (15%)		**2 (5%)**		**3 (33%)**		**4 (42%)**		**5 (5%)**	
Bare Rock	40 %	Bare Rock	70 %	Glenrosa	29 %	Hutton	48 %	Arcadia, Rensburg	52 %
Mispah	33 %	Mispah	20 %	Mispah	25 %	Glenrosa	12 %	Mispah	16 %
Glenrosa	23 %	Glenrosa	10 %	Hutton	23 %	Mispah	11 %	Bare Rock	12 %
Hutton	4%			Bare Rock	21 %	Clovelly	10 %	Stream beds	10 %
				Hutton, Shortland	2%	Oakleaf, Dundee	9%		
						Bare Rock	5%		
						Hutton, Shortland	3%		
						Avalon	2%		

Table 25: Soils expected at the respective terrain units within the Fb 15 land type (Land Type Survey Staff, 1972 - 2006)

TERRAIN UNITS									
1 (15%)		**2 (5%)**		**3 (33%)**		**4 (42%)**		**5 (5%)**	
Bare Rock	40%	Bare Rock	70%	Glenrosa	29%	Hutton	48%	Arcadia, Rensburg	52%
Mispah	33%	Mispah	20%	Mispah	25%	Glenrosa	12%	Mispah	16%
Glenrosa	23%	Glenrosa	10%	Hutton	23%	Mispah	11%	Bare Rock	12%
Hutton	4%			Bare Rock	21%	Clovelly	10%	Oakleaf, Dundee	10%
				Hutton, Shortlands	2%	Oakleaf, Dundee	9%	Avalon	10%
						Bare Rock	5%		
						Hutton, Shortlands	3%		
						Avalon	2%		

The six (6) representative soil forms identified within the proposed project area include the Carolina, Glenrosa, Mispah and three technosols (Witbank, Stilfontein and Johannesburg) soil forms (**Figure 53**). Based on the verified baseline findings, the proposed Lower Compartment TSF lower compartment was found to be dominated by the disturbed Witbank soils from the mine tailings deposits. The Witbank soils resulted due to human intervention and are collected from the surrounding mining dumps. Due to extensive disturbance, the

Witbank soils lack evidence of morphological order and are considered to have low suitability for agricultural potential. Artificial waterbodies with Stilfontein soils were also identified adjacent to the proposed Lower Compartment TSF lower compartment. The Stilfontein soils comprise of anthropogenic materials that have undergone saturation due to human activities. In addition, the northern portion of the proposed project area was found to be dominated by Johannesburg technosols. The Johannesburg technosols refers to urban developments such as roads, buildings, construction buildings and recreational areas. All the technosols for the purpose of this project are considered to have a low suitability, due to their morphological composition that extensively inhibits agricultural activities.

Furthermore, the proposed pipeline was found to be dominated by the semi-impermeable to impermeable Mispah and Glenrosa soil forms, while its significant portion comprised of Carolina soil forms. The Mispah soil form comprises of an orthic topsoil on top of a hard rock horizon. The Glenrosa soil form comprises of an orthic topsoil on top of a lithic subsoil horizon. Lastly, the Carolina soil form comprises of an orthic topsoil on top of a yellow-brown apedal subsoil that is underlain by a hard rock horizon. The Mispah soils are marked by shallow depth, impermeable underlying horizons, and the presence of parent materials. Due to their restricted permeability, the Mispah soils have limited root penetration and water movement, which inhibits crop production. Consequently, the soils are concluded to have a low sensitivity and low productivity, which are more suitable for grazing and supporting natural vegetation rather than intensive crop production. The identified Glenrosa soil forms are characterised by gleylithic subsoil, with signs of wetness. The gleylithic subsoil horizons were shallow with the presence of weathering parent material. Lastly, the Carolina soil form is characterised by very shallow apedal soils with freely drained upper horizons and restrictive underlying horizon. The soils are mostly suitable for shallow rooted crops and is considered to have a moderate agricultural potential. Some of the identified soil horizons within the proposed project area are illustrated in **Figure 54** and **Figure 55**.

Accordingly, following Smith, (2006) which the national Department of Agriculture, Forestry and Fisheries (DAFF), (2017) land capabilities protocols were further expanded from, the above-mentioned identified soil forms are restricted to land capability classes IV (i.e. Carolina soil form) categorised by LC 6-8 (Low to Moderate), land capability VI (i.e. Glenrosa and Mispah soil forms) categorised by LC 1-5 (Very low to Low), land capability VII (i.e. Stilfontein and Witbank soil forms) categorised by LC 1-5 (Very low), and land capability VIII (i.e. Johannesburg soil forms) categorised by LC 1-5 (Very low). The soil land capability was aligned and compared to the National Land Capability data (DAFF, 2017). A climate capability level 8 has been assigned to the area given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates.

By using the determined land capability for the most sensitive soil (Carolina soil form) and the determined climate capability, a land potential of “L6” was calculated. Furthermore, the calculated land potential for less sensitive soils (i.e. Glenrosa and Mispah soil forms) is land potential L7, and technosols including Johannesburg, Stilfontein and Witbank is land potential L8. According to Smith (2006), the “L6” land potential is characterised by very restricted potential with regular and or severe limitations due to soil, slope, temperature or rainfall. The “L7” land potential level is characterised by a low potential with a severe limitation due to soil, slope, temperatures, or rainfall. The “L8” land potential level is characterised by a very low potential with very severe limitations due to soil, slope, temperatures, or rainfall. The areas associated with the “L6, L7 and L8” land potentials are considered to be non-arable (**Figure 56**). Therefore, **the proposed project area falls predominately on non-arable soils**.

The following land potential levels have been determined;

- Land potential level 6 (this land potential is characterised by very restricted potential. Regular and/ or severe limitations due to soil, slope, temperatures or rainfall). Non-arable;
- Land potential level 7 (this land potential is characterised by low potential. Severe limitations due to soil, slope, temperatures or rainfall). Non-arable; and
- Land potential level 8 (this land potential is characterised by very low potential. Very severe limitations due to soil, slope, temperatures or rainfall). Non-arable.

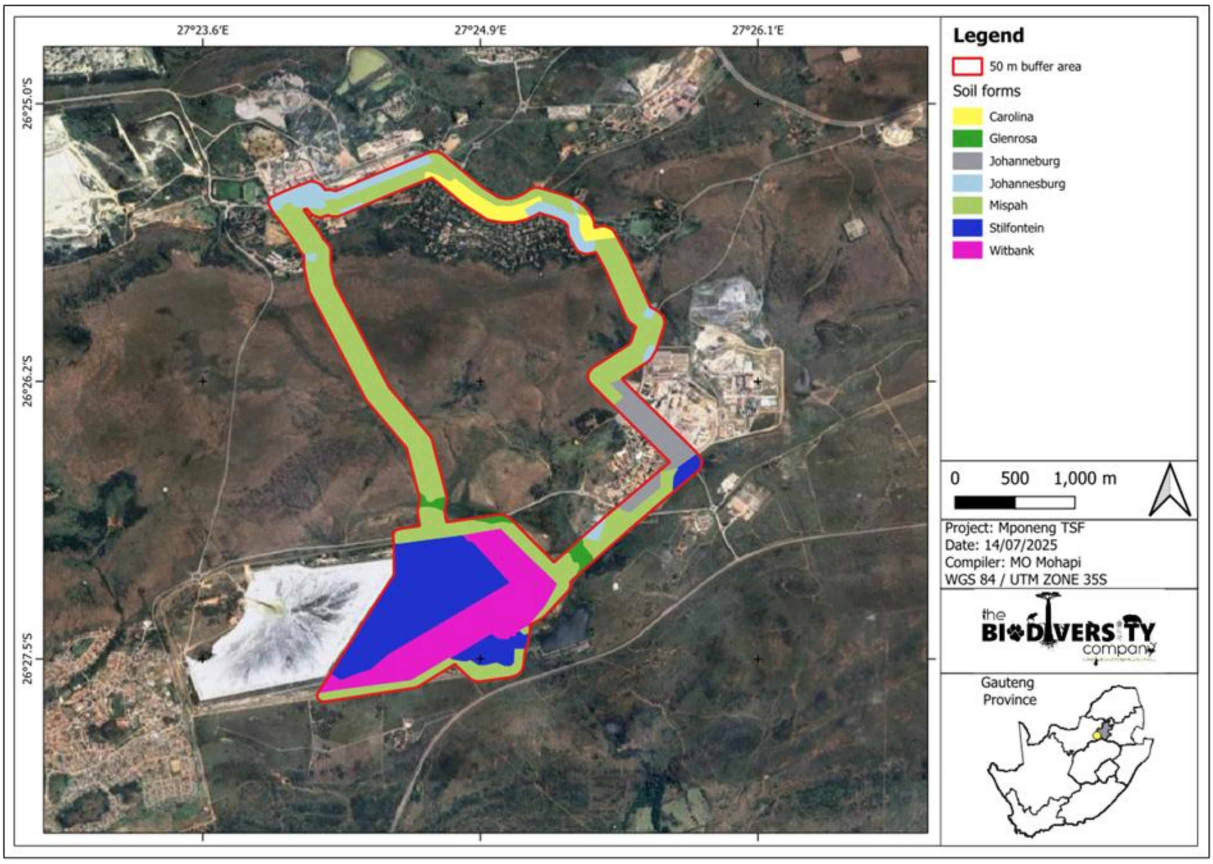


Figure 53: Soil forms found within the proposed project area (The Biodiversity Company, 2025)

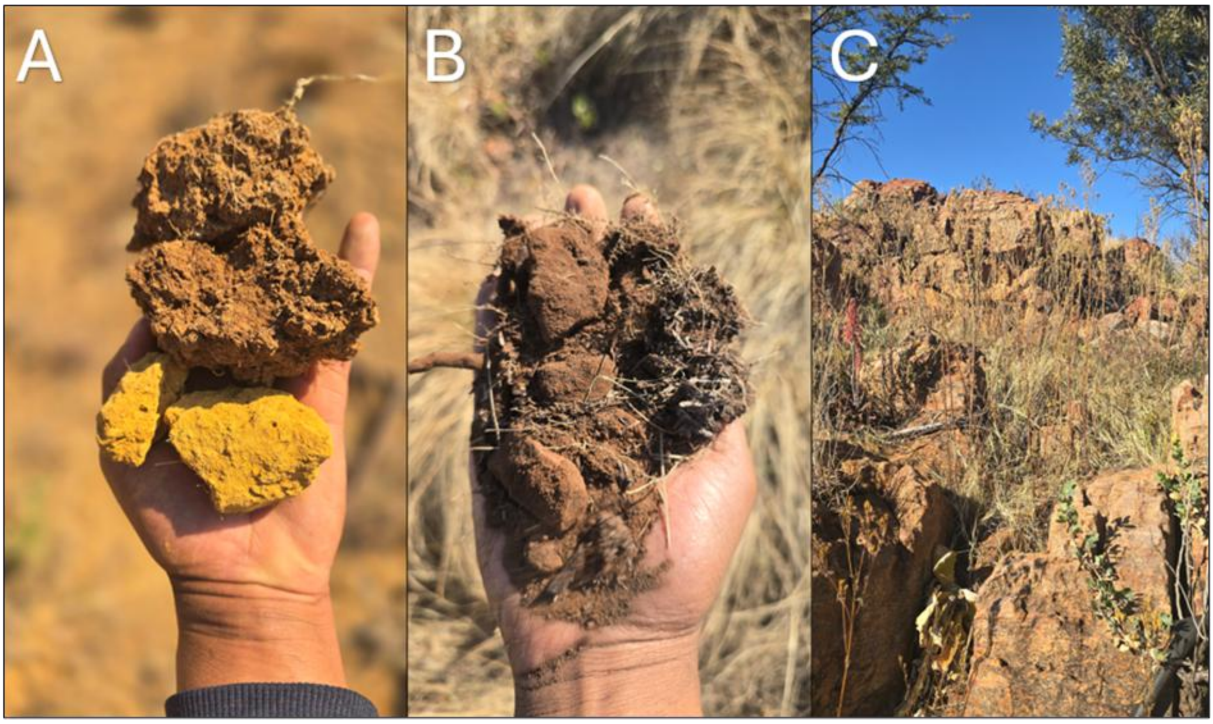


Figure 54: Soil forms found within the proposed project area; A) Carolina soil form; B) Glenrosa soil form; and C) Mispah soil form (The Biodiversity Company, 2025)

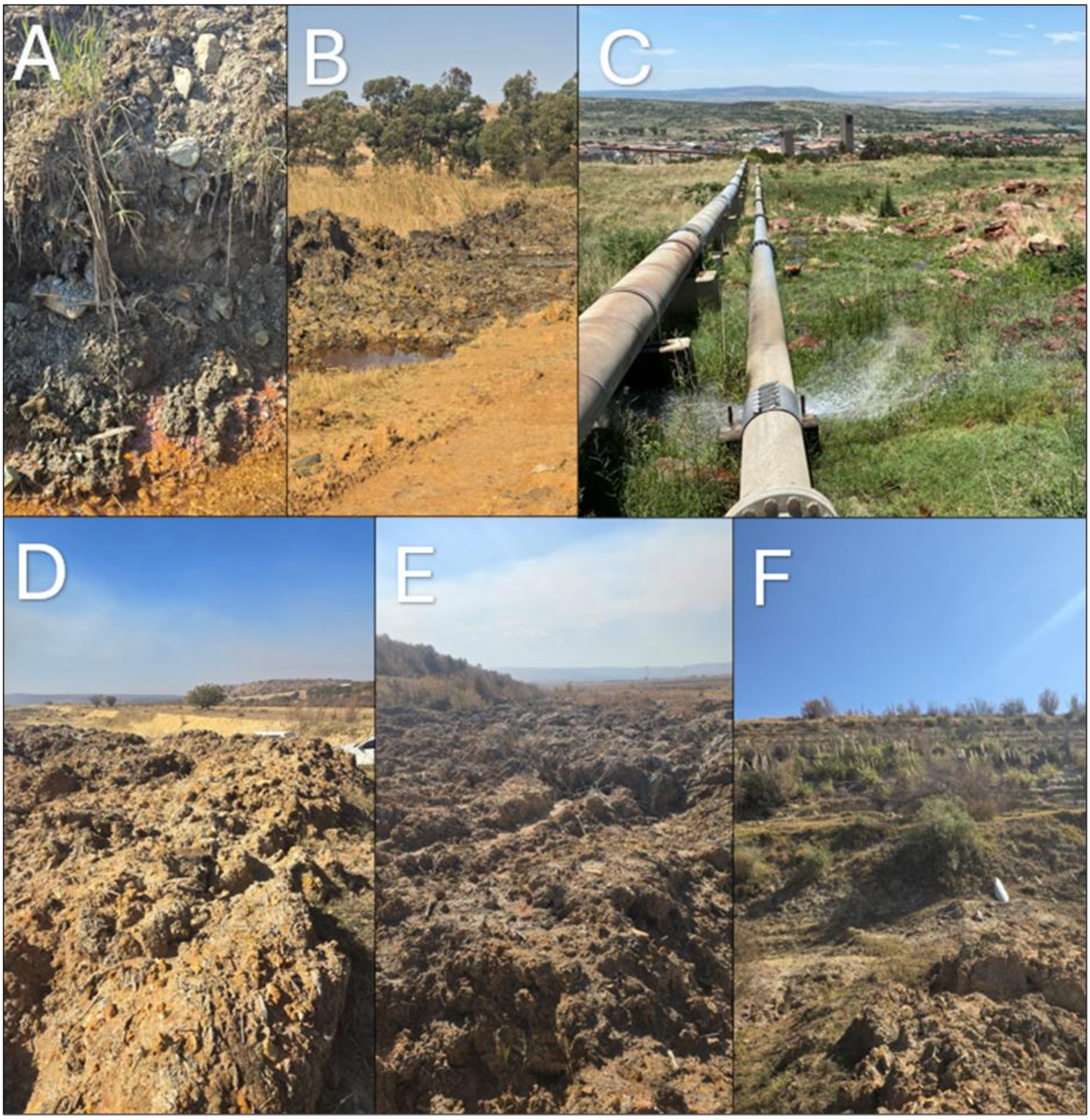


Figure 55: Anthrosols and Technosols; A and B) Stilfontein; C) Johannesburg; D to F) Witbank (The Biodiversity Company, 2025)

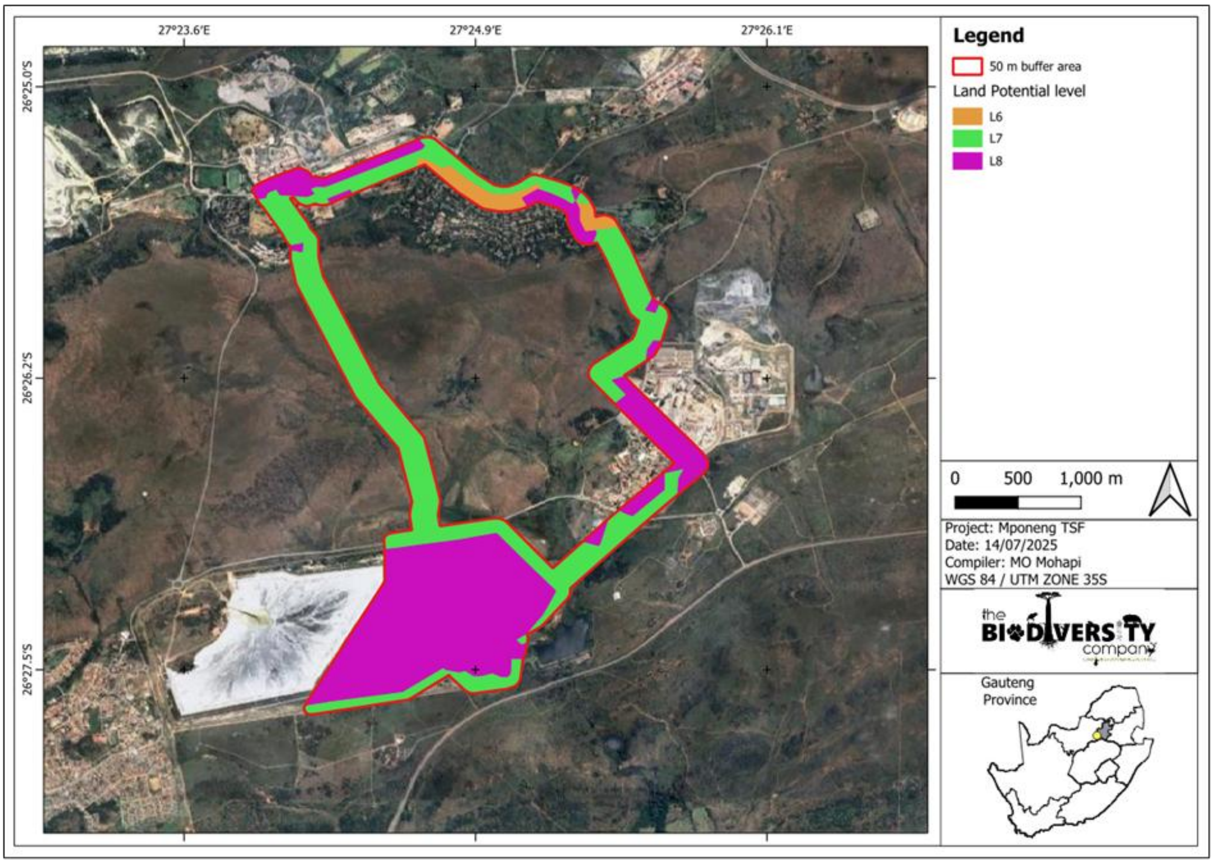


Figure 56: Land Potential of the proposed project area (The Biodiversity Company, 2025)

The land capability dataset (DAFF, 2017) indicates that the proposed project area falls evenly within the "Low to Moderate" land capability sensitivity and the "Moderate to High" land capability sensitivity, with a marginal having a "Very low to Low" land capability sensitivity (refer to the DFFE Screening Tool Report - **Appendix D**). No field crop boundaries were identified within the proposed project area, according to the agricultural screening tool (DFFE, 2025).

The soil findings and the current land uses disputes all areas associated with the "Moderate to High" land capability sensitivity. It further concurs with the "Low to Moderate" land capability sensitivity to an extent and fully correlates with the demarcated "Very low to Low" land capability sensitivity. Based on the verified findings, the moderate to high land capability areas were found to be dominated by very low to low potential soils including the Glenrosa, Mispah and technosols. Furthermore, the marginal confirmed low to moderate land capability areas are comprised of moderate potential soils i.e. Carolina soil form. The remaining very low to low land capability areas are comprised of low potential soils including the Mispah and Glenrosa soil forms. The proposed project and the associated activities are expected to have acceptable changes to the soil resources, and they are anticipated to have minimal impact on the soil resources. Therefore, the overall site sensitivity of the proposed project area is concluded to be predominately "Low", with a marginal "Medium" agricultural sensitivity along the alternative pipeline route option in an area of residential development where the soil has already been disturbed and fragmented deeming it infeasible for cropping practices.

7.7 TERRESTRIAL BIODIVERSITY AND VEGETATION

Terrestrial biodiversity is the variety of life forms on the land surface of the Earth. High biodiversity is an indicator of a healthy ecosystem, which is directly linked to human health. Animals and plants are responsible for many vital services our lives depend on, including:

- oxygen production;
- water regulation;

- soil retaining; and
- providing flood protection.

Biodiversity is both a part of nature and affected by it. Some biodiversity loss is because of events such as seasonal changes or ecological disturbances (wildfires, floods, etc.), but these effects are usually temporary, and ecosystems have managed to adapt to these threats. Human-driven biodiversity loss, in contrast, tends to be more severe and long-lasting. The human-made climate crisis is leading to environmental destruction, habitat loss, and species extinction. Terrestrial biodiversity is decreasing rapidly through habitat loss: a process where a natural habitat becomes incapable of supporting its native species, which are consequently displaced or killed. In the recent past, there have Increased efforts implemented to prevent further loss of terrestrial biodiversity and the ecosystem services they provide. The characteristics and implications of the terrestrial biodiversity within the Mponeng Lower Compartment TSF are obtained from the Baseline Terrestrial Biodiversity Assessment for The Proposed Mponeng Lower Compartment Tailings Storage Facility undertaken by the Biodiversity Company, 2026 (**Appendix G**) are discussed below.

7.7.1 ECOLOGICALLY IMPORTANT LANDSCAPE FEATURES

The following features describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI.

Table 26: Desktop and background spatial features examined

Desktop Information Considered	Relevant/Irrelevant: Reasoning	Section In Report
Ecosystem Threat Status (RLE 2021)	Relevant. The study area overlaps with a 'Least Concern' ecosystem.	**7.7.2.2**
Ecosystem Protection Level (NBA, 2018)	Relevant. The study area overlaps with a 'Poorly Protected' Ecosystem.	**7.7.2.3**
Provincial Conservation Plan (2024)	Relevant. The study area overlaps with Critical Biodiversity Area (CBA) 2, and Ecological Support Area (ESA) 1.	**4.2.3**
Gauteng Ridges (2019)	Relevant. The study area overlaps with a Class 2 ridge and is located adjacent to two Class 1 ridges.	**4.2.5**
Key Biodiversity Areas (KBA)	Irrelevant. Not located within 10 km of any KBA	Nil
South African Protected and Conservation Areas Databases (2024) (SAPAD and SACAD)	Irrelevant. The study area is not within range of any relevant SAPAD or SACAD areas. The Gauteng C-Plan does however show a Protected Area to the east of the study area.	Nil
National Protected Areas Expansion Strategy (NPAES)	Relevant. The study area overlaps with portions of NPAES areas.	**7.8.4**
Strategic Water Source Areas (SWSA)	Irrelevant. The study area does not transect any nor is within close proximity of National Freshwater Ecosystem Priority Areas.	Nil
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Relevant. The study area overlaps with CR SAIIAE wetlands and a CR/EN River	**7.8.5**
National Freshwater Priority Area (NFEPA)	Relevant. The study area overlaps with Non Priority FEPA wetlands, and an unclassified Class D: Largely Modified and the Class C: Moderately Modified Elandsfonteinspruit River.	**7.8.3**
Mining and Biodiversity Guidelines	Relevant. The study area overlaps with areas rated as Moderate, High and Highest Biodiversity Importance with the correlating risks for mining.	**4.1.5**

7.7.2 THE NATIONAL BIODIVERSITY ASSESSMENT

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DFFE and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period. The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The two headline indicators assessed in the NBA are Ecosystem Threat Status and Ecosystem Protection Level (Skowno et al., 2019).

7.7.2.1 **VEGETATION TYPE**

The study area is situated within the Savanna biome. The Savanna biome of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

a) Seasonal precipitation; and

b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by a herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006). The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layers, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include Vachellia and Albizia) and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the study area overlaps with Gauteng Shale Mountain Bushveld vegetation type (**Figure 57**). This vegetation unit occurs mainly on the ridge of the Gatsrand south of Carletonville-Westonaria-Lenasia. It also occurs as a narrow band along the ridge that runs form a point between Tarlton and Magaliesberg in the west, through Sterkfontein, Pelindaba, Atteridgeville to Klapperkop and southeastern Pretoria in the east. The altitude ranges between 1300 to 1 750m. It consists of low, broken ridges varying in steepness and with high surface rock cover. Vegetation is a short, semi-open thicket dominated by a variety of woody species. The understorey is dominated by a variety of grasses. Some of the ridges form plateaus above the northern slopes that carry scrubby grassland with high surface rock cover.

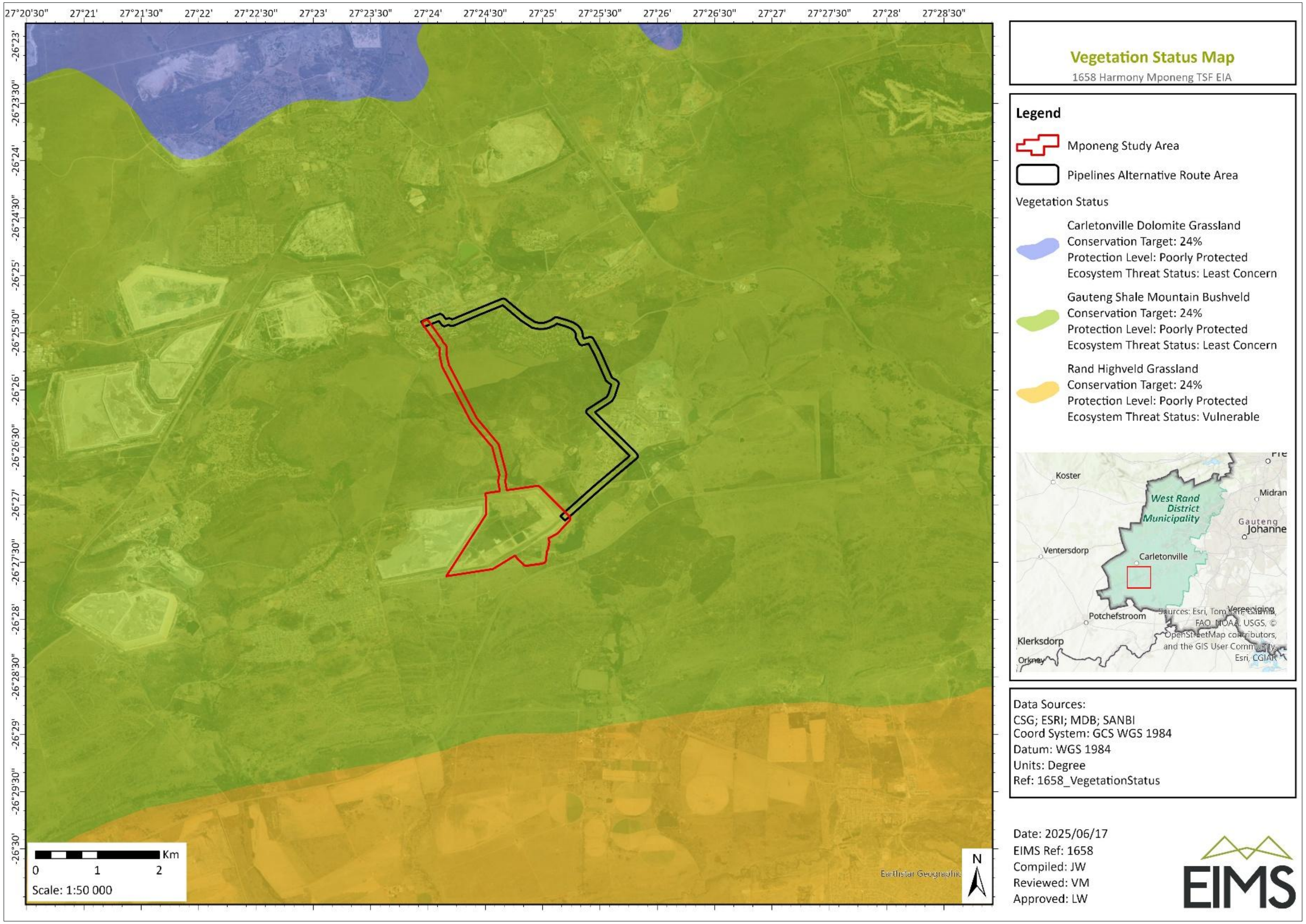


Figure 57: Site Vegetation Map

7.7.2.2 ECOSYSTEM THREAT STATUS - RED LIST OF ECOSYSTEMS

Ecosystem Threat Status (ETS) outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in a good or healthy ecological condition (Skowno et al., 2019). CR, EN, or VU ecosystem types are collectively referred to as threatened ecosystems. According to the National Vegetation Data (2018) obtained from SANBI, the proposed development site is located within the Gauteng Shale Mountain Bushveld vegetation type (**Figure 57**).

This vegetation type is classified as Least Concern (RLE, 2022). The national target for conservation protection for this vegetation type is 24%. Less than 1% is statutorily conserved, for example, the Skanskop and Hartbeesthoek Nature Reserves, Magaliesberg Nature Area and Groenkloof National Park. Additionally, over 1% conserved in other reserves including the John Nash Nature Reserve, Cheetah Park and Hartbeesthoek Radio Astronomy Observatory. About 21% transformed mainly by urban and built-up areas, mines and quarries, cultivation and plantations. Wattles a common invasive plant in places.

7.7.2.3 ECOSYSTEM PROTECTION LEVEL

Ecosystem Protection level (EPL) informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno et al., 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. According to the National Vegetation Data (2018) obtained from SANBI, the proposed development site is located within the Gauteng Shale Mountain Bushveld (**Figure 57**). The Gauteng Shale Mountain Bushveld is a PP ecosystem.

7.7.3 FLORAL CHARECTERISTICS

7.7.3.1 EXPECTED SPECIES OF CONSERVATION CONCERN AND PROTECTED PLANTS

According to the Terrestrial Biodiversity Assessment undertaken by the Biodiversity Company (2026), the Global Biodiversity Information Facility (GBIF) database lists 98 flora species expected to occur within the area (refer to the report in **Appendix G** for the full list). Four (4) of these species are considered as Species of Conservation Concern (SCC). Two (2) species were listed as per the DFFE Screening Tool Report (**Table 27**).

Please note that the Screening Tool report includes lists of bird, mammal, reptile, amphibian, butterfly, and plant species of conservation concern known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number. As per the best practise guideline that accompanies the protocol and screening tool (Species Environmental Assessment Guideline, 2022), the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as sensitive plant or sensitive animal and its threat status may be included, e.g. critically endangered sensitive plant or endangered sensitive animal.

Table 27: Threatened flora species that are expected to occur within the extended study area (The Biodiversity Company, 2026)

Species Name	Regional	IUCN	Habitat	Likelihood (Occurrence)	Reason
Adromischus umbraticola	NT	NE	Plants grow on south-facing rock crevices on ridges	Confirmed	Suitable habitat within study area
Khadia beswickii	VU	CR	Open shallow soil over rocks in grassland.	Confirmed	

Species Name	Regional	IUCN	Habitat	Likelihood (Occurrence)	Reason
Lithops leslie subsp. lesliei	VU	NE	Occurs primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses	Moderate	
Sensitive Species 1248	VU	NE	-	Moderate	

7.7.3.2 **IDENTIFIED SPECIES OF CONSERVATION CONCERN AND PROTECTED PLANTS**

Based on the Terrestrial Biodiversity Impact Assessment, Three (3) floral SSC were observed in total, *Adromischus umbraticola* subsp. *umbraticola*, *Cleome conrathii* and *Khadia beswickii. C. conrathii* was only observed during the wet season survey. **Table 28** and **Figure 58** shows the SCCs observed. According to the species guidelines, buffers should be incorporated for all populations of Critically Endangered, Endangered, Vulnerable, Rare and Critically Rare Species (SANBI, 2020). The guidelines stipulate that a 200m buffer is required as per SANBI requirements. A 200m buffer was placed on all the *Khadia beswickii* individuals within the study area.

Table 28: Threatened flora species that are expected to occur within the extended study area (The Biodiversity Company, 2026)

Family	*Species*	Threat Status (SANBI)
Aizoaceae	*Khadia beswickii*	Vulnerable
Cleomaceae	*Cleome conrathii*	Near Threatened
Crassulaceae	*Adromischus umbraticola subsp. umbraticola*	Near Threatened

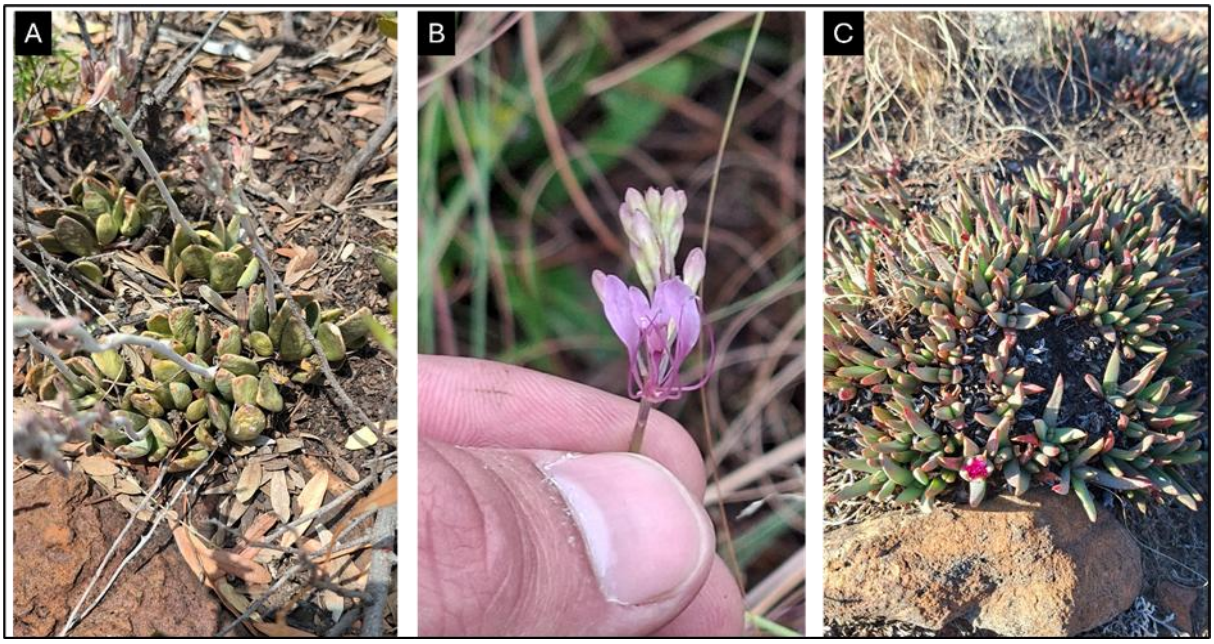


Figure 58: Photos illustrating floral SCC recorded for the STUDY AREA; A) *Adromischus umbraticola subsp. umbraticola*, B) *Cleome conrathii* and C) *Khadia beswickii* (The Biodiversity Company, 2026)

Five (5) provincially protected plant species were recorded during the site assessment; *Crinum graminicola, Haemanthus humilis subsp. humilis, Cussonia paniculata subsp. sinuata, Aloe verecunda* and *Protea afra subsp. Afra* (refer to **Table 29**). All species of the *Crinum, Haemanthus* and *Cussonia* genera are provincially protected under Schedule 1 of the Transvaal Nature Conservation Ordinance, No. 12 of 1983. Images of the protected species are seen in **Figure 59** with the locality presented in **Figure 60**. The protected species found within the study area will require a permit, should any of the protected species require removal, damage/destruction, or relocation.

Table 29: Provincially protected plants recorded within the study area (The Biodiversity Company, 2026)

Family	*Species*	Threat Status (SANBI)
Amaryllidaceae	*Crinum graminicola*	LC
Amaryllidaceae	*Haemanthus humilis subsp. humilis*	LC
Araliaceae	*Cussonia paniculata subsp. sinuata*	LC
Asphodelaceae	*Aloe verecunda*	LC
Proteaceae	*Protea afra subsp. afra*	LC

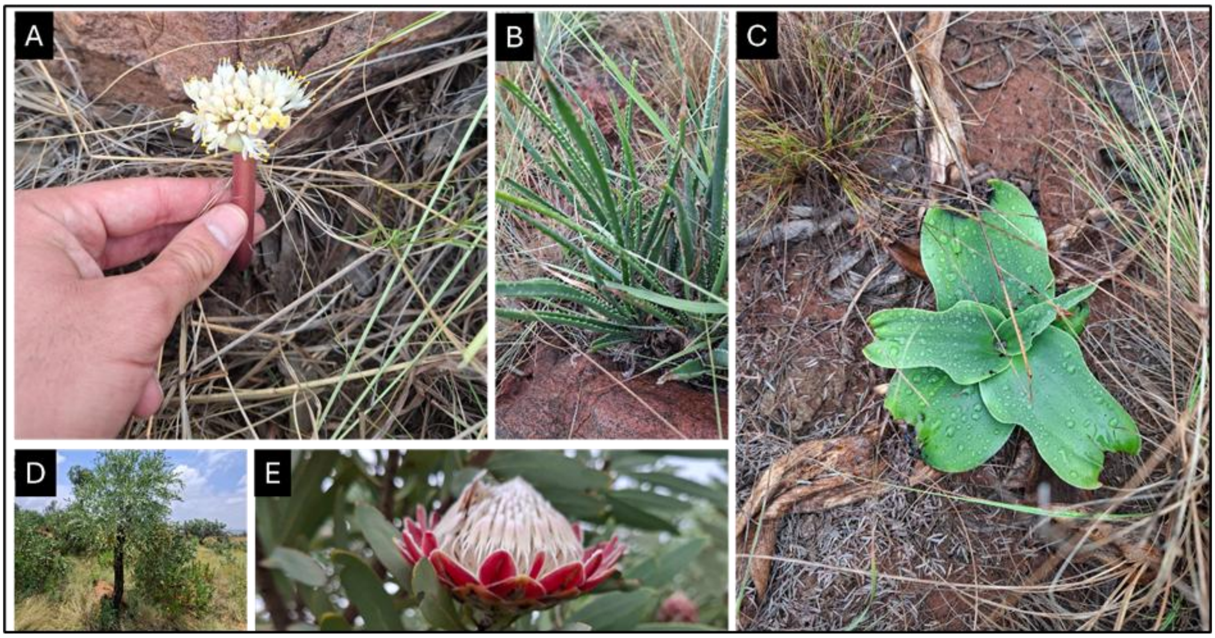


Figure 59: Photos illustrating some of the protected flora species recorded for the STUDY AREA*; A) Haemanthus humilis subsp. humilis B) Aloe verecunda, C) Crinum graminicola, D) Cussonia paniculata subsp. sinuata and E) Protea afra subsp. Afra* (The Biodiversity Company, 2026)

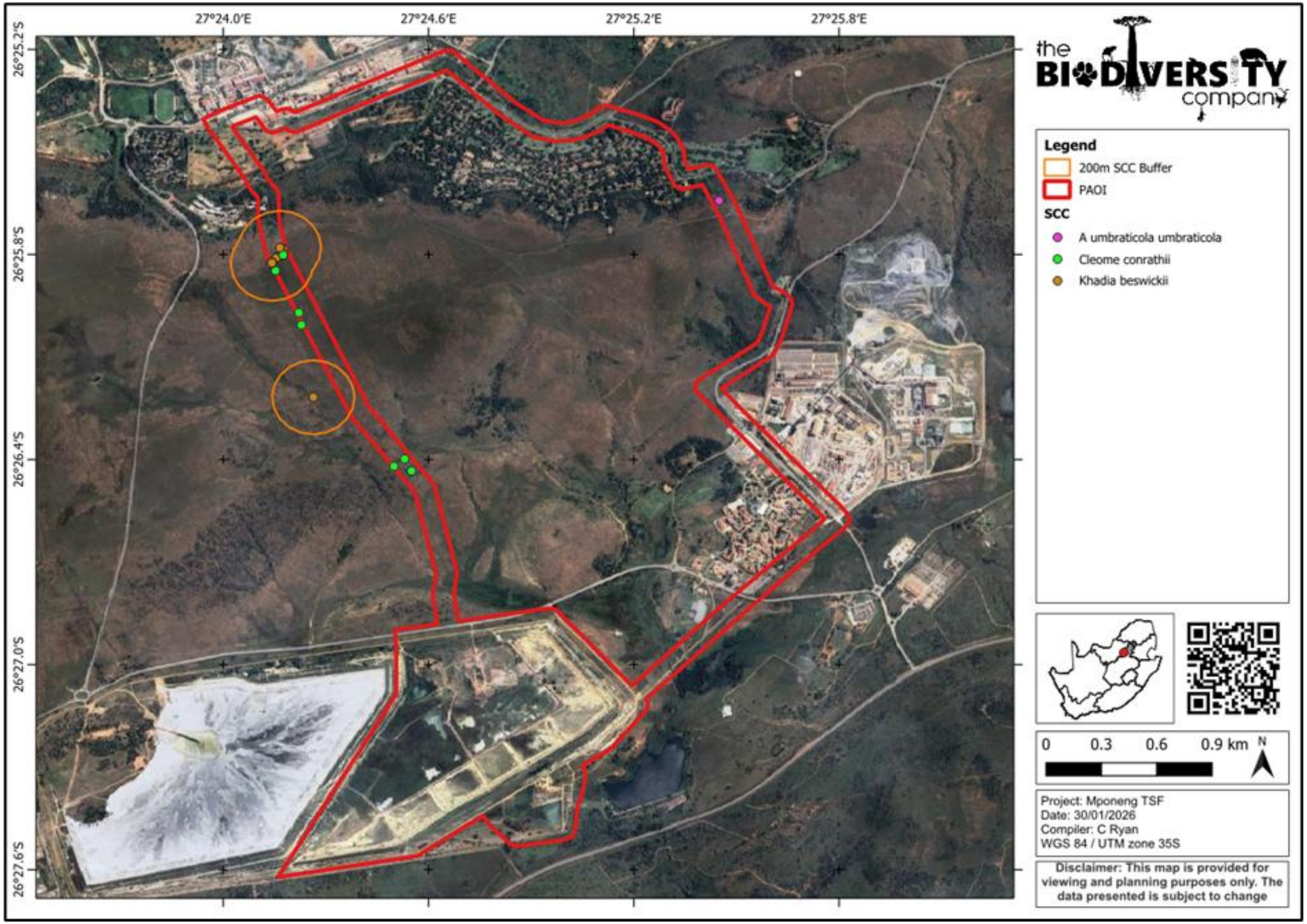


Figure 60: Visual representation of the species of conservation concern and protected (The Biodiversity Company, 2026)

7.7.4 FAUNAL CHARECTERISTICS

7.7.4.1 EXPECTED FAUNAL SPECIES WITHIN THE STUDY AREA

7.7.4.1.1 AMPHIBIANS

Based on the FrogMap, 22 amphibian species are expected to occur within the extended study area. One (1) amphibian SCC, the *Pyxicephalus adspersus* (Giant Bull Frog) is expected to occur within the project area (**Table 30**).

7.7.4.1.2 REPTILES

Based on the ReptileMAP database, 67 reptile species are expected to occur within the area. Three (3) species are regarded as SCCs (**Table 30**). No species were listed by the Screening Tool.

7.7.4.1.3 MAMMALS

The MammalMap lists 108 mammal species that could be expected to occur within the area. This list excludes large mammal species that are normally restricted to protected areas. Fifteen (15) of these expected species are regarded as SCC (**Table 30**). Of these 15 SCCs, 11 have been assigned a low likelihood of occurrence based on the lack of suitable habitat in the project area. Four (4) species have been assigned a moderate likelihood of occurrence. Two (2) species were listed by the Screening Tool.

7.7.4.1.4 AVIFAUNA

The Southern African Bird Atlas Project (SABAP) 2 data indicate that 278 avifauna species are expected for the project area and surrounding areas. Of these, 27 are considered SCC (**Table 30**). The likelihood of occurrence within the project area is included. The Screening Tool lists three (3) avifauna SCC that could be expected to occur. Refer to the Terrestrial Biodiversity Assessment Report in **Appendix G** for the full list of species.

Table 30: Threatened fauna species that are expected to occur within the extended study area (The Biodiversity Company, 2026)

SPECIES	COMMON NAME	CONSERVATION STATUS		LIKELIHOOD OF OCCURRENCE
		REGIONAL	GLOBAL	
SCC amphibian species that are expected to occur within the project area				
Pyxicephalus adspersus	Giant Bull Frog	NT	LC	Moderate
SCC reptile species that are expected to occur within the project area				
Chamaesaura aenea	Coppery Grass Lizard	LC	NT	Moderate
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Homoroselaps dorsalis	Striped Harlequin Snake	LC	NT	Moderate
SCC mammal species that are expected to occur within the project area				
Aonyx capensis	African Clawless Otter	NT	NT	Low
Atelerix frontalis	Southern African Hedgehog	NT	LC	Moderate
Cloeotis percivali	Percival's Short-eared Trident Bat	EN	LC	Low
Crocidura maquassiensis	Makwassie Musk Shrew	VU	LC	Moderate
Crocidura mariquensis	Swamp Musk Shrew	NT	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Moderate
Mystromys albicaudatus	African White-tailed Rat	VU	EN	Low

SPECIES	COMMON NAME	CONSERVATION STATUS		LIKELIHOOD OF OCCURRENCE
		REGIONAL	GLOBAL	
Otomys auratus	Southern African Vlei Rat (Grassland type)	NT	NT	Moderate
Panthera pardus	Leopard	VU	VU	Low
Pipistrellus rusticus	Rusty Pipistrelle	LC	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Low
Rhinolophus blasii	Blasius's Horseshoe Bat	NT	LC	Low
Threatened avifauna species that are expected to occur within the project area				
Anhinga rufa	African Darter	NT	LC	High
Tyto capensis	African Grass Owl	VU	LC	Confirmed
Circus ranivorus	African Marsh Harrier	VU	LC	Moderate
Circus maurus	Black Harrier	EN	EN	Low
Nycticorax nycticorax	Black-crowned Night Heron	NT	LC	Moderate
Elanus caeruleus	Black-winged Kite	NT	LC	High
Glareola nordmanni	Black-winged Pratincole	LC	NT	Moderate
Spatula smithii	Cape Shoveler	NT	LC	Moderate
Gyps coprotheres	Cape Vulture	VU	VU	Low
Calidris ferruginea	Curlew Sandpiper	VU	VU	Moderate
Hydroprogne caspia	Caspian Tern	VU	LC	Low
Eupodotis senegalensis	White-bellied Korhaan	VU	LC	Moderate
Coracias garrulus	European Roller	NT	LC	Moderate
Dendrocygna bicolor	Fulvous Whistling Duck	NT	LC	Low
Podiceps cristatus	Great Crested Grebe	VU	LC	Low
Ardea alba	Great Egret	NT	LC	High
Phoenicopterus roseus	Greater Flamingo	NT	LC	Low
Scopus umbretta	Hamerkop	NT	LC	High
Charadrius pecuarius	Kittlitz's Plover	NT	LC	Moderate
Sarkidiornis melanotos	Knob-billed Duck	NT	LC	Moderate
Falco biarmicus	Lanner Falcon	NT	LC	Moderate
Phoeniconaias minor	Lesser Flamingo	VU	NT	Low
Falco naumanni	Lesser Kestrel	VU	LC	High
Oxyura maccoa	Maccoa Duck	VU	EN	Moderate
Asio capensis	Marsh Owl	NT	LC	High
Mirafra cheniana	Melodious Lark	NT	LC	Moderate
Anas erythrorhyncha	Red-billed Teal	NT	LC	High
Sagittarius serpentarius	Secretarybird	VU	EN	High
Netta erythrophthalma	Southern Pochard	NT	LC	Moderate
Anas undulata	Yelow-billed Duck	NT	LC	High
Legend: EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable				

According to the list of protected species under Schedule 6, if any individuals of these species are to be disturbed, permits must be obtained from the Provincial Department (GDARD). A Terrestrial Biodiversity Impact Assessment with components of flora, fauna and avifauna was undertaken. The study identified the type, sensitivity and conservation status and/or implications thereof of the site-specific species and the potential impacts and mitigation associated with the proposed project (refer to **Section 8.3**), the identified species are discussed in Section below.

7.7.4.2 IDENTIFIED FAUNAL SPECIES WITHIN THE STUDY AREA

7.7.4.2.1 MAMMALS

The overall mammal richness of the study area was low, which is attributed to the increased anthropogenic impacts present near the mining areas. A total of four (4) mammal species were recorded, none of them being SCC (refer to **Table 31** and **Figure 61**).

Table 31: Mammal species observed within the study area (The Biodiversity Company, 2026)

Family	*Species*	Common Name	Threat Status (SANBI)
Leporidae	*Pronolagus randensis*	Jameson's Red Rockhare	LC
Leporidae	*Lepus spp.*	Hares and Jackrabbits	-
Bathyergidae	*Cryptomys pretoriae*	Highveld Mole-Rat	LC
Canidae	*Lupulella mesomelas*	Black Backed Jackal	LC

Figure 61: Photos illustrating mammal species recorded within the study area; *A) Lupulella mesomelas (Black Backed Jackal), B) Cryptomys pretoriae (Highveld Mole-Rat) and C) Lepus spp. and D) Pronolagus randensis (Jameson's Red Rockhare* (The Biodiversity Company, 2026)

7.7.4.2.2 HERPETOFAUNA

One (1) reptile species was observed during the field surveys. No Amphibian species were observed and furthermore no SCC were observed. **Table 32** summarizes the herpetofauna species identified in the study area, including their most recent conservation status.

Table 32: The herpetofauna Species of Conservation Concern (SCCs) identified within the study area (The Biodiversity Company, 2026)

Family Name	Scientific Name	Common Name	Conservation Status	
			SANBI	IUCN
Scincidae	*Trachylepis striata*	*African Striped Skink*	LC	LC

7.7.4.2.3 AVIFAUNA

In total, nineteen (19) avifauna species were observed within the study area. One (1) of them is an SCC (*Anas undulata*). Refer to **Table 33** for the list of avifauna species identified on site.

Table 33: The Avifauna species identified within the study area (The Biodiversity Company, 2026)

Family Name	Scientific Name	Common Name	Conservation Status	
			Regional	**Global**
Emberizidae	*Emberiza tahapisi*	Cinnamon-breasted Bunting	LC	LC
Anatidae	*Anas undulata*	Yellow-billed Duck	NT	LC
Charadriidae	*Vanellus senegallus*	African Wattled Lapwing	LC	LC
Cisticolidae	*Cisticola juncidis*	Zitting Cisticola	LC	LC
Columbidae	*Spilopelia senegalensis*	Laughing Dove	LC	LC
Corvidae	*Corvus albus*	Pied Crow	LC	LC
Laniidae	*Lanius collaris*	Southern Fiscal	LC	LC
Lybiidae	*Tricholaema leucomelas*	Acacia Pied Barbet	LC	LC
Motacillidae	*Macronyx capensis*	Cape Longclaw	LC	LC
Passeridae	*Passer melanurus*	Cape Sparrow	LC	LC
Ploceidae	*Plocepasser mahali*	White-browed Sparrow-weaver	LC	LC
Ploceidae	*Ploceus velatus*	Southern Masked Weaver	LC	LC
Ploceidae	*Ploceus velatus*	Southern Masked Weaver	LC	LC
Pycnonotidae	*Pycnonotus nigricans*	African Red-eyed Bulbul	LC	LC
Sturnidae	*Acridotheres tristis*	Common Myna	LC	LC
Sturnidae	*Lamprotornis nitens*	Cape Starling	LC	LC
Threskiornithidae	*Bostrychia hagedash*	Hadada Ibis	LC	LC
Turdidae	*Turdus smithi*	Karoo Thrush	LC	LC
Viduidae	*Vidua paradisaea*	Long-tailed Paradise Whydah	LC	LC

7.7.5 HABITAT CHARECTERISTICS

The following sections discuss the results from the field survey that was conducted for the proposed project, which was undertaken on the 3rd of July 2025 and the 20th of January 2026. Habitats observed are described in **Table 34** and shown in **Figure 62**.

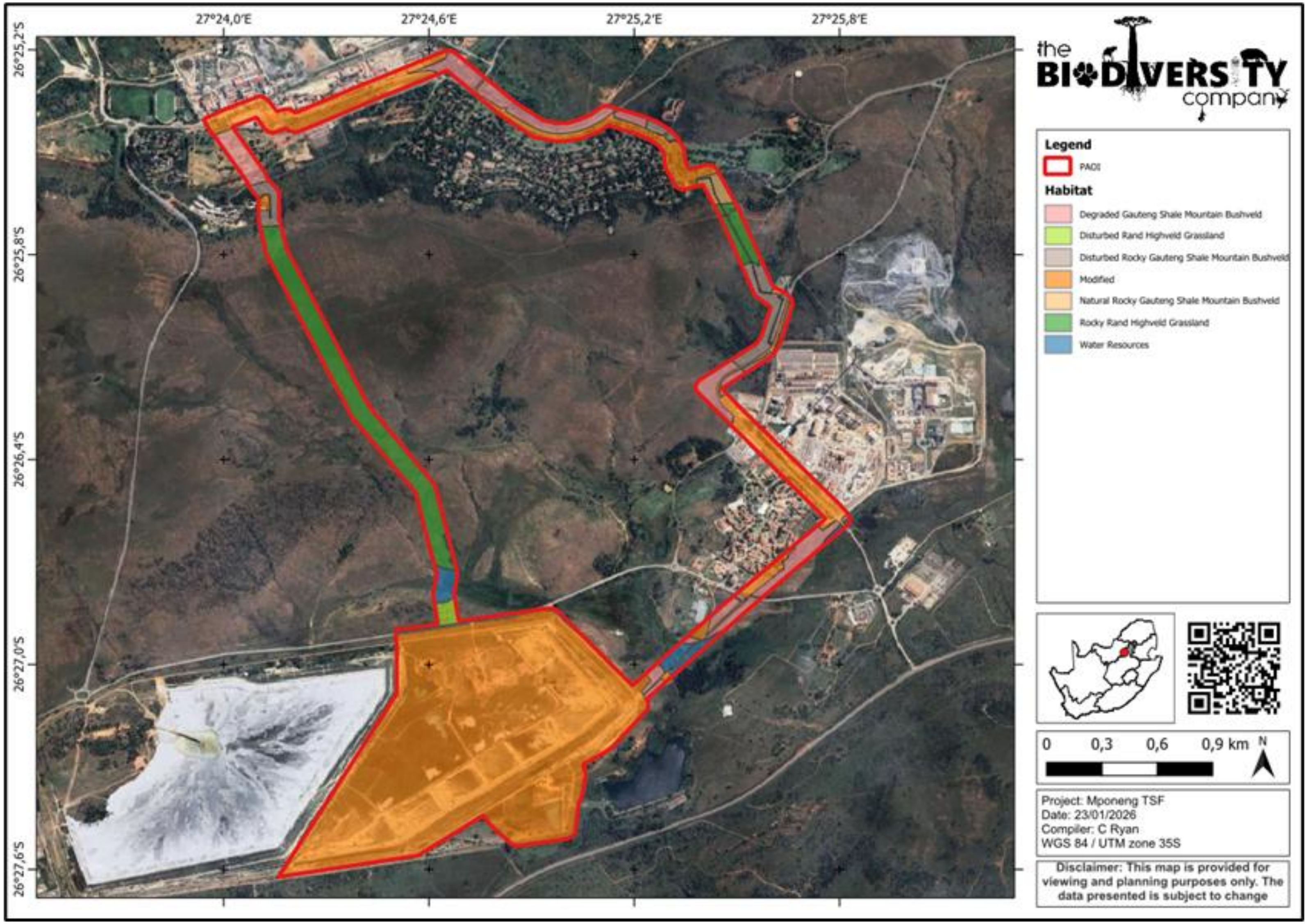


Figure 62: Habitats identified within the study area (The Biodiversity Company, 2026)

7.7.5.1 **SITE HABITATS**

Habitats observed are described in **Table 34** with reference images presented in Figure **63** to Figure **69.**

Table 34: Conditions and characteristics of habitats identified within the study area (The Biodiversity Company, 2026)

Habitat	Description and condition	Ecosystem Processes and Services
Rocky Rand Highveld Grassland	Even though the vegetation map has classed the whole study area as Gauteng Shale Mountain Bushveld, certain portions of the STUDY AREA were identified as Rand Highveld Grassland (VU) based on plant species characteristic of that vegetation type. This habitat is characterised by extensive rocky sloping plains with a high floral richness dominated by grass species such as *Themeda triandra, Heteropogon contortus* and *Elionurus muticus*. This habitat is a viable constituent of the VU Rand Highveld Grassland Vegetation Type. Dominant indigenous species characteristic of the vegetation type are present, including *Heteropogon contortus*, *Loudetia simplex*, *Eragrostis curvula*, *Senecio coronatus, Cheilanthes hirta* and *Searsia magalismontanum*. Fauna observed within this habitat include *Cryptomys pretoria* (Highveld Mole-Rat) and *Lupulella mesomelas (*Black Backed Jackal). Current impacts to this habitat type include grazing, roads, vehicle ingress and other existing linear infrastructure (powerlines and pipelines). The main determining factor between the Rocky Rand Highveld Grassland and the Disturbed Rand Highveld Grassland is the level of grazing pressure from cattle and edge effects from the neighbouring roads and Trailing's Facility. Three (3) plant SCC (*Khadia beswickii, Cleome conrathii* and *Adromischus umbraticola* subsp. *umbraticola)* were found within this habitat type and overlaps with CBA 2 and ESA 1. No mammal or herpetofauna SCC were observed within the study area, however, suitable habitat for SCC is present and it is expected that they can use the area as a movement corridor and for foraging. One avifaunal SCC was observed flying over this habitat type (*Anas undulata [Yellow-billed duck]).* Four (4) provincially protected species were identified within this habitat type (*Crinum graminicola, Haemanthus humilis, Aloe verecunda* and *Protea afra* subsp. *afra*).	This habitat supports primary production, soil stabilization, nutrient cycling, and water regulation, enhanced by its substantial vegetation cover. This habitat provides ecological functions by offering structurally diverse habitat and refugia for multiple faunal species, while supporting pollination and seed dispersal through its flowering forbs and shrubs. The mix of grasses and shrubs provides forage, and plant clumps offer shade and shelter, helping small mammals, reptiles, and ground-dwelling birds survive. The presence of SCC and protected plant species further underscores this habitat's importance in maintaining ecosystem functioning. It also facilitates the recruitment and dispersal of SCC into surrounding areas, supporting the persistence of these species and strengthening their population numbers.

<table>
<tr><td></td><td>There was an overall low AIP presence within this habitat type and only two (2) species were recorded (Tagetes minuta and Solanum sisymbriifolium).</td><td></td></tr>
<tr><td colspan="3">

Figure 63: Rocky Rand Highveld Grassland (The Biodiversity Company, 2026)</td></tr>
<tr><td>Disturbed Rand Highveld Grassland</td><td>This habitat is representative of Rand Highveld Grassland, but in a disturbed state. Overgrazing and mismanagement have led to the grass layer being reduced to short tufts with sparse vegetation in between. Seriphium vulgaris has invaded these areas due to overgrazing. This habitat is no longer a viable constituent of the VU Rand Highveld Grassland.

Indigenous species observed within this habitat include Indigofera oxytropis, Pogonarthria squarrosa and Entada elephantina.</td><td>The ecosystem functioning and services of this habitat has been hindered due to the anthropogenic disturbances. This disturbed Rand Highveld Grassland habitat still however provides important ecosystem services, including soil stabilization through remaining grass and shrub cover, which helps reduce wind and water erosion. The habitat offers movement corridors for a variety of fauna such.</td></tr>
</table>

	The floral species richness within this habitat type is diminished due to anthropogenic influences. Current impacts include overgrazing, vehicle ingress and edge effects from neighbouring modified areas (Roads and Tailings Storage Facility). No floral SCC were observed within this habitat type, and none are expected. Overlaps with ESA 1. One (1) provincially protected species was observed within this habitat type (*Protea afra* subsp. *afra*).	

Figure 64: Disturbed Rand Highveld Grassland (The Biodiversity Company, 2026)

Natural Rocky Gauteng Shale Mountain Bushveld	This habitat is characterized by a high proportion of exposed surface rock and supports a semi-open thicket, dominated by a variety of woody species including *Senegalia afra, Searsia magalismontanum*, *Protea afra afra, Vachellia karoo* and *Vangueria infausta*. Other indigenous species observed within this habitat include *Asparagus* sp., *Diospyros lycioides* and *Kalanchoe paniculata*. One flora SCC was found within this habitat (*Adromischus umbraticola* subsp. *umbraticola*). This habitat is representative of the Gauteng Shale Mountain Bushveld. Current impacts include edge effects from existing infrastructure (roads, pipeline, fencing and neighbouring houses). Disturbance to fauna include collisions with fences. Even though an existing pipeline is passing through this habitat, the bushveld surrounding it is natural with minimal current impacts. Few AIP species were present within this habitat type (*Opuntia ficus-indica, Lantana camara* and *Solanum mauritianum).*	This habitat provides ecological functions by offering structurally diverse habitat and refugia for multiple faunal species, while supporting pollination and seed dispersal through its flowering forbs and shrubs. The extensive rock cover allows for a suitable microclimate to be present for the survival of *A. umbraticola* subsp. *umbraticola,* providing neighboring ridge habitat with plant recruitment. This habitat provides erosion control and nutrient cycling. Carbon sequestration and nectar resources for pollinators is also provided.

Figure 65: Natural Rocky Gauteng Shale Mountain Bushveld (The Biodiversity Company, 2026)

Disturbed Rocky Gauteng Shale Mountain Bushveld	This habitat is representative of the Gauteng Shale Mountain Bushveld albeit in a disturbed manner. This habitat differs from the Natural Rocky Gauteng Shale Mountain Bushveld in that there are an increased AIP invasion and other disturbances (edge effects from neighbouring roads and other infrastructure). No floral SCC were observed, however, suitable habitat is present. No fauna SCC were observed; however, it is expected that faunal SCC might use this habitat as a movement corridor.	Even though this habitat is disturbed, it provides key ecosystem services, microclimate regulation, and nutrient cycling through its unique combination of rock cover and indigenous vegetation.

Figure 66: Disturbed Rocky Gauteng Shale Mountain Bushveld (The Biodiversity Company, 2026)

Degraded Gauteng Shale Mountain Bushveld	This habitat is comprised of areas that have undergone constant degradation, in some cases land clearance. The plant species abundance and structure has changed as a result of this degradation, leaving some areas with an increase grass and decrease in tree cover in comparison to the natural bushveld areas. Indigenous species observed within this habitat include *Vachellia karoo, Hyparrhenia hirta, Ehretia rigida* and *Senegalia afra.* The floral species richness within this habitat type is diminished due to anthropogenic influences. Current impacts include AIP invasion, vehicle ingress, edge effects from neighbouring modified areas, and vegetation clearing. AIP species observed within this habitat include *Campuloclinium macrocephalum, Erigeron bonariensis, Tagetes minuta, Opuntia ficus-indica, Acacia decurrens, Verbena bonariensis, Acacia melanoxylon, Lantana camara* and *Solanum mauritianum.* No floral SCC were observed within this habitat and none are expected. Overlaps with ESA 1. One (1) provincially protected species was observed within this habitat type (*Protea afra* subsp. *afra*).	The ecosystem functioning and services provided by this habitat has been severely diminished due to anthropogenic influences. This habitat still however provides areas for faunal species to forage and still acts as a movement corridor for various faunal species.

Figure 67: Degraded Gauteng Shale Mountain Bushveld (The Biodiversity Company, 2026)

Water Resources	This habitat type consists of wet portions of land as delineated by the aquatic specialists. Additional information regarding this habitat unit may be found in the accompanying Aquatics Report (TBC, 2026). Please note that the delineations of this habitat were provided by the Aquatic Specialist. All inferences made about the Water Resources should be made with the accompanying Aquatic Report. Indigenous species observed within this habitat include *Crassula dependens, Eragrostis gummiflua* and Cyperaceae species. No floral SCC were observed, however the habitat is suitable.	This habitat provides water to faunal species and aids in water purification, flood regulation, groundwater recharge, and erosion control.
	 Figure 68: Water Resources Habitat (The Biodiversity Company, 2026)	
Modified	Modified habitats, in this instance, include, roads, houses, lawns and infrastructure associated with the mining operations (TSF and processing plants). They are largely ecologically dysfunctional and have plant species that are characteristic of disturbance. Images of the habitat are presented below.	The ecosystem functions and services of this habitat have been severely compromised due to modification. However, it still offers some benefits, particularly by supporting the dispersal of wind-borne indigenous plant seeds, which aids in plant recruitment in surrounding areas.

Figure 69: Modified Habitat (The Biodiversity Company, 2026)

7.7.5.2 SITE ECOLOGICAL IMPORTANCE

The different habitat types within the study area were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCCs and their ecosystem processes. As per the terms of reference for the project, GIS sensitivity maps are required in order to identify sensitive features in terms of the relevant specialist discipline/s within the study area. Based on the criteria provided in Appendix B of this report, all habitats within the study area were assigned a sensitivity category, i.e., a SEI category. (**Table 35**). The SEI of the study area is illustrated in **Figure 70**.

Table 35: Summary of habitat types delineated within field assessment area (The Biodiversity Company, 2026)

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance[1]	Receptor Resilience	Site Ecological Importance[2]
Degraded Gauteng Shale Mountain Bushveld	Low	Low	Low	Medium	Low
	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC	Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.		Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality,	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Disturbed Rand Highveld Grassland	Low	Low	Low	Medium	Low
	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.		Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Disturbed Rocky Gauteng Shale Mountain Bushveld	Medium	Low	Low	Low	Medium
	> 50% of receptor contains natural habitat with potential to support SCC.	Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a		Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.

[1] Considered as the 'sensitivity'
[2] Considered as the sensitivity in relation to the project component.

		very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.			
Natural Rocky Gauteng Shale Mountain Bushveld	Medium Confirmed or highly likely occurrence of populations of Near Threatened (NT) species > 50% of receptor contains natural habitat with potential to support SCC.	Medium Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore	High Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Rocky Rand Highveld Grassland	High Confirmed or highly likely occurrence of VU species that has a global EOO of > 10 km^2	Medium > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	Medium	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore	High Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Water Resources	Medium	Medium	Medium	Low	High

	> 50% of receptor contains natural habitat with potential to support SCC.	Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.		Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Modified	Low	Very Low	Very Low	High	Very Low
	< 50% of receptor contains natural habitat with limited potential to support SCC.	Several major current negative ecological impacts.		Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

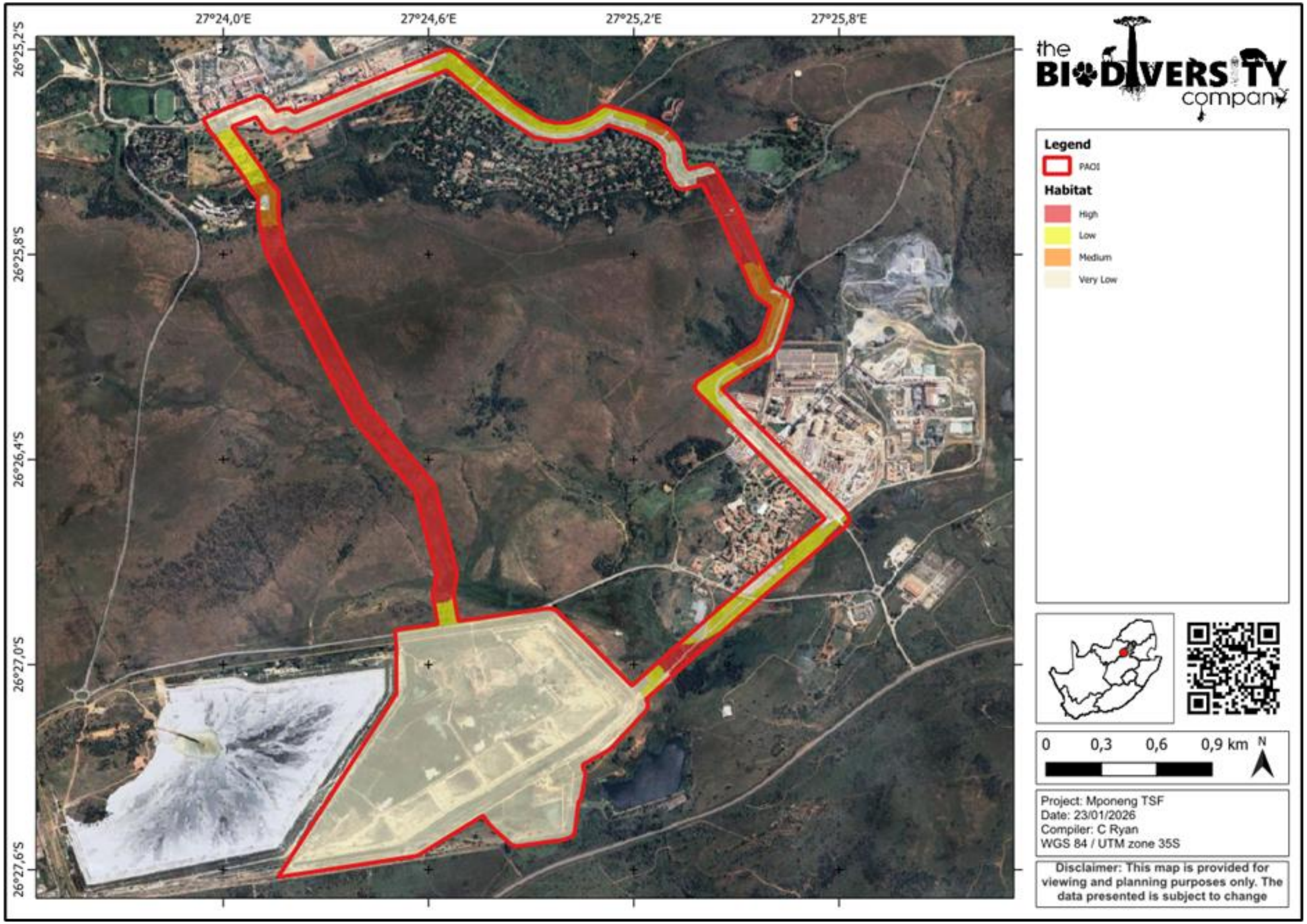


Figure 70: Map illustrating Site Ecological Importance of the habitat types within the study area (The Biodiversity Company, 2026)

7.8 SURFACE WATER AND WETLANDS

7.8.1 HYDROLOGY

South Africa is divided into nineteen (19) Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level is achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the CMS which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources.

According to Hydrologic Consulting (2025), the Mponeng Lower Compartment TSF is the site is located within the Highveld Ecoregion, within the Vaal-Orange WMA. The Vaal-Orange Water Management Area (WMA) is South Africa's largest and most economically significant WMA, formed by the merger of the Vaal and Orange River systems. It covers parts of six provinces and crosses international borders, impacting Botswana, Lesotho, Namibia, Zimbabwe, Mozambique, and Eswatini. Managed by the Vaal-Orange Catchment Management Agency (VOCMA), this area is vital for the nation's economy, serving major industrial, mining, and agricultural sectors, as well as urban and rural communities. The study area is located within the Upper Vaal-Orange WMA. The Upper Vaal-Orange WMA is the combined management area for the Upper Vaal WMA and the Upper and Lower Orange WMAs, now managed collectively as the Vaal-Orange WMA (WMA 4). It is a critical and central region in South Africa, encompassing the headwaters of the Vaal River and supporting the economic heartland of the country's urban, industrial, and mining sectors. This combined area is vital for national GDP, receives water from the Lesotho Highlands Water Project, and faces significant water resource challenges due to heavy development.

The study area is positioned within quaternary catchment C23J with the proposed pipelines extending to quaternary catchment C23E (see **Figure 72**). Quaternary catchment C23J is part of the Vaal River system, specifically within the Upper Vaal WMA, which is characterized by intensive industrial, mining, and urban water use, impacting its water resources and contributing significantly to South Africa's GDP. This catchment is a smaller hydrological unit that falls under the jurisdiction of the VOCMA, which is responsible for managing the water resources within the Vaal-Orange WMA. The nearest River to the study area is the Elandsfonteinspruit River to the south-east of the site, however, this river is only labelled in the 1:500,000 river dataset for South Africa. The NGI’s 1:50,000 topographical map data illustrates numerous nonperennial river systems to the north and south, both of which converge to the southeast of the site. The northern system feeds the Elandsfonteinspruit, enabling perennial flows (per the NGI’s classification).

The northern and southern system are associated with a vlei to the east and dams both north and south to the site. There are upstream furrows directing runoff from part of the greater Mponeng Operation (south of the Old North Complex TSF) and along the Mponeng TSF trenches draining to the non-perennial rivers to the west. The southern system is characterised by two larger dams, one of which is listed as the proposed return water dam for the Mponeng TSF.

7.8.2 TOPOGRAPHICAL RIVER LINES AND INLAND WATER AREAS

The topographical inland and river line data for the “2627” dataset indicated several inland water areas, which were classified as numerous dams, one marsh vlei and three large reservoirs (**Figure 73**). Furthermore, several topographic non-perennial drainage features were identified within the study area, along with one perennial river, the Elandsfonteinspruit.

7.8.3 NATIONAL FRESHWATER PRIORITY AREA

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al., 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel et al., 2011).

Within the study area, several NFEPA features are evident (**Figure 74**). Notably, a channelled valley-bottom wetland, present in the southern portion of the study area. This wetland is associated with a network of non-perennial drainage lines and is situated adjacent to the main infrastructure footprint. In addition, several seep wetlands are distributed along the periphery of the study area, particularly to the north and east and, several wetland flats were identified within the study area. Furthermore, a NFEPA river (Elandsfonteinspruit), traverses the southeastern boundary of the study area, providing important ecological connectivity. According to the dataset, all identified wetlands have been classified as artificial and to have a "Z3 - Heavily to Critically Modified" condition and are classified as "non-priority" systems.

7.8.4 NATIONAL PROTECTED AREAS EXPANSION STRATEGY

The National Protected Area Expansion Strategy 2018 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2018). The study area overlaps with portions of NPAES areas (**Figure 75**).

7.8.5 SOUTH AFRICAN INVENTORY OF INLAND AQUATIC ECOSYSTEMS

Several wetland types are present, including channelled valley-bottom wetlands, unchannelled valley-bottom wetlands, and seep wetlands (**Figure 76**). The channelled valley-bottom wetlands are primarily concentrated along the eastern and southern boundaries of the study area, closely associated with the Elandsfonteinspruit river, which flows through the southeastern section of the study area. Unchannelled valley-bottom wetlands are scattered throughout the mid-western and northern portions of the study area, often following natural drainage lines. Seep wetlands are more isolated, occurring in smaller patches along the periphery of the site. The wetlands have been classified according to the dataset to either have a "A/B – Natural/Largely Natural", "C – Moderately Modified" or a "D/E/F – Largely/Seriously/Critically Modified" condition. Furthermore, all wetlands are considered to be "Critically Endangered" and "Not Protected" with regard to Ecosystem Threat and Protection Status, respectively. According to the dataset, the Elandsfonteinspruit River is classified as a "Critically Endangered" ecosystem and is considered to be "Poorly Protected".

7.8.6 WETLANDS SURVEY

Three (3) Hydrogeomorphic (HGM) units were identified within the encompassing 500m Mponeng Lower Compartment TSF study area. These were classified as; one (1) channelled valley-bottom, one (1) unchannelled valley-bottom and one (1) Hillslope Seep (**Figure 77**). Several dams were identified within the study area, most of which were in-stream features with only one off-channel feature. In addition, several non-perennial drainage features were identified, none of which have any connectivity to a river. A summary of the wetland features is provided in **Table 36** below and a represented in **Figure 71**.

Table 36: Wetland classification as per SANBI guideline (The Biodiversity Company, 2026)

Wetland Unit	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland	Highveld	Central Bushveld Group 1	Valley floor	Channelled valley-bottom	N/A	N/A
HGM 2	Inland	Highveld	Central Bushveld Group 1	Valley floor	Unchannelled valley-bottom	N/A	N/A
HGM 3	Inland	Highveld	Central Bushveld Group 1	Slope	Seep	Without channelled outflow	N/A

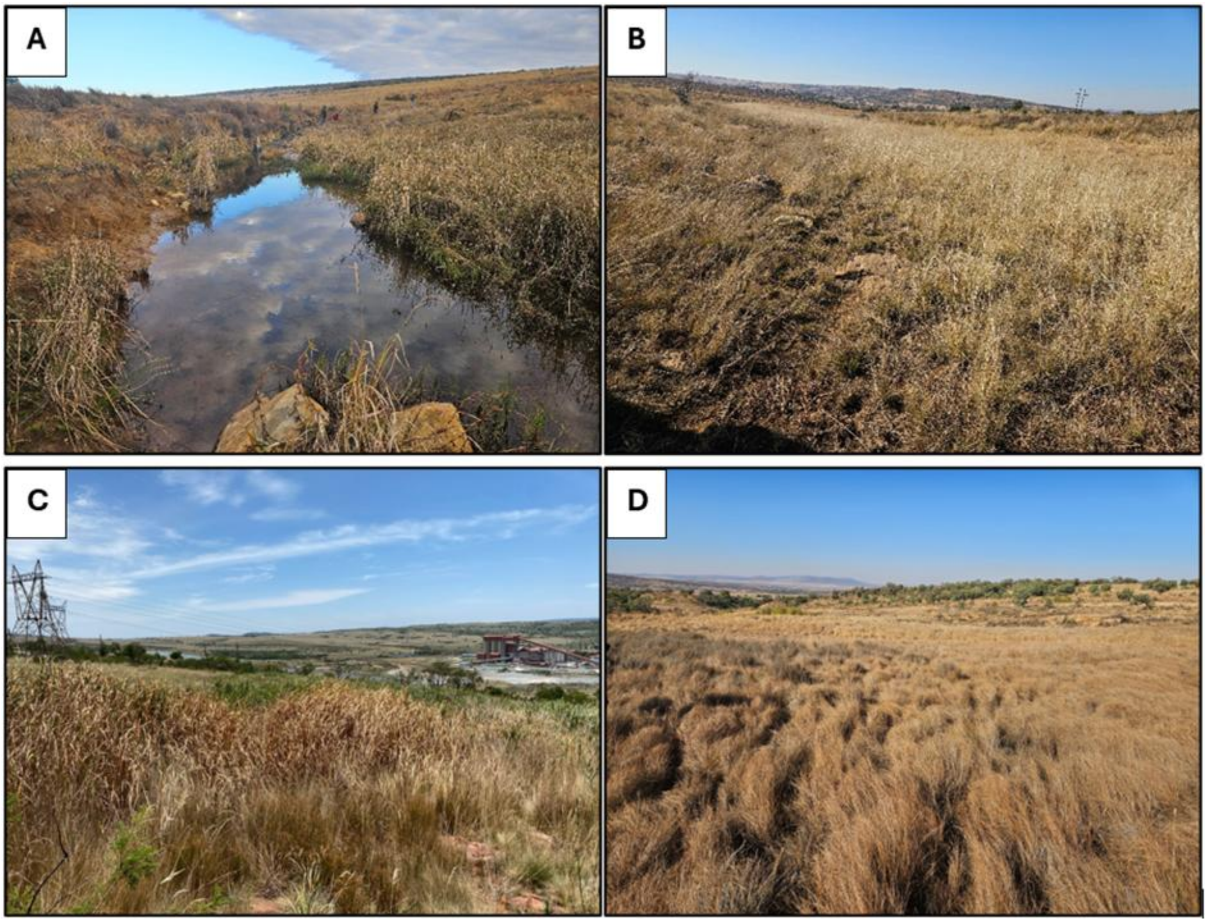


Figure 71: Examples of the wetlands delineated within the project area. A) HGM 1 – Channelled valley-bottom, B) HGM 2 - Unchannelled valley-bottom, C) Hillslope seep and D) Seep (The Biodiversity Company, 2026)

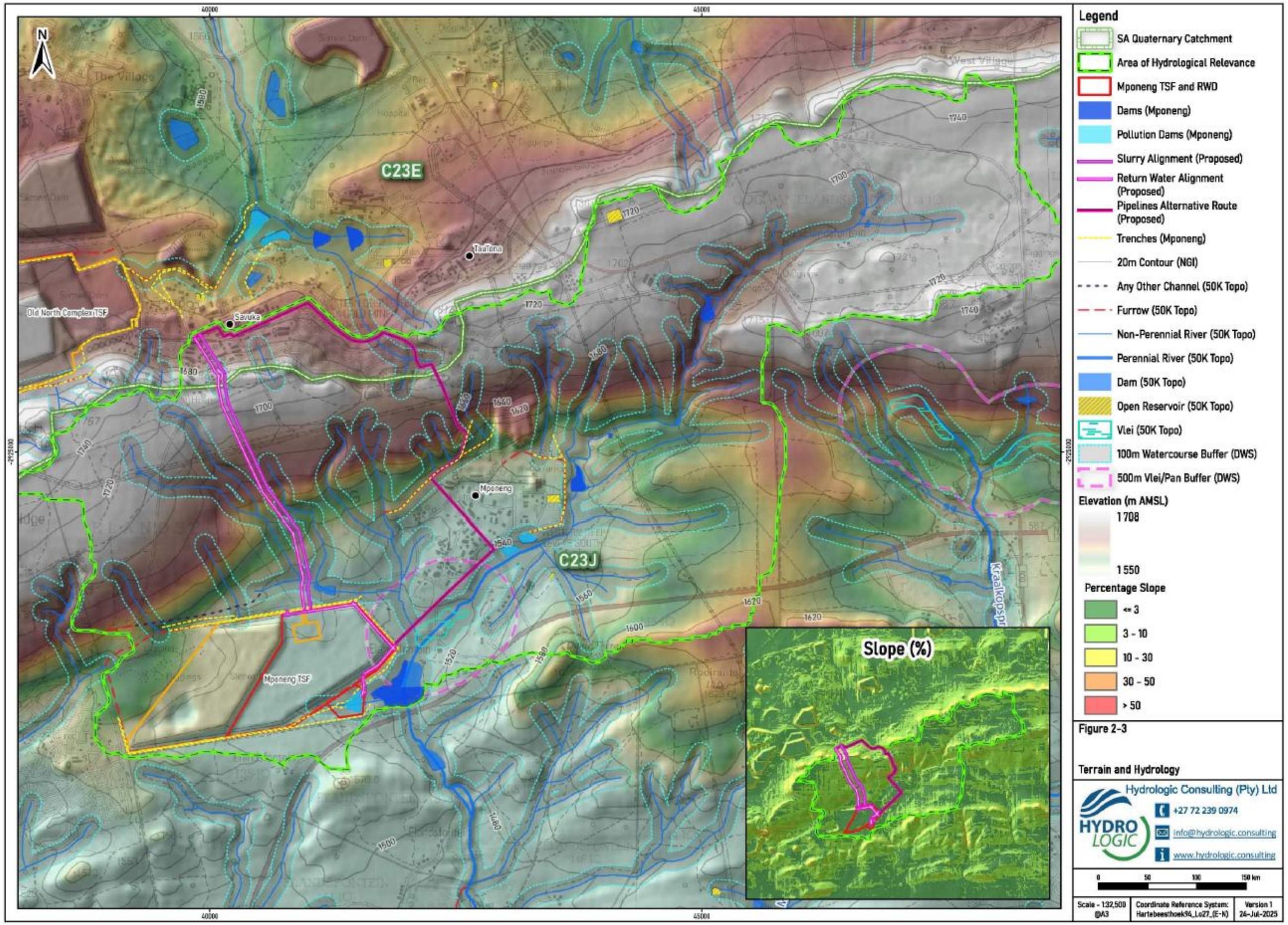


Figure 72: Hydrological setting of the site (Hydrologic Consulting, 2025)

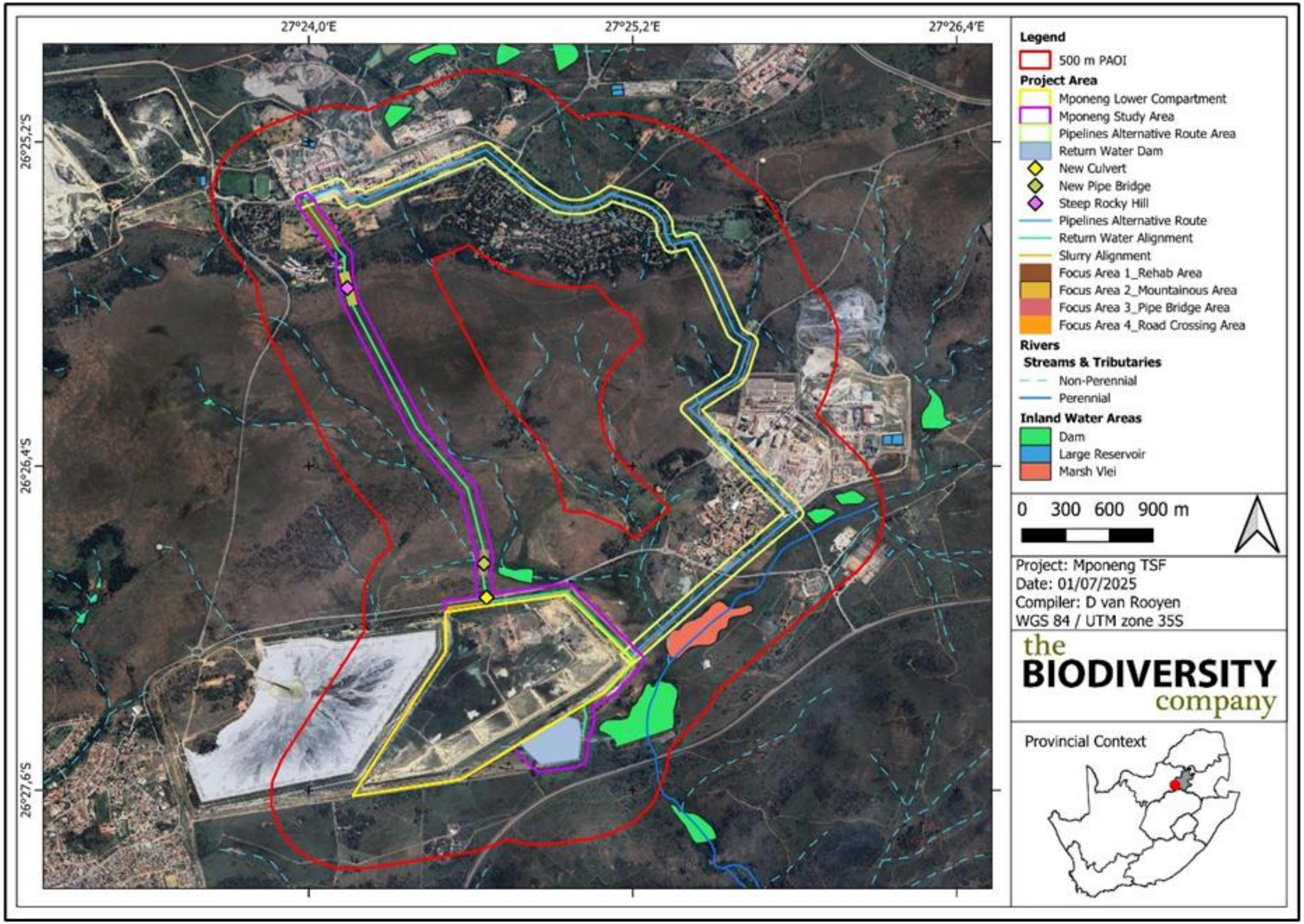


Figure 73: Topographical inland water areas and river lines that intersect the Project Area of Influence (The Biodiversity Company, 2026)

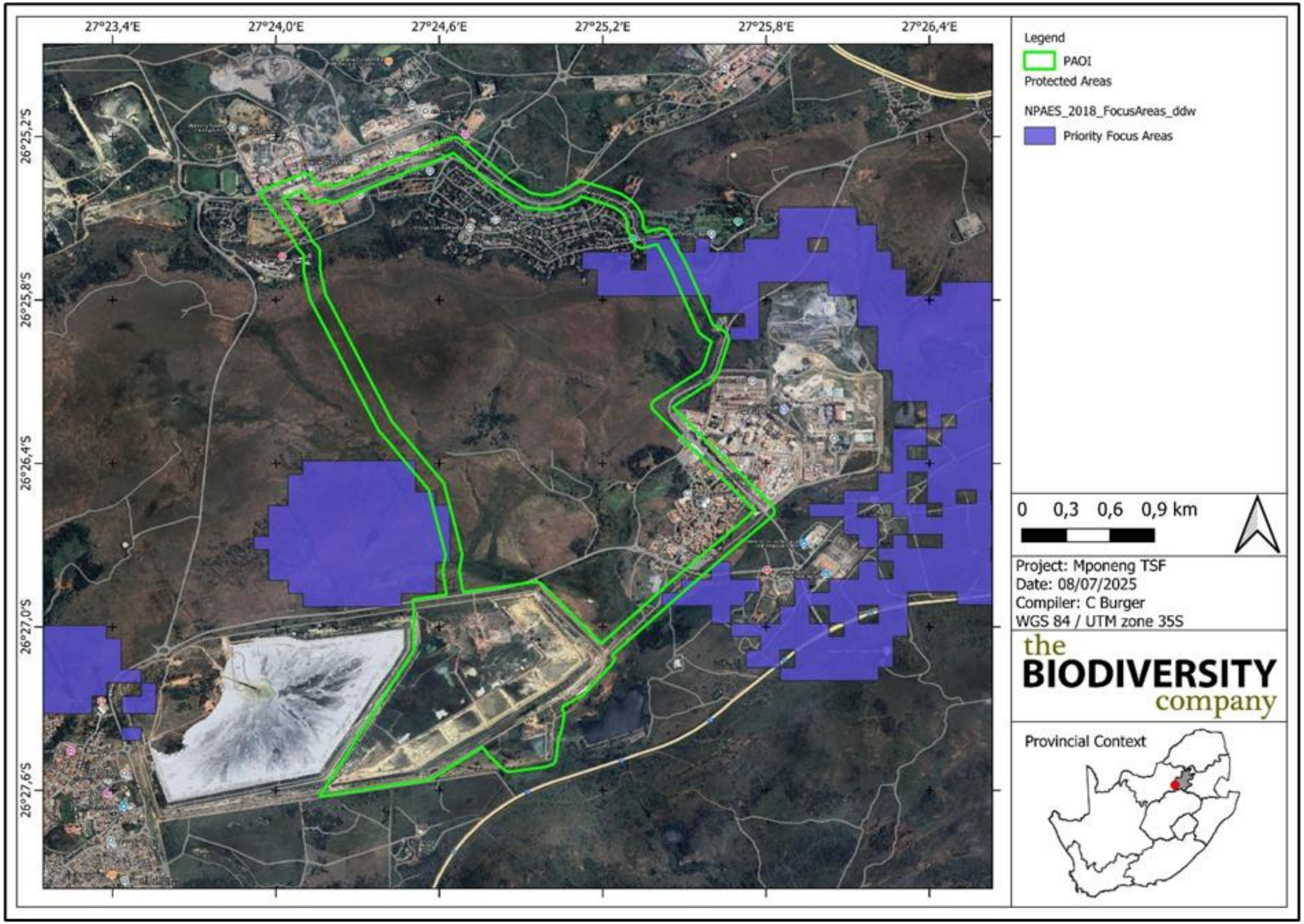


Figure 74: The study area in relation to the National Protected Area Expansion Strategy (The Biodiversity Company, 2026)

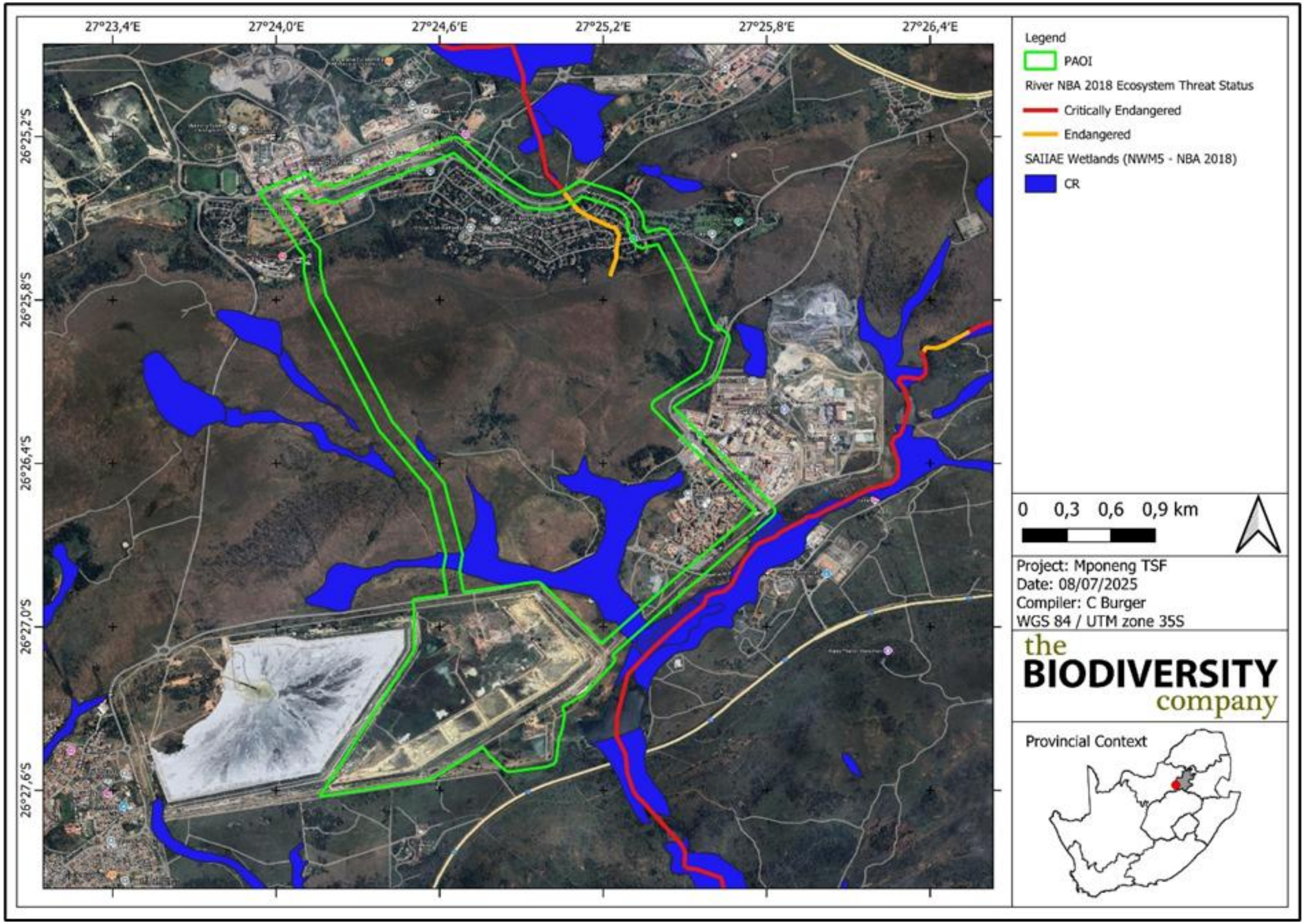


Figure 75: Map illustrating the SAIIAE threat status of rivers and wetland systems within the study area (The Biodiversity Company, 2026)

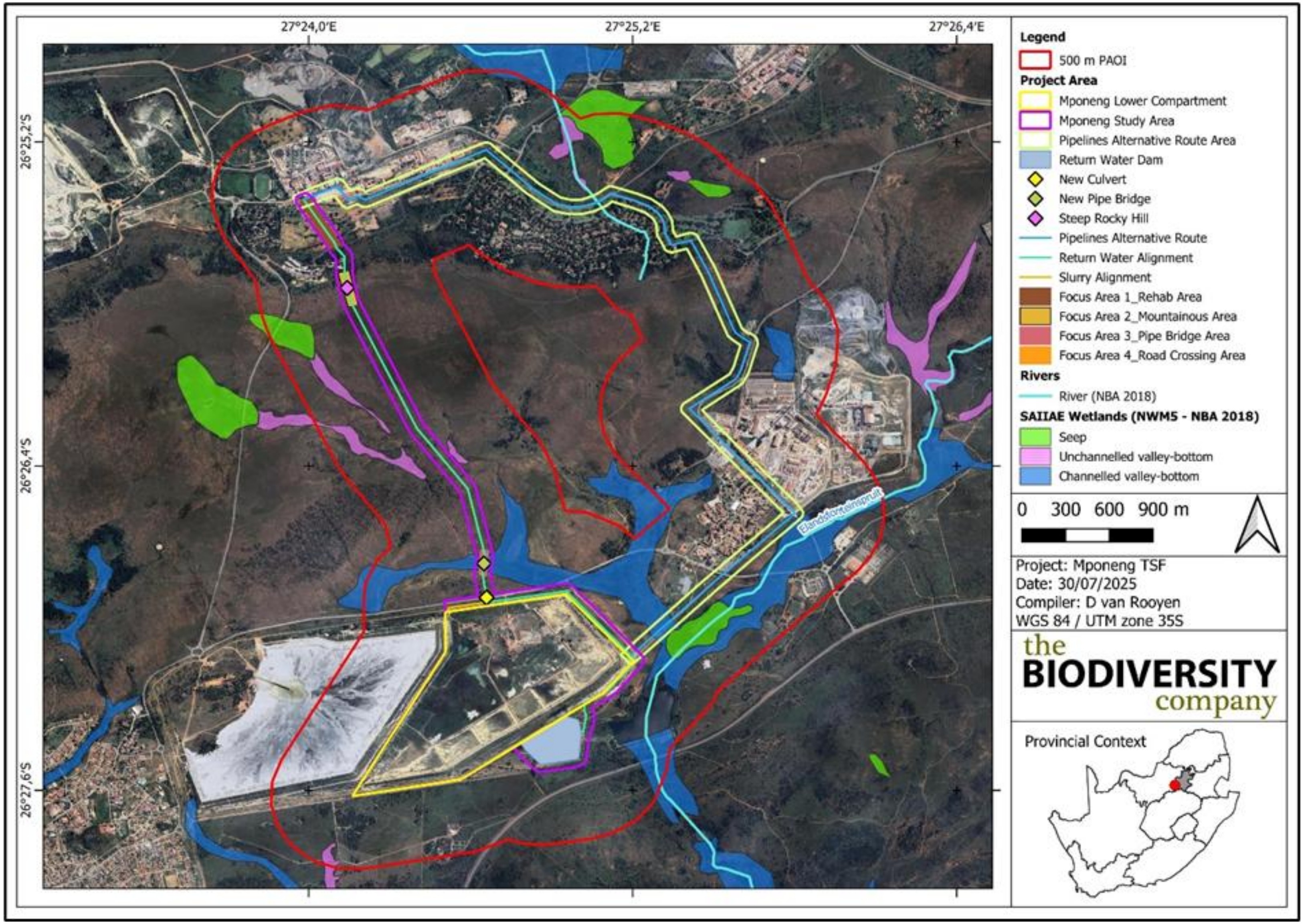


Figure 76: Wetland features identified within the study area (The Biodiversity Company, 2026)

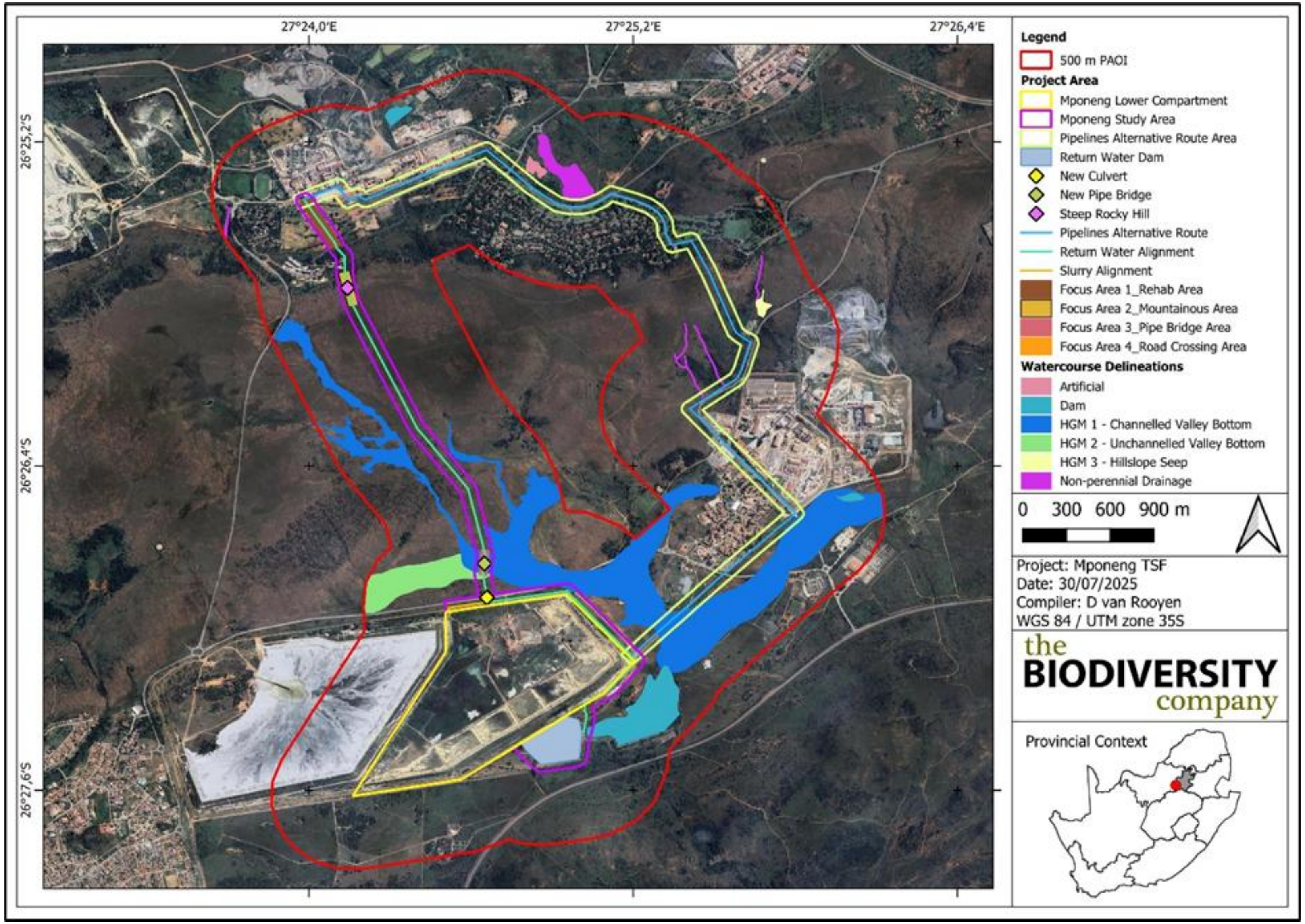


Figure 77: Delineation of watercourses within the study area (The Biodiversity Company, 2026)

7.8.7 FUNCTIONAL AND ECOLOGICAL CONDITIONS

Only wetlands at an appreciable level of risk in relation to the proposed project and related activities were considered for the Functional and Ecological Assessments. Instream dams were assessed as part of the HGM unit they occur within. Artificial features may provide ecosystem services however, they do not represent natural ecological settings and do not have reference states for ecosystem health assessments. HGM 4 and the spring wetland were excluded from the functionality assessment due to the spring not being a true wetland, and the destruction of HGM 4, which occurs within a TSF. The sections below provide details on the functional and ecological conditions of the watercourses on site.

7.8.7.1 **ECOSYSTEM SERVICES**

The ecosystem services provided by the relevant wetland units on site were assessed and rated using the WET-EcoServices method (Kotze *et al.,* 2009). The results of the assessment are discussed below. Ecosystem services contributing to these scores include flood attenuation, stream flow regulation, nutrient and toxicant assimilation and the maintenance of biodiversity. Ecosystem services contributing to scores determined for the valley bottom wetlands (HGM 1 and HGM 2), include Education and research, flood attenuation, stream flow regulation, nutrient and toxicant assimilation and the maintenance of biodiversity. Charismatic faunal and avifaunal species were observed at the permanently inundated areas such as the headwater outlets and springs of HGM 1. Vegetation robustness and density may have contributed to stream flow regulation, slowing down flow, which in turn aids in nutrient and toxicant assimilation. HGM 2 was observed to have a gentler slope and dense graminoid vegetation. This may contribute to flood attenuation more than HGM 1 which presented steep banks and exposed bedrock in certain parts of the system

7.8.7.2 **PRESENT ECOLOGICAL STATE**

Four modules, namely hydrology, geomorphology, water quality and vegetation, were assessed as a single unit for the HGM Units and subsequently an area weighted score was obtained for the HGM Units. The potential impacts of activities such as agriculture, drought, prospecting, mining, altered hydrological functions and clearing of natural vegetation within the greater catchment were taken into consideration during the assessment.

HGM 1 and HGM 2 have been subject to heavy disturbances in the lower reaches as a result of mining activities. The wetlands contain geomorphic structural changes from impoundments such as dams, TSFs and roads. Greater impacts were observed at HGM 1 due to its location relative to mining and associated activities. HGM 2 was observed to be indirectly impacted by the mining activity but more so by the TSF and road locates south of the system. The impoundments and road crossing points at HGM 1 have resulted in changes to the hydrology of the system by limiting natural flows and creating concentrated flows during wet seasons. The wetlands (HGM 1 and HGM 2) catchment is dominated by mining and urban build-up, which play a role in changing the flow and sediment dynamics of the systems. Since disturbance has occurred within the wetlands, in the catchment and on the periphery of the wetlands, the removal of natural vegetation has created opportunity for the proliferation of alien vegetation such as *Bidens Pilosa*, *Cirsium vulgare* and *Verbena bonariensis*. Furthermore, changes to the hydrology of the HGM 1 has resulted in favourable conditions for reeds and reed grasses as opposed to sedges, rushes and grasses which are usually prevalent in channelled valley bottom wetlands.

HGM 1 has been subjected to the most disturbances compared to HGM 2. The wetland contains geomorphic structural changes from mining activities and access roads through the wetland, which justifies the PES score of E – Seriously modified. HGM 2 presented a PES score of D – Largely Modified and has exhibited some change to its natural hydrology due to alterations of the surrounding landscape which is considered to be the wetlands catchment. Changes to the hydrological patterns of the wetland is assumed to have resulted in the vegetation composition of the wetland being limited to fewer sedge and more graminoid species. The geomorphic structure of the wetland is not perceived to have been altered significantly as no physical earth-moving changes within the wetland were evident except for road construction.

7.8.7.3 ECOLOGICAL IMPORTANCE AND SENSITIVITY

The Ecological Importance and Sensitivity (EIS) assessment was applied to the HGM units in conjunction with the ecosystem service scores in the preceding sections, to assess the levels of sensitivity and ecological importance of the wetland. Various components are considered for the EIS, including the overlap with Strategic Water Source Areas (SWSAs), the NFEPA and NBA 2018 wetland type threat and the protection status and, the wetlands condition as displayed in **Table 37**. It should be noted that the delineated wetlands were not identified by the NBA 2018 dataset, hence the protection and threat status of the nearest wetlands of the same type within the catchment were used as a baseline for the assessment. The average EIS ratings were calculated to be “High” for HGM 1 and HGM 2 (**Table 37**).

Table 37: Aspects considered in the Ecological Importance and Sensitivity assessment (The Biodiversity Company, 2026)

HGM Type	NFEPA Wet Type			NBA Wetlands			SWSA (Y/N)	CBA/ESA (Y/N)	EIS Rating
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Condition	Ecosystem Threat Status 2018	Ecosystem Protection Level			
Channelled Valley-Bottom (HGM 1)	Central Bushveld Group 1	VU	Poorly Protected	E Seriously Modified	CR	Not Protected	N	Y	B - High
Unchannelled Valley-Bottom (HGM 2)		LT	Poorly Protected	D Largely Modified	CR	Not Protected	N	Y	B - High

Legend: CBA = Critical Biodiversity Area; CR = Critically Endangered; ESA = Ecological Support Area; EIS = Ecological Importance and Sensitivity; HGM = Hydrogeomorphic; LT = Least Threatened; SWS = Strategic Water Source Area; and VU = Vulnerable

7.8.7.4 RECOMMENDED ECOLOGICAL CATEGORY AND RECOMMENDED MANAGEMENT OBJECTIVE

The Recommended Ecological Category (REC) and Recommended Management Objective (RMO) for the wetland areas was determined from the results of the PES and EIS assessments. These assessments indicated that the wetland feature within the site, had underwent transformation as a result of historical and current impacts. Nevertheless, despite the altered ecological integrity of the systems, they are considered to provide ecological services. The results of the assessment are E/F – Improve and C/D – Improve for both HGM 1 and HGM 2 respectively.

7.9 GEOHYDROLOGY - GROUNDWATER

A final geohydrological specialist was conducted as part of the EIA and included in this EIA Report in **Appendix G.** A description of the conceptual hydrogeological model is important to provide an understanding of the regional geology (refer to **Section 7.4.2**), which is the governing factor in both the aquifer formation and the movement of groundwater, as well as the hydrogeological setting and groundwater occurrence in the mining area. The hydrogeological setting and conceptual model of the study area is described according to the following criteria:

- Borehole information.
- Aquifer type.
- Groundwater use.
- Aquifer parameters.
- Aquifer recharge.
- Groundwater gradients and flow.

- Groundwater quality.
- Aquifer classification.

7.9.1 BOREHOLE INFORMATION

There are several groundwater monitoring boreholes in the vicinity of the Mponeng Lower Compartment TSF. No private boreholes could be located within a 2km radius of the TSF as there no major groundwater users in the area. The localities of the available boreholes are shown on **Figure 78** and summarised in **Table 38**.

7.9.2 AQUIFER TYPE

Groundwater occurrences in the study area are predominantly restricted to the following types of terrains.

- Weathered and fractured rock aquifer in the Transvaal Formations.
- Dolomitic and Karst Aquifers.

Although the dolomite aquifer is the most prominent aquifer in the region, it does not play any role in the activities at the Mponeng Lower Compartment TSF. The Mponeng Lower Compartment TSF is predominantly located on the shale of the Timeball Hill formation. The dolomite is ±400m below surface at the Mponeng TSF site. Evidence has shown that there is no connectivity between the weathered / fractured aquifer and the underlying dolomite aquifer. Even in compartments where the dolomite aquifer is dewatered the groundwater levels in the weathered / fractured aquifer remains unaffected.

7.9.2.1 WEATHERED AND FRACTURED AQUIFER

Groundwater occurs in the near-surface geology in the weathered and fractured sedimentary deposits (quartzite and shale) of the Transvaal strata. The lava of the Hekpoort Formation has similar weathering characteristics to that of the shale and is therefore deemed as the same aquifer. These formations are not considered to contain economic and sustainable aquifers, but localised high yielding boreholes may, however, exist where significant fractures are intersected. Groundwater occurrences are mainly restricted to the weathered formations, although fracturing in the underlying "fresh" bedrock may also contain water. Experience has shown that these open fractures seldom occur deeper than 60m. The base of the aquifer is the impermeable quartzite, shale and lava formations, whereas the top of the aquifer would be the surface topography. The groundwater table is affected by seasonal and atmospheric variations and generally mimics the topography. These aquifers are classified as semi-confined. The two aquifers (weathered and fractured) are mostly hydraulically connected, but confining layers such as clay and shale often separate the two. In the latter instance the fractured aquifer is classified as confined. The aquifer parameters, which includes transmissivity and storativity is generally low and groundwater movement through this aquifer is therefore also slow.

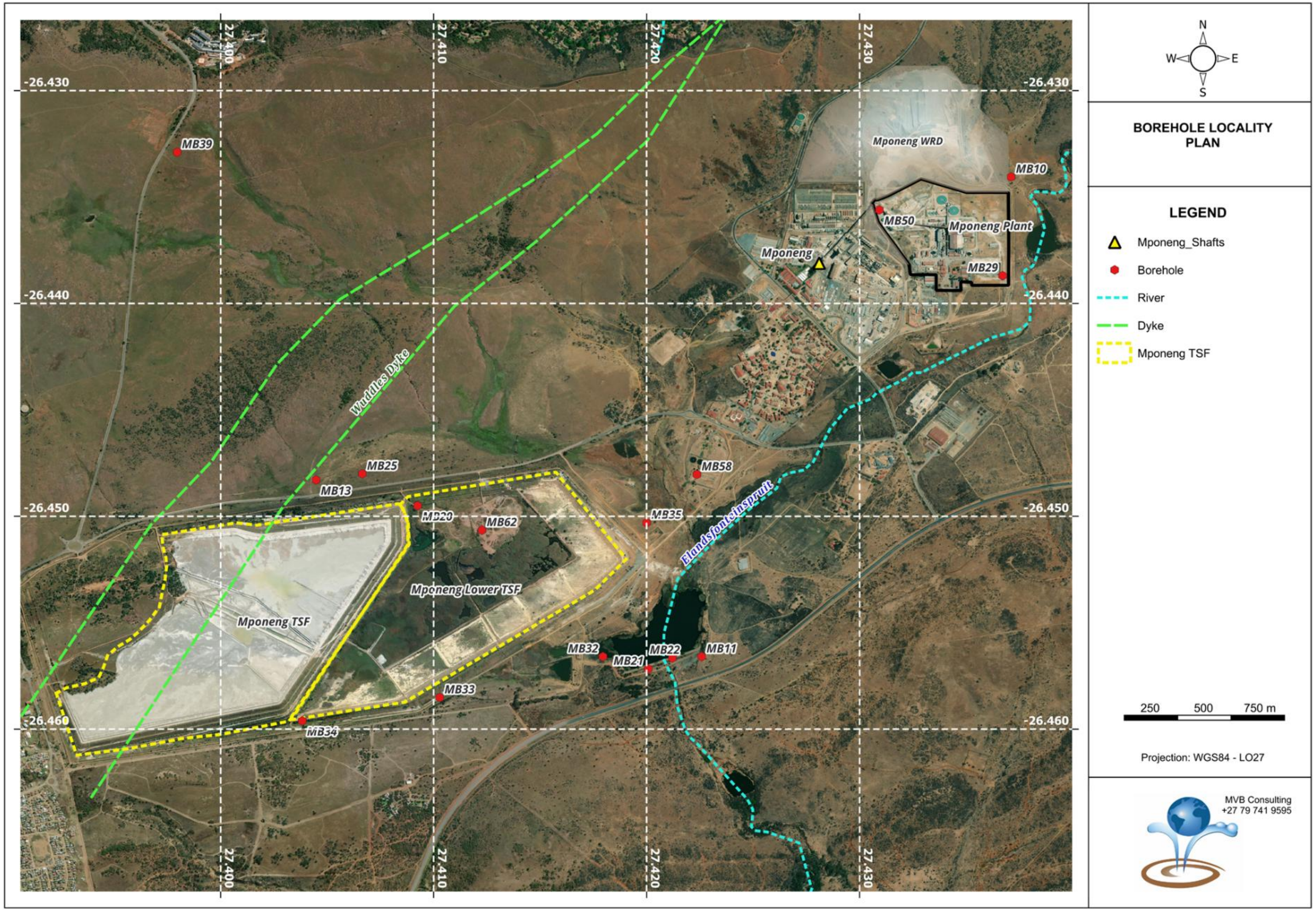


Figure 78: Monitoring boreholes in the vicinity of the Mponeng TSF (MvB Consulting, 2025)

Table 38: Mine monitoring boreholes (GCS, 2023)

BH ID	Longitude	Latitude	Z	Description	Borehole Depth (m)	Geology
MB10	27.43712	-26.43405	1569.26	SE of Mponeng RD; N of Mponeng GP	29.66	Timeball Hill Shale and Quartzite
MB11	27.42259	-26.45659	1499.16	SE of Mponeng TSF and Below aquatic Dam	30.00	Shales
MB13	27.40448	-26.44829	1560.05	N of Mponeng TSF, N road,	33.50	Timeball Hill Shale and Quartzite
MB20	27.40925	-26.44950	1541.87	Next to the eye (fountain),	30.00	Shales (weathered / fractured)
MB21	27.42008	-26.45717	1498.45	SE of Mponeng TSF, SE Mponeng RWD	30.00	Shales
MB22	27.42121	-26.45666	1497.81	SE of Mponeng TSF, SE Mponeng RWD	30.00	Shales and andesite lava
MB25	27.40665	-26.44800	1556.15	N of Mponeng TSF	100.00	Timeball Hill Shale and Quartzite
MB29	27.43672	-26.43869	1555.53	South of anti pollution dams at Mponeng Plant		-
MB32	27.41795	-26.45659	1507.50	S of S Mponeng RWD		-
MB33	27.41029	-26.45851	1524.70	South of South TSF below van Eeden dam		Borehole dry / blocked
MB34	27.40383	-26.45961	1535.43	South of South TSF below partition of 2 dams		Borehole dry / blocked
MB35	27.42000	-26.45030	1512.43	E of S s/dam next to soccer field	30.00	Timeball Hill Shale and Hekpoort Andesite
MB39	27.39796	-26.43289	1705.33	On Gatsrand up from Wadela circle to Savuka	114.00	Timeball Hill Shale
MB50	27.43093	-26.43560	1563.83	South-west (down gradient) of Mponeng waste dump	35.00	Timeball Hill Shale and Quartzite
MB58	27.42236	-26.44803	1516.85	Downstream of Mponeng (south) sewage works		Borehole locked
MB62	27.41227	-26.45065	1534.33	Downstream Mponeng Solid Waste Site at TSF Compartment		-

7.9.2.2 **DOLOMITE AQUIFER**

Dolomite aquifers in the region are known to contain large quantities of groundwater and are commonly associated with sustainable groundwater abstraction. The water that plaques the underground mining is primarily derived from the dolomite aquifer overlying the workings. The depth to groundwater in the region ranges from 4m to 41m below surface in the non-dewatered groundwater compartments (Zuurbekom and Boskop/Turffontein). This is in contrast to the groundwater levels in excess of 200 m in the dewatered compartments (Gemsbokfontein West, Venterspost, Bank and Oberholzer). The unsaturated zone in the dolomite aquifer ranges from weathered wad material and Karoo sediments within deep solution cavities or grykes (deeply weathered paleo-valley within the dolomite) to relatively fresh fractured dolomite between major solution cavities and at depth.

The shallow weathered dolomite aquifer has been formed because of the karstification which has taken place prior to the deposition of the Karoo sediments on top of the dolomites. There is general agreement that this aquifer is the significant source of water within the dolomite. The base of the weathered dolomite (aquifer) is irregular in nature and there are zones of deep weathering (grykes). The maximum depth to the base of this aquifer is in the order of 200m below surface. The non-weathered dolomite approximates a traditional fractured rock aquifer at depth where dissolution has been less pronounced. It is extremely unlikely that any significant groundwater flow occurs below these depths except along intersecting structural conduits to the underlying mine workings

7.9.2.3 **RELATIONSHIP BETWEEN THE WEATHERED / FRACTURED AQUIFER AND THE DOLOMITE AQUIFER**

Evidence has shown that there is no connectivity between the weathered / fractured aquifer and the underlying dolomite aquifer. Even in compartments where the dolomite aquifer is dewatered the groundwater levels in the weathered / fractured aquifer remains unaffected. **Figure 79** illustrates the relationship between the fractured and dolomite aquifers and also shows that the degree of karstification. Based on the exploration borehole information, it appears that the dolomite that that is covered by Transvaal strata is less karstified and the dolomite aquifer is therefore not as well developed. The mines situated south of the “Gatsrant” are generally dry mines with limited groundwater inflow, whereas the mines north of the “Gatsrant” is plagued by high groundwater inflow volumes. This is, in part, attributed to the well-defined karstification in the northern dolomites.

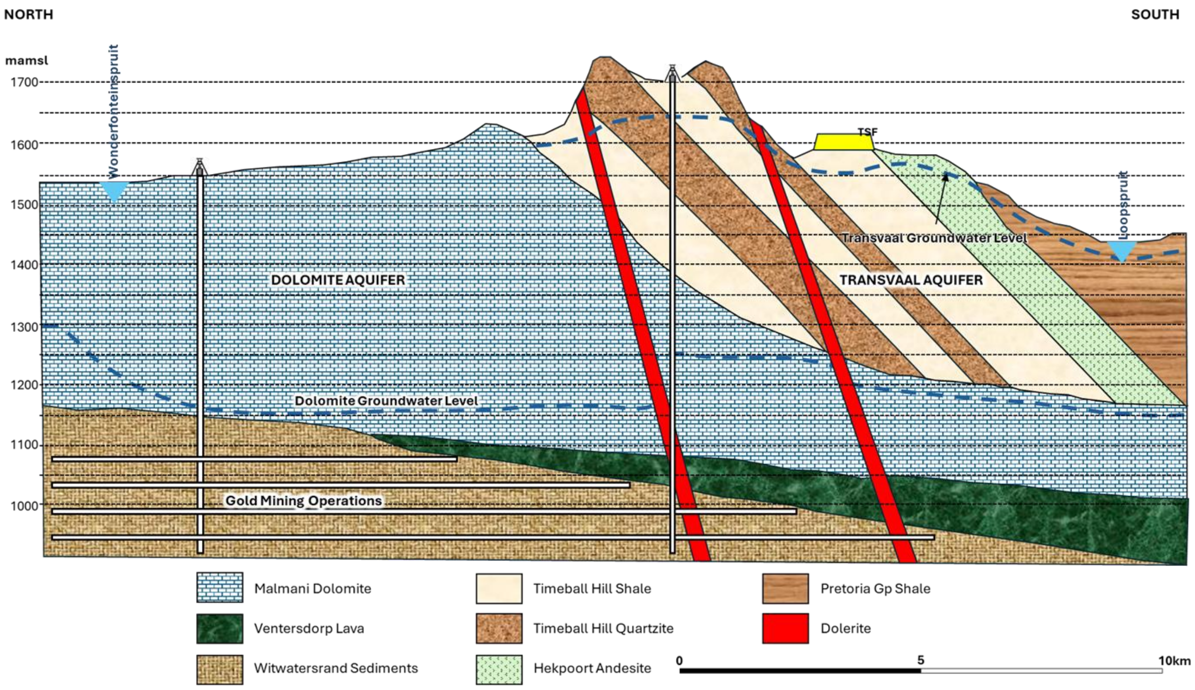


Figure 79: Graphical illustration of the aquifers in the study area (Van Biljon, 2018)

7.9.3 AQUIFER PARAMETERS

The newly drilled boreholes were pump tested. Important parameters that can be obtained from borehole or test pumping include Hydraulic Conductivity (K), Transmissivity (T) and Storativity (S). These parameters are defined as follows (Krusemann and De Ridder, 1991):

- Hydraulic Conductivity: This is the volume of water that will move through a porous medium in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow. It is normally expressed in metres per day (m/day).
- Transmissivity: This is the rate of flow under a unit hydraulic gradient through a cross-section of unit width over the full, saturated thickness of the aquifer. Transmissivity is the product of the average hydraulic conductivity and the saturated thickness of the aquifer. Transmissivity is expressed in metres squared per day (m2/day).
- Storativity: The storativity of a saturated confined aquifer is the volume of water released from storage per unit surface area of the aquifer per unit decline in the component of hydraulic head normal to that surface. Storativity is a dimensionless quantity.

Pump testing that was undertaken by GCS (2019) estimated the aquifer parameters in the weathered and fractured aquifer to be as follows (**Table 39**).

Table 39: Transmissivity and hydraulic conductivity values in the weathered and fractured aquifers (GCS, 2019)

ID	Blow Yield (litre/hour)	Transmissivity (m^2/day)	Hydraulic conductivity (m/day)		Aquifer
			Constant Discharge Test	Recovery Test	
MB10	23 000	-	12.9	6.08	Timeball Hill Shale and Quartzite
MB11	150	0.07	-	-	Shale
MB12	400	0.01	0.052	0.0303	Shale
MB13	1 190	0.7	0.1194	0.0363	Timeball Hill Shale and Quartzite
MB19	100	-	-	-	Shale
MB20	100 000	337	11.6	14.38	Shale (weathered / fractured)
MB21	1 600	2	-	-	Shale
MB22	3 600	13	0.5573	0.4645	Shale and andesitic lava
MB35	-	-	0.47	1.86	Timeball Hill Shale and Hekpoort Andesite
MB39	-	-	0.04	-	Timeball Hill Shale
MB50	Seepage	-	-	-	Timeball Hill Shale and Quartzite
MB51	Seepage	-	-	-	Timeball Hill Shale and Quartzite
MB58	3 000	-	-	-	Timeball Hill Shale and Quartzite

7.9.4 AQUIFER RECHARGE

Recharge is defined as the process by which water is added from outside to the zone of saturation of an aquifer, either directly into a formation, or indirectly by way of another formation. According to the Groundwater Assessment Phase II (GRAII) the recharge is approximately 4% of mean annual precipitation. Groundwater recharge (*R*) for the area is also calculated using the chloride method (Bredenkamp *et al.*, 1995) and is expressed as a percentage of the Mean Annual Precipitation (MAP). The method is based on the following equation:

$$R = \frac{Chloride\ concentration\ in\ rainfall}{Chloride\ concentration\ in\ ground\ water} x\ 100$$

According to Vegter (1995) the recharge in the fractured aquifer is 31 mm / annum with water occurring in the shallow weathered zone and water bearing fractures only. This is equal to approximately 4% of mean annual precipitation. The average rainfall in the area is approximately 646 mm / annum. The average chloride in rainfall for areas inland is approximately 1.0 mg/L and the harmonic mean of the chloride concentration values in groundwater samples obtained from the mining area is 25.88 mg/

$$R = \frac{1}{25.88} x\ 100 = 3.9\%$$

This value corresponds with Vegter's value.

7.9.5 GROUNDWATER GRADIENTS AND FLOW

The first important aspect when evaluating the hydrogeological regime and groundwater flow mechanisms is the groundwater gradients. Groundwater gradients, taking into consideration fluid pressure, are used to determine the hydraulic head which is the driving force behind groundwater flow. The flow governs the migration of contaminants and a detailed assessment of the flow was required to determine subsurface flow directions from the TSF or any other potential contaminant source.

In most geological terrains, the groundwater mimics the topography and to test if this is the case within the study area the available groundwater levels were plotted against the topography (represented by the borehole collar elevations). Based on the assessment, a very good correlation (99%) between the topography and the groundwater level was identified, which suggests that groundwater flow will follow the topographical gradient. **Figure 80** depicts the groundwater level elevations, which as expected, mimics the surface contours. Groundwater flow is perpendicular to the groundwater contours and flows predominantly towards the south-west.

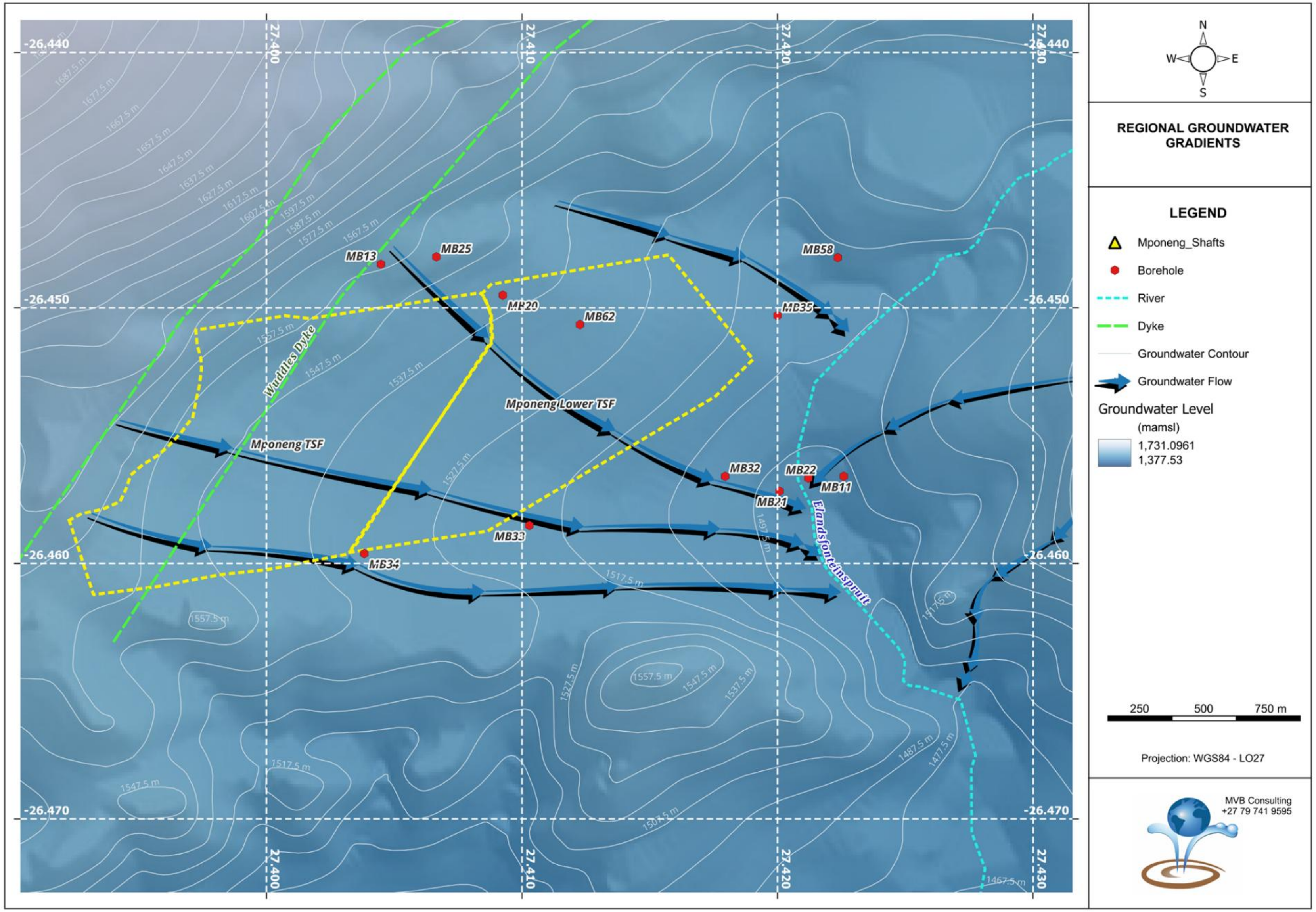


Figure 80: Regional groundwater gradient and borehole locations in relation to the TSF site (MvB Consulting, 2025)

7.9.6 GROUNDWATER QUALITY

The mine routinely monitors the groundwater quality in the vicinity of the Mponeng Lower Compartment TSF. This data was made available and is used to assess the current impacts from the TSF.

Since there are no groundwater users within a 1km radius from the Mponeng Lower Compartment TSF, the groundwater chemistry is compared to the South African Water Quality Guidelines (second edition) Volume 5: Agricultural Use: Livestock Watering (Department of Water Affairs and Forestry, 1996), as well as the SANS 241 (2015). The SANS 241 Drinking Water Specification is the definitive reference on acceptable limits for drinking water quality parameters in South Africa and provides guideline levels for a range of water quality characteristics. The SANS 241 (2015) Drinking-Water Specification effectively summarises the suitability of water for drinking water purposes for lifetime consumption.

The guideline for livestock watering represents the target water quality specified in the guidelines. The target water quality guidelines were obtained from the Department of Water Affairs and Forestry, 1996. South African Water Quality Guidelines (second edition). Volume 5: Agricultural Use: Livestock Watering. According to the guidelines (DWAF, 1996), the following constituents are of concern for livestock watering. The chemistry of the groundwater is presented in **Table 40**. Where either of the guidelines are exceeded, the values are highlighted in baby pink. With reference to **Table 40** the following is observed:

- Monitoring boreholes MB29 and MB50 in the plant area show an impact. This is, however, not applicable to the current investigation.
- Monitoring boreholes MB32 and MB35 show an impact from the up-gradient Mponeng TSF. This is in line with the expected groundwater flow paths.
- The groundwater flow is towards the Return Water Dams (RWD), but borehole BH35 shows that the impacted water passes underneath the RWD. The impact is therefore expected to flow into the Aquatic Dam, or it will form part of the baseflow of the Elandsfonteinspruit. The relatively good water quality in the Aquatic Dam suggests that the impacted groundwater forms part of the baseflow of the stream.

The distribution of the sulphate (SO_4) concentrations provides an aerial view of the impact areas, which is as expected along the eastern and south-eastern boundary of the TSF (**Figure 81**).

Table 40: Groundwater chemistry (MvB Consulting, 2025)

Analysis in mg/L (unless specified otherwise)	SANS 241	DWAF	MB39	MB10	MB29	MB32	MB50	MB11	MB13	MB62	MB20	MB21	MB22	MB25	MB35
Electrical Conductivity (mS/m)	170	-	2.4	4	219	313	228	118	2.2	7.7	1.5	109	98.5	2.1	435
Hardness Total			7	10	391	837	500	466	7	18	7	399	363	9.5	1434
pH	<5 - >9.7	-	6.5	6.6	5.7	6.6	5.7	7.7	6.3	6.8	6	7.2	6.9	5.8	4.8
Suspended Solids at 105°C	-	-	26	<25	94	<25	257	236	<25	408	358	260	220	1455	59
Total Dissolved Solids at 180°C	1 200	1 000	<100	<100	1 476	2 176	1 499	814	<100	<100	<100	760	682	165	2 971
Alkalinity Total	-	-	<30	<30	<30	57	<30	232	<30	<30	<30	190	156	<30	<30
Ammonia	1.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Calcium	-	1 000	<2.0	2.4	99	201	118	96	<2.0	2.6	<2.0	92	78	2.1	409
Chloride	300	1 500	<5	5	366	571	402	187	<5	12	<5	206	191	<5	814
Fluoride	1.5	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium	-	500	<2.0	<2.0	35	80	50	54	<2.0	2.7	<2.0	41	41	<2.0	99.6
Nitrate & Nitrite	11	100	0.8	1.6	11	7.6	54	1.7	1.1	1.7	<0.5	1.2	<0.5	0.9	<0.5
Orthophosphate	-	-	<0.05	<0.05	<0.05	0.1	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sodium	200	2 000	2.1	3.9	267	351	250	34	2.1	6.8	<2.0	37	32	2.2	396
Sulphate	500	1 000	<5.0	<5.0	468	775	334	94	<5.0	<5.0	<5.0	41	33	<5.0	1 261
Zinc	5	0.02	<0.10	<0.10	0.12	<0.10	0.19	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	1.1
Aluminium	0.3	5	<0.03	<0.03	0.04	<0.03	0.03	<0.03	<0.03	0.07	<0.03	<0.03	<0.03	<0.03	<0.03
Boron	2.4	5	<0.02	<0.02	0.08	0.05	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cadmium	0.003	0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper	2	0.5	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Cyanide Dissolved - CFA	0.2	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cyanide WAD - CFA	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron	2	10	0.05	<0.03	<0.03	0.03	<0.03	0.04	<0.03	0.09	3.5	0.7	4.5	<0.03	4.8
Lead	0.01	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	0.4	10	<0.03	<0.03	1	0.22	0.2	0.23	0.18	0.04	0.26	1.6	2.4	0.091	4.2
Nickel	0.07	1	<0.03	<0.03	0.07	0.05	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	0.14
Uranium	0.03	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

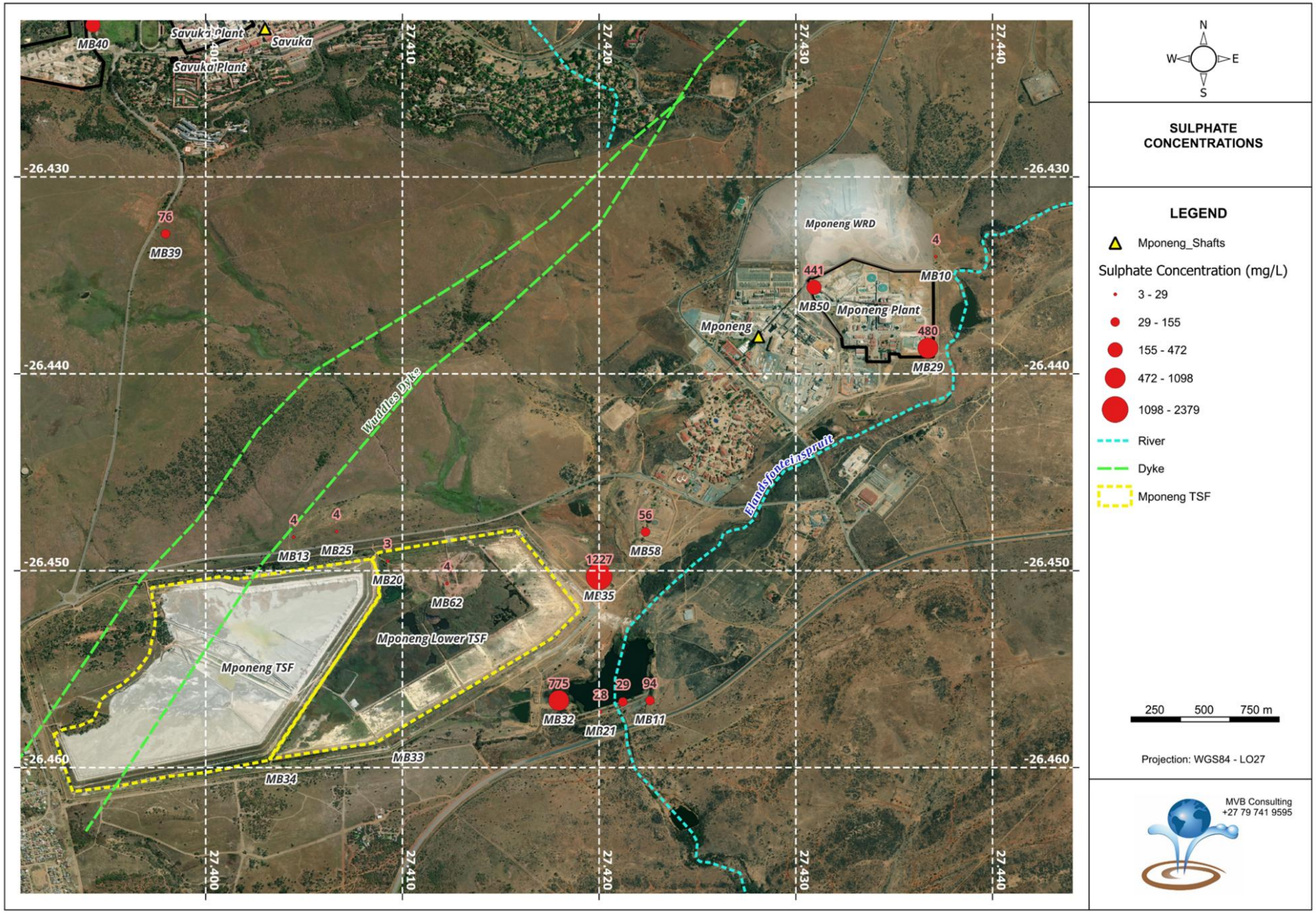


Figure 81: Sulphate concentration distribution in the groundwater monitoring boreholes (MvB Consulting, 2025)

7.9.7 AQUIFER CLASSIFICATION

An aquifer classification system provides a framework and objective basis for identifying and setting appropriate levels of groundwater resource protection. This would facilitate the adoption of a policy of differentiated groundwater protection.

The aquifer classification system used to classify the aquifers is the proposed National Aquifer Classification System of Parsons (1995). This system has a certain amount of flexibility and can be linked to second classifications such as a vulnerability or usage classification. Parsons suggests that aquifer classification forms a very useful planning tool that can be used to guide the management of groundwater issues. He also suggests that some level of flexibility should be incorporated when using such a classification system.

The South African Aquifer System Management Classification is presented by five major classes:

- Sole Source Aquifer System;
- Major Aquifer System;
- Minor Aquifer System;
- Non-Aquifer System; and
- Special Aquifer System.

The following definitions apply to the aquifer classification system:

- Sole source aquifer system: "An aquifer that is used to supply 50 % or more of domestic water for a given area, and for which there are no reasonable alternative sources should the aquifer become depleted or impacted upon. Aquifer yields and natural water quality are immaterial".
- Major aquifer system: "Highly permeable formations, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good".
- Minor aquifer system: "These can be fractured or potentially fractured rocks that do not have a high primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although this aquifer seldom produces large quantities of water, they are both important for local supplies and in supplying base flow for rivers".
- Non-aquifer system: "These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks does occur, although imperceptible, and needs to be considered when assessing risk associated with persistent pollutants".
- Special aquifer system: "An aquifer designated as such by the Minister of Water Affairs, after due process".

After rating the aquifer system management and the aquifer vulnerability, the points are multiplied to obtain a Groundwater Quality Management (GQM) index. The aquifers in the study area are classified as follows:

Table 41: Aquifer Classification (MvB Consulting, 2025)

Description	Aquifer	Vulnerability	Rating	Protection
Weathered Aquifer	Minor (2)	1	2	Low
Fractured Aquifer	Minor (2)	1	2	Low

7.10 AIR QUALITY

The information presented in this Section was largely obtained from the Air Quality Baseline Report for the Redeposition on Mponeng Lower Compartment (Airshed Planning Professionals (Pty) Ltd, 2025). Tailings Storage

Facility Air quality sensitive receptors (AQSRs) refer to places where humans reside. Ambient air quality guidelines and standards, as discussed under **Section 4.1.12**, have been developed to protect human health. Ambient air quality, in contrast to occupation exposure, pertains to areas outside of an industrial site or boundary where the public has access to and according to the Air Quality Act, excludes air regulated by the Occupational Health and Safety Act (Act No 85 of 1993).

7.10.1 ATMOSPHERIC DISPERSION POTENTIAL

In the assessment of the possible impacts from air pollutants on the surrounding environment and human health, a good understanding of the regional climate and local air dispersion potential of a site is essential. Meteorological characteristics of a site govern the dispersion, transformation, and eventual removal of pollutants from the atmosphere (Pasquill and Smith, 1983; Godish, 1990). The extent to which pollution will accumulate or disperse in the atmosphere is dependent on the degree of thermal and mechanical turbulence within the earth's boundary layer. The wind direction and the variability in wind direction, determine the general path pollutants will follow, and the extent of crosswind spreading (Shaw and Munn, 1971). While there is an on-site meteorological station at Mponeng, no recent data was available. Use was therefore made of modelled Weather Research and Forecasting Model (WRF) meteorological data for an on-site location for the period 1 January 2022 to 31 December 2024. No data was provided on the current ambient PM_{10} and $PM_{2.5}$ concentrations. Dustfall measurements were available for January 2022 to July 2025.

Savuka and Mponeng current surface operations cover an area of 62 square kilometres (km²) and is located approximately 6 km south of Carletonville (**Figure 82**). Other neighbouring towns include Fochville and Potchefstroom, situated 12 km and 50 km respectively to the south and west of the Mponeng operations (see **Figure 82**). The land use in the area comprises primarily of mining and agriculture. The topography is characterised by undulating hills ranging from 1 500 to 1 700 metres above mean sea level (mamsl).

The wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds between 5 and 7 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The frequency with which calms occurred, i.e. periods during which the wind speed was below 1 m/s are also indicated. The period wind field and diurnal variability in the wind field are shown in **Figure 83**, while the seasonal variations are shown in **Figure 84**. The wind field is dominated by winds from the northerly sector. The strongest winds (>6 m/s) occurred mostly from the north-northeasterly sector. Calm conditions occurred 3.5% of the time, with the average wind speed over the period of 3.63 m/s. Both daytime and night-time show dominant northerly wind fields, with calm conditions 4.4% during the day, and 2.52% during the night. The dominant northerly winds prevail throughout the seasons, with an increase in wind speeds during the spring months

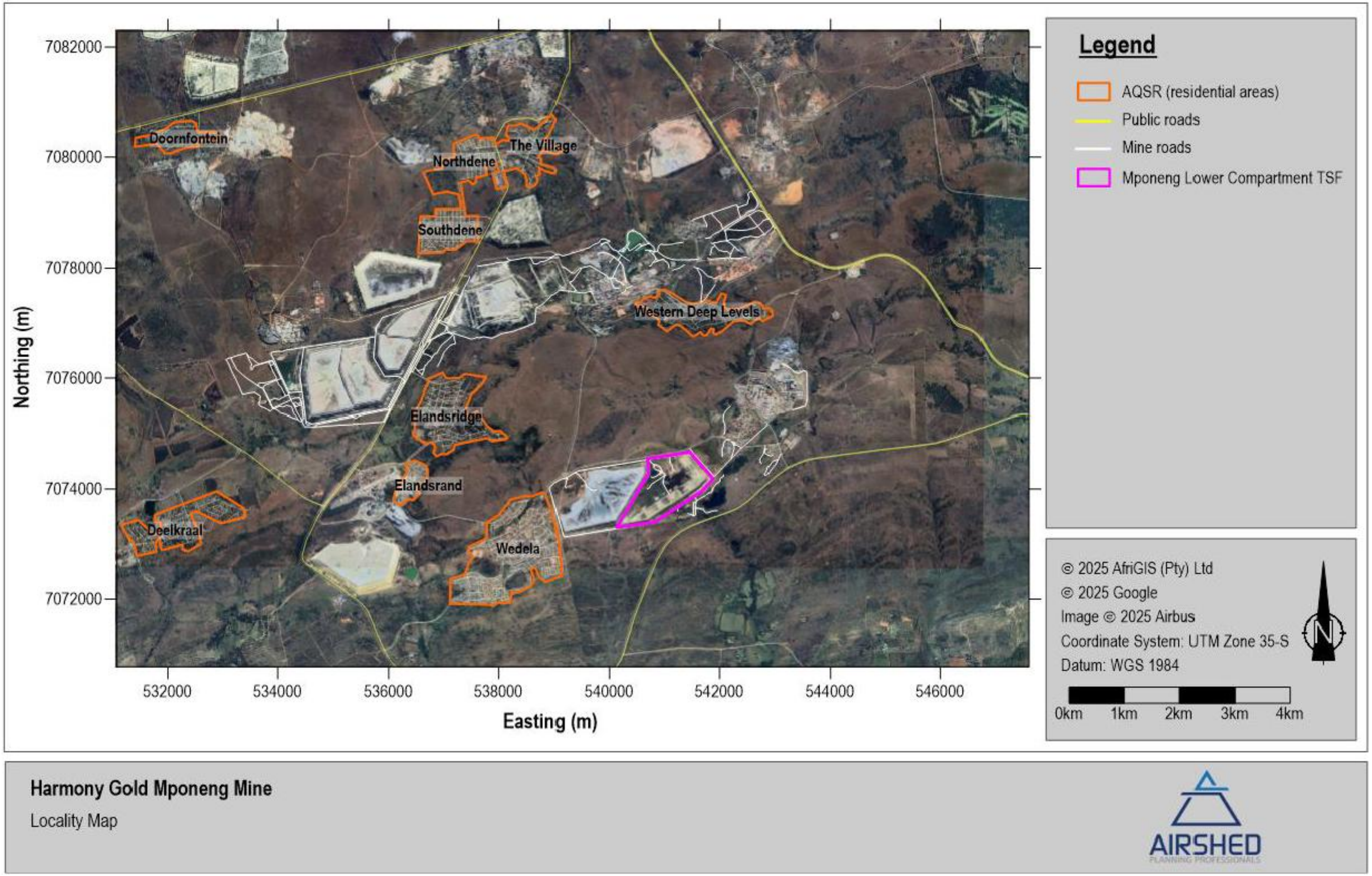


Figure 82: Location of sensitive receptor areas surrounding the current Savuka and Mponeng Mining Operations (Airshed Planning Professionals, 2026)

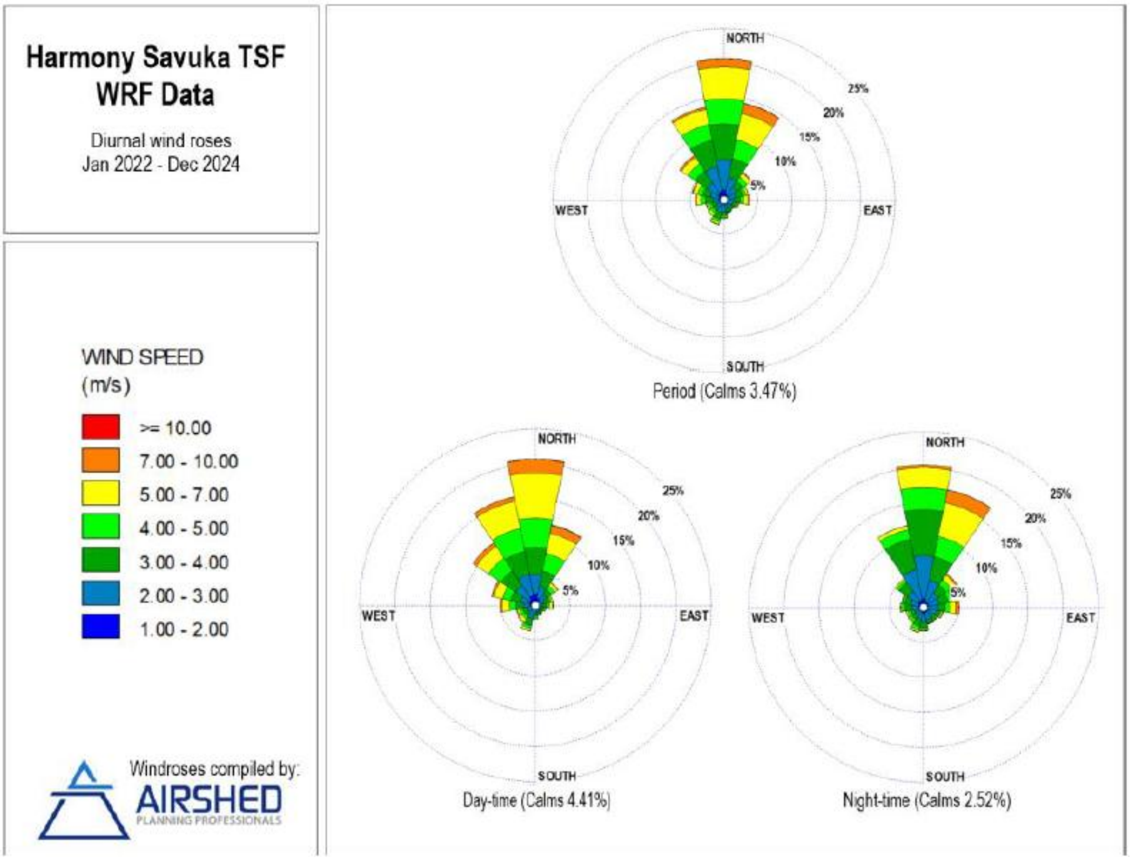


Figure 83: Period, day- and night-time wind roses (WRF data, January 2022 to December 2024)

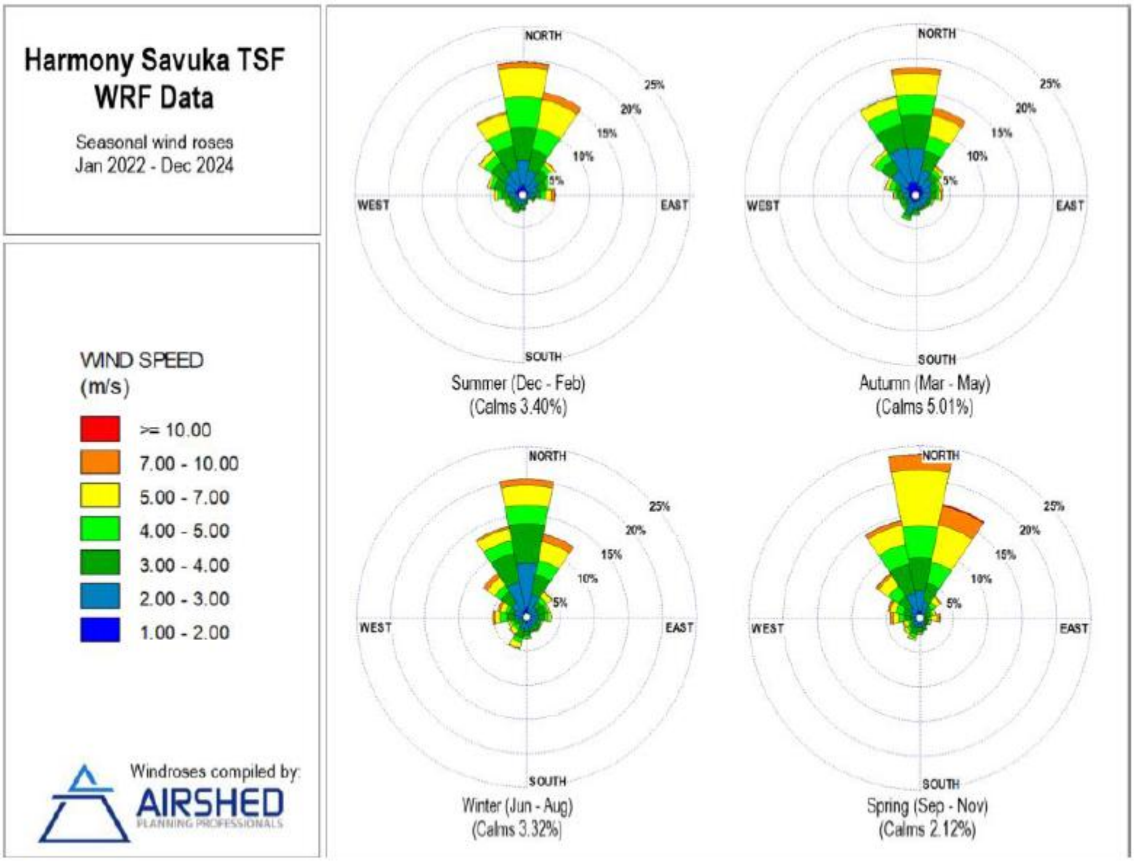


Figure 84: Seasonal wind roses (WRF data, January 2022 to December 2024)

7.10.2 EXISTING SOURCES OF AIR POLLUTION

The current air quality in the study area is mostly influenced by mining, deposition and reclamation activities at Savuka and Mponeng and other companies' mining operations, as well as farming activities, domestic fires, vehicle exhaust emissions and dust entrained by vehicles. These emission sources vary from activities that generate relatively course airborne particulates (such as farmland preparation, dust from paved and unpaved roads, and the mine sites) to fine Particulate Matter (PM) such as that emitted by vehicle exhausts, diesel power generators and processing operations.

Domestic households are known to have the potential to be one the most significant sources that contribute to poor air quality within residential areas. Individual households are low volume emitters, but their cumulative impact is significant. It is likely that households within the local communities or settlements utilize coal, paraffin and/or wood for cooking and/or space heating (mainly during winter) purposes. Pollutants arising from the combustion of wood include respirable particulates, CO and SO_2 with trace amounts of polycyclic aromatic hydrocarbons (PAHs), in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

Biomass burning includes the burning of evergreen and deciduous forests, woodlands, grasslands, and agricultural lands. Within the project vicinity, crop-residue burning and wildfires (locally known as veld fires) may represent significant sources of combustion-related emissions. The frequency of wildfires in the grasslands varies between annual and triennial. Biomass burning is an incomplete combustion process (Cachier, 1992), with carbon monoxide, methane and nitrogen dioxide gases being emitted. Approximately 40% of the nitrogen in biomass is emitted as nitrogen, 10% is left in the ashes, and it may be assumed that 20% of the nitrogen is emitted as higher molecular weight nitrogen compounds (Held, et al., 1996). The visibility of the smoke plumes is attributed to the aerosol (particulate matter) content.

Emissions from unpaved roads constitute a major source of emissions to the atmosphere in the South African context. When a vehicle travels on an unpaved road the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong turbulent air shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. Dust emissions from unpaved roads vary in relation to the vehicle traffic and the silt loading on the roads. Unpaved roads in the region are mainly haul and access roads. Emissions from paved roads are significantly less than those originating from unpaved roads, however they do contribute to the particulate load of the atmosphere. Particulate emissions occur whenever vehicles travel over a paved surface. The fugitive dust emissions are due to the re-suspension of loose material on the road surface. Paved roads in the region include the N12 to the south, the R501 to the north and R500 to the east.

7.10.3 PROJECT ACTIVITIES FROM AN AIR QUALITY PERSPECTIVE

The proposed activities will result in emissions to air from a variety of activities and sources. The only source of air emissions due to the Project is wind erosion due to the re-instatement of the Mponeng Lower TSF as a tailings deposit area, where it is currently used as a holdings dam and Landfill facility. Slurry and return water pipes will have to be constructed between the Savuka Plant and the Mponeng TSF. The main air pollution activities are listed in **Table 42**.

Table 42: Activities and associated air pollutants from the Savuka and Mponeng Operations (Airshed Planning Professionals, 2025)

ACTIVITY	ASSOCIATED POLLUTANTS
CURRENT OPERATIONS	
Underground Mining (emissions released via vent shafts)	

ACTIVITY	ASSOCIATED POLLUTANTS
Drilling and blasting	particulate matter (PM)[(a)(c)], sulfur dioxide (SO_2); oxides of nitrogen (NOx); carbon monoxide (CO); Total Organic Compounds (TOC) and carbon dioxide (CO_2)[(b)]
Loading and tipping of ore and waste	mostly PM, gaseous emissions from mining equipment (Diesel Particulate Matter [DPM], SO_2; NOx; CO; CO_2)
Primary crusher (assumed to be underground)	mostly PM, gaseous emissions from machinery (PM, SO_2; NOx; CO; CO_2)
Materials handling (loading of ore and waste)	mostly PM, gaseous emissions from Front-end-Loaders (FELs) (PM, SO_2; NOx; CO; CO_2)
Surface Operations	
Secondary & tertiary crushing and screening	mostly PM[(c)], gaseous emissions from machinery (PM, SO_2; NOx; CO; CO_2)
Materials handling (loading & off-loading)	mostly PM[(c)] and windblown dust from storage piles
Trucks transporting ore and waste	PM from vehicle entrainment on unpaved road sections and gaseous emissions from truck exhaust (PM, SO_2; NOx; CO; CO_2)
Tailings Storage Facilities (TSFs)	PM[(c)] from windblown dust and radon
Marginal Ore Dumps (MOD)	PM[(c)] from windblown dust and radon
Processing plant stacks	PM[(c)], SO_2; NOx; CO; CO_2

Notes: (a) Particulate matter (PM) refers to Total Suspended Particulates (TSP), PM_{10} and $PM_{2.5}$

(b) CO_2 and methane are greenhouse gasses (GHG).

(c) Radionuclides associated with PM emissions

Airborne PM is the most significant pollutant of concern from the proposed redeposition at Mponeng Lower Compartment TSF. The impact of particles on human health is largely dependent on: (i) particle characteristics, particularly particle size and shape, and chemical composition; and (ii) the duration, frequency and magnitude of exposure. The potential of particles to be inhaled and deposited in the lung is a function of the particle size, shape and density. Airborne particulate matter may range from relatively uniform soil particles (e.g. during dust storms) to very complex mixtures of extremely small organic and inorganic particles and liquid droplets (e.g. industrial sites). These particles could be made up of several components, including salts and acids (such as sulfates and nitrates), organic chemicals, metals and radionuclides, and soil or dust particles. The nasal openings permit large dust particles (less than few mm's) to enter the nasal region, along with much finer airborne particulates. Larger particles are deposited in the nasal region by impaction on the hairs of the nose or at the bends of the nasal passages.

Smaller particles, typically less than 10 micrometres (µm), pass through the nasal region and are deposited in the tracheobronchial and pulmonary regions. Particles are removed by impacting with the wall of the bronchi when they are unable to follow the gaseous streamline flow through subsequent bifurcations of the bronchial tree. As the airflow decreases near the terminal bronchi, the smallest particles (less than 2.5 µm) are removed by Brownian motion, which pushes them to the alveolar membrane (CEPA/FPAC Working Group, 1998; Dockery & Pope, 1994).

Ambient air pollution PM can therefore be divided into three classes based on their size:

- Inhalable coarse particulate matter (PM_{10}) consists of particles with a diameter between 2.5 and 10 µm that deposit efficiently along the airways. Particles larger than 10 µm are generally not inhaled into the lungs. These particles are typically found near roadways and dusty industries.
- Fine particulate matter ($PM_{2.5}$) consists of particles with a diameter less than 2.5 µm and can be inhaled deeply into the lungs. These particles can be directly emitted from sources such as vegetation fires, or they can form when gases emitted from power plants, industries and automobiles react in the air.
- Ultrafine particles (PM_1) consist of particles with a diameter smaller than 0.1 µm and have widespread deposition within the respiratory tract. These particles are typically a result of secondary chemical reactions in the atmosphere.

Air quality standards and guidelines for airborne particulates are given for various particle size fractions, including total suspended particulates (TSP), and thoracic (PM_{10}) and respirable ($PM_{2.5}$) particulates. PM comprises a mixture of organic and inorganic substances. From gold mining and processing facilities the radioactive particles in the form of radionuclides and radon releases are of concern. These are addressed in in the radiation study conducted by AquiSim Consulting (Pty) Ltd (**Appendix G**).

7.11 VISUAL LANDSCAPE

The information presented in this Section was largely obtained from the Visual Impact - Mponeng Lower Compartment Tailings Storage Facility (Graham Young Landscape Architect (GYLA), 2025)).

7.11.1 LANDSCAPE CHARACTER

The study area features a varied aesthetic and visual landscape, with mining activities predominating the western and northern sections of the study area and savannah-covered grassland and agriculture in the southern regions. The northwestern and western sections consist of gently undulating land that slopes westward and southward towards drainage lines that generally flow west and northwest. The topography rises in the central parts of the study area immediately north of the Project site, which is mostly undeveloped and composed of gentle rolling grassland. Residential areas, linked to the mines, are situated immediately west (Wedela), northwest (Harmony housing), and north of the Project site (Western Deep Levels housing). South of Wedela and the Project site is grassland with savannah-covered slopes. These areas are primarily used for grazing. The far southern sections of the study area comprise agricultural lands. The panoramas in **Figure 85** to **Figure 86** (refer to the Visual Impact Assessment Report for the location of the viewing points) show these characteristics. **Figure 87** below indicates the spatial distribution of the landscape character types and their associated scenic quality and sensitivities as they occur today. The study area can roughly be divided into the following landscape types:

- Savannah-covered slopes – high scenic quality – high visual sensitivity to change.
- Open grassland on higher land – moderate scenic quality – moderate visual sensitivity to change.
- Agricultural lands – moderate scenic quality – moderate visual sensitivity to change.
- Urbanisation and settlements – moderate to low scenic quality – moderate to low visual sensitivity to change
- Mining and degraded land - low scenic quality – low visual sensitivity to change (the project occurs in this landscape type).

Figure 85: Landscape character - Views 1, 2 and 3 (Graham Young Landscape Architect, 2025)

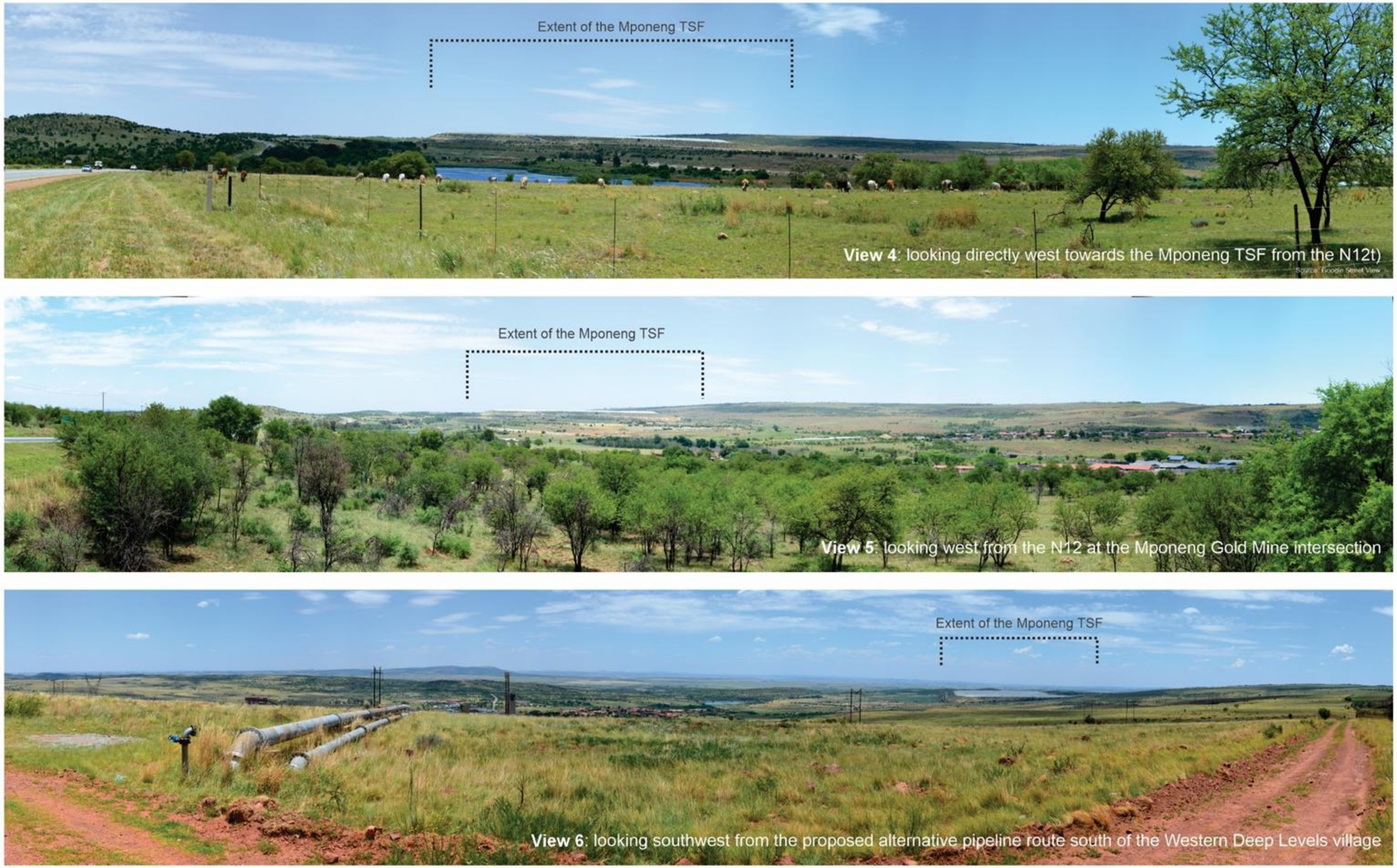


Figure 86: Landscape character - Views 4, 5 and 6 (Graham Young Landscape Architect, 2025)

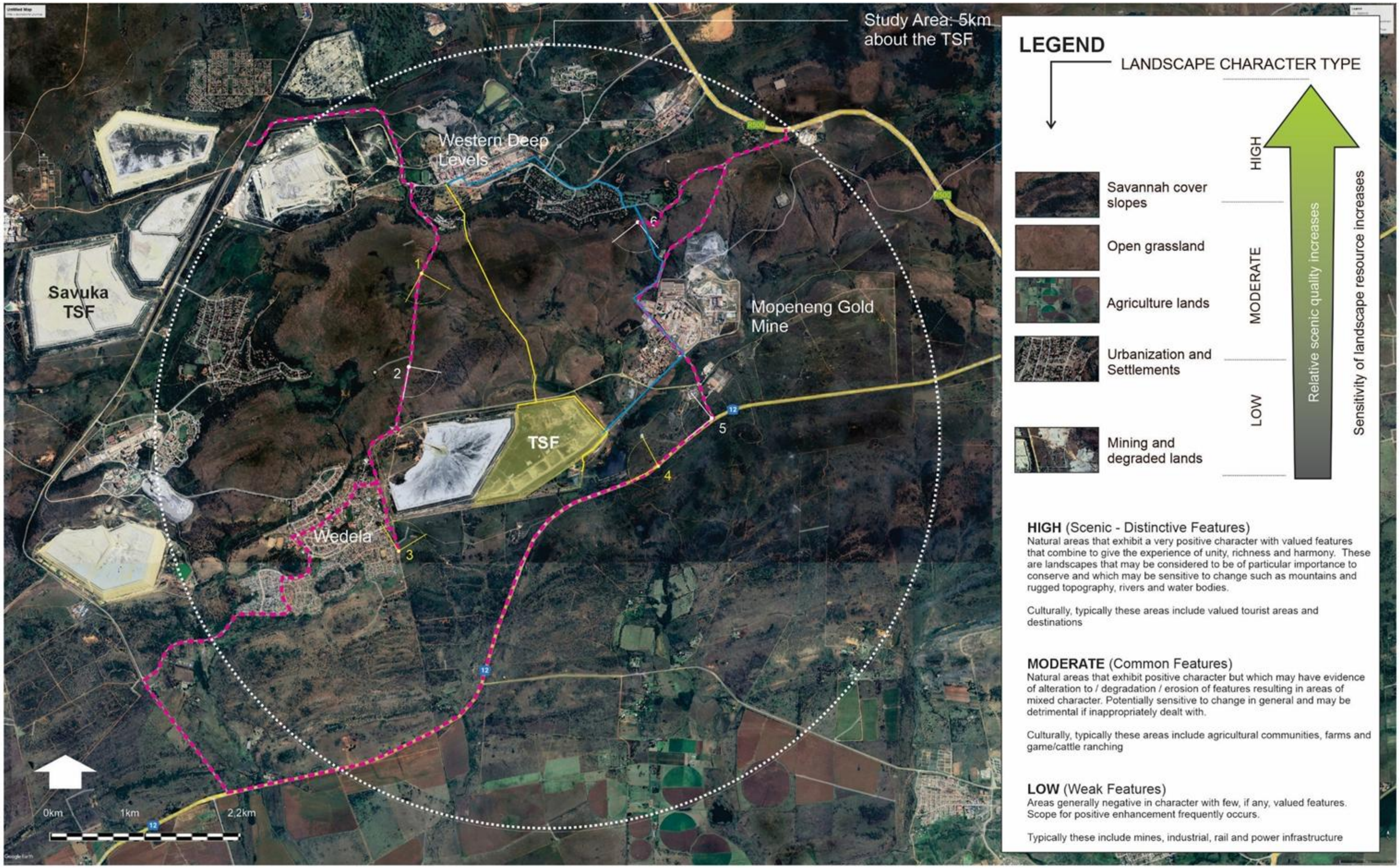


Figure 87: Landscape sensitivities (Graham Young Landscape Architect, 2025)

7.11.2 VISUAL RESOURCE VALUE, SCENIC QUALITY, AND LANDSCAPE SENSITIVITY

The value of the visual resource and its associated scenic quality assigned to the landscape character types described in **Section 7.11.1** is determined through the value of "individual contributors to landscape character, especially key characteristics, which may include individual elements of the landscape, particular landscape features, notable aesthetic, perceptual or experiential qualities, and combinations of these contributors" (LIEMA, 2013, p. 89). These primary features give the area typical characteristics and a sense of place. The sensitivity of the study area's various landscape types is defined as high, moderate or low (as indicated below and in **Figure 87**) and is dependent on the following four factors:

- Character (does it contribute to the area's sense of place and distinctiveness?)
- Quality – in what condition is the existing landscape?
- Value – is the landscape valued by people, the local community, and visitors, and is the landscape recognised locally, regionally, or nationally?
- Capacity – what scope is there for change (either negative or positive) in the existing landscape character? (LIEMA 2013).

When the criteria is considered and understood within the context of the subregion, the landscape types are assigned a visual resource value, as indicated in **Table 43**.

Table 43: Value of the Visual Resource (Graham Young Landscape Architect, 2025)

High **Savannah covered slopes**	**Moderate** Open grassland and agricultural lands and Moderate to Low for areas of urbanisation.	**Low** Mines and associated infrastructure and degraded land
This landscape type is considered to have a *high* value because it is a: A distinct landscape that exhibits a positive character with valued features that combine to give the experience of unity, richness, and harmony. It is a landscape that may be important to conserve and has an intense sense of place.	These landscape types are considered to have a *moderate/low to moderate* scenic value because they are: Common landscape that exhibits some positive character, but which has evidence of alteration/degradation/erosion of features, resulting in areas of more mixed character.	This landscape type is deemed to have a *low* scenic value because it is a: Minimal landscape negative in character with few, if any, valued features.
Sensitivity: It is extremely sensitive to change in general. It will be detrimentally affected because the key characteristics of the landscape, considering its existing character and quality, have limited ability to accommodate change without adverse effects.	**Sensitivity:** It is moderately sensitive to change in general, and change may be detrimental because the key characteristics of the landscape have some ability to accommodate change, considering the existing character and quality of the landscape.	**Sensitivity:** It is generally less susceptible to change because the relevant characteristics of the landscape can accommodate change without adverse effects, considering its existing character and quality.

7.11.3 ASSESSING POTENTIAL VISUAL IMPACT

Visual impacts relate to the changes that occur in the composition of available views as a result of alterations to the landscape, to people's responses to those changes, and to the overall effects on visual amenity. Visual impact is therefore measured by the change to the existing visual environment (caused by the physical presence of a new development) and the extent to which that change either undermines (negative impact), enhances (positive impact), or maintains the visual quality of the area. To assess the potential visual impact of the Project, four main factors are considered. In this report, a professional opinion of the Landscape Architect is given relative to potential visual impact. Viewshed and simulation modelling was used to confirm or refute the original risk prediction in relation to:

Visual Intrusion: The nature of intrusion or contrast (physical characteristics) of a Project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use.

Visibility: The area/points from which Project components will be visible.

Visual exposure: Visibility and visual intrusion are qualified with a distance rating to indicate the degree of intrusion.

Sensitivity: Sensitivity of visual receptors to the proposed development.

7.11.4 SENSITIVE RECEPTORS

Sensitive receptors are locations where people would most likely be susceptible to adverse changes in the landscape caused by the physical presence of the Project. The prominent locations of concern for the Mponeng Lower Compartment TSF are likely to be:

- Farmsteads near the N12 and southeast of the Project site
- Travellers along the N12 Provincial Road.

All other areas are deemed not sensitive to the proposed development because views from these locations would come from areas related to existing mining activities. People living in or passing through these locations will experience only a minor change and negligible loss of the baseline landscape aesthetic due to the scale and extent of the proposed Mponeng TSFs' height extension. The high visual absorption capacity (VAC) of the existing landscape, when viewed from these locations, combined with the fact that deposition will occur on an existing footprint, means that potentially sensitive receptors would see the new facilities within the context of the current mining infrastructure with very little change. This change would take place over the life of the mine and beyond, as the TSF would remain as residual structures in the landscape and represent the worst-case scenario for the project.

Visual sensitivities could stem from receptors located in the study area that observe changes to the aesthetic baseline. The rising walls of the Mponeng TSF would largely blend into the visual landscape from these points, making the proposed Project moderately visible from parts of the N12 road and only minimally visible from the southeastern and southern edges of the study area, where a few farmsteads are situated. Refer to the viewshed analysis in **Figure 88**. The Mponeng extension would also be visible from the grassland plateau north of the site; however, there are no receptors in this area.

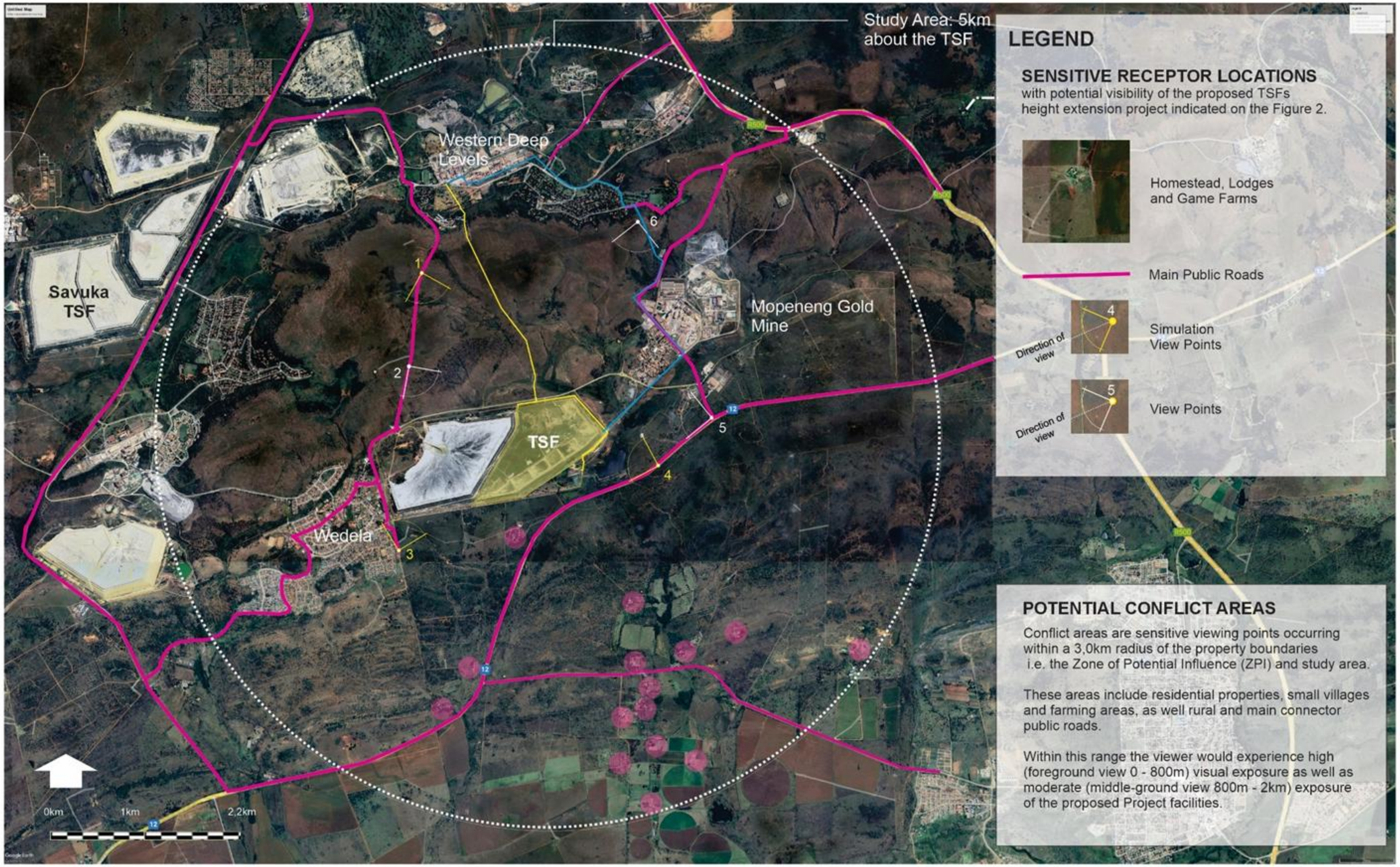


Figure 88: Mponeng Lower Compartment TSF Sensitive Receptors (Graham Young Landscape Architect, 2025)

7.12 SOCIO-ECONOMIC

The socio-economic baseline conditions relevant to the Project area are described in Equispectives (2015; 2020). The baseline socio-economic information was updated in 2022 through the 2022 South African Census (https://census.statssa.gov.za/#/province/7/2). The Draft Integrated Development Plan (IDP) for Merafong City 2025-26 best describes the socio-economic conditions for the Municipality (https://merafong.gov.za/wp-content/uploads/2025/04/Draft-IDP-Document-March-2025-2026.pdf). The Radiological Health Impact Assessment for Savuka TSF (Aquisim Consulting, 2025) provides a detailed summary of the conditions that serve as a basis for human behavioural conditions and their interaction with the environment (refer to https://www.eims.co.za/2025/06/25/1657-harmony-savuka-ba-wula/ for the report).

7.12.1 MUNICIPAL PROFILE

According to the Draft Integrated Development Plan (IDP) for Merafong City 2025-26, Merafong City Local Municipality (MCLM) is a Category B municipality with an Executive Mayor Governance system. A Category B municipality, also known as a local municipality, is a type of local government in South Africa that shares executive and legislative authority with a Category C (district) municipality. These municipalities are the primary providers of local services, such as refuse removal, sewage, and water supply, operating within a broader district municipality framework for more regional functions like bulk water infrastructure and integrated development planning.

The Speaker is the Chairperson of Council and is responsible for overseeing the functioning of Council and its committees. The office of the Speaker is further responsible for the establishment and functioning of ward committees. The Chief Whip is responsible for ensuring compliance to the code of conduct by Councillors. MCLM covers an area of 1631.7km² and it comprises of twenty-eight (28) wards in terms of Section 18 (3) of the local government: Municipal Structures Act, 1998 (Act 117 of 1998) which constitutes 28 Ward Councillors and 24 Proportional Representative Councillors. MCLM is situated in the South-western part of Gauteng Province and form a part of West Rand District Municipality which consists of four local municipalities namely: Mogale City, Rand West Municipality and Merafong City. MCLM incorporates the following areas:

- Carletonville
- Khutsong
- Fochville
- Kokosi
- Greenspark
- Welverdiend
- Wedela
- Blybank
- Mining Towns

7.12.2 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

Population statistics are normally collected by way of a Census, however because Censuses are usually a huge logistical exercise, many Countries conduct a Census once every 5 to ten years. Between Censuses administrative data is collected by various agencies about population, events such as births, deaths and cross-border migration and these agencies are allowed to produce and use this data. It has been about 12 years since the 2011 Census has taken place, therefore the available data has become old and unreliable. In 2016 Statistics South Africa conducted a Community Survey to supplement the 2011 Census and the municipality has in the past used those figures complemented by data released by other sources such as Quantec Survey of 2017. The most recent Census was undertaken in 2022 and some of the results have been released by Statistics South Africa.

7.12.2.1 POPULATION DYNAMICS

The West Rand population increased by 21,6% from 821 191 in 2011 to 998 466 in 2022 whereas Merafong population increased by 14,2% from 2011 to 2022 rising from 197 520 to 225 476. The West Rand is the least populated District in Gauteng with 0,9 million (988 466) people while Merafong City is the least populated Municipality in West Rand with 225 476 people. The research also shows that in most Wards, the majority of the population belongs to the Black population group. In Ward 12 more than half of the population belonged to the White population group, while in Ward 14 just over a third of the population belonged to the White population group. Ward 12 includes Deelkraal as well as Welverdiend (which is located outside the 5 km radius). Ward 14 includes West Wits Village, a portion of Fochville, the Numba Wani Residence and the Mohaleshoek Informal Settlement. At 85,5% the Black African population group constitutes the largest proportion of West Rand's population, followed by White (10,3%) and Coloured (2,8%). At 89,4% the Black African population group constitutes the largest proportion of Merafong's population, followed by White (8,8%) and Coloured (1,3%). Refer to **Figure 89** for the population by race dynamics.

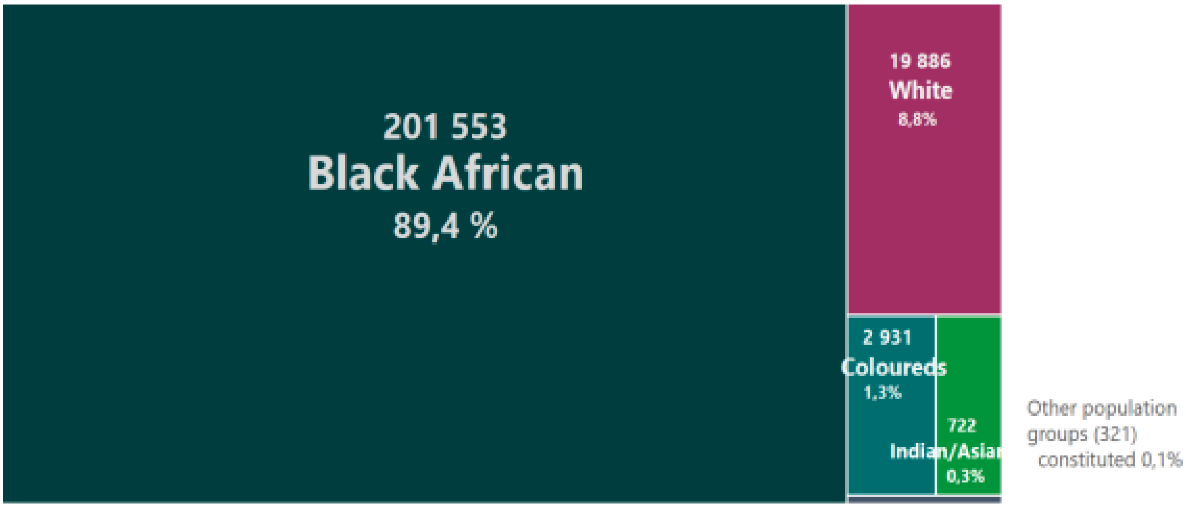


Figure 89: Merafong population groups (Statssa, Census 2022)

7.12.2.2 HOUSING DYNAMICS

Gauteng Households increased from 2,1 million in 1996 to 5,3 million in 2022. There were about 357 thousand households in West Rand 2022 with 77 599 thousand households located within Merafong City in 2022. The number of households in Merafong City increased by 16.5% from 66 624 in 2011. West Rand's average household size slightly decreased from 3,1 in 2011 to 2,8 in 2022 while the average household size in Merafong City also decreased slightly by 0.1 between 2011 and 2022. Households that resided in formal dwellings increased by 13,6 percentage points from 74,9% in 1996 to 88,5% in 2022 in Gauteng. There were more households that resided in formal dwellings in Merafong City in 2022 as compared to other municipalities in West Rand. Households that resided in formal dwellings increased from 60,4% in 1996 to 91,6% in 2022 in Merafong City.

7.12.2.3 COMMUNITY TYPES

Communities can be classified as belonging to one of the following groups (Equispectives, 2020):

a. Formal Residential Structure Communities

A formal dwelling can be described as "A structure built according to approved plans, i.e., house on a separate stand, flat or apartment, townhouse, a room in a backyard or rooms or flatlet elsewhere" (Statistics South Africa, 2012). In some areas, there may be a formal as well as an informal dwelling on a stand, creating a community with mixed dwelling types.

b. Informal Residential Structure Communities

An informal dwelling can be described as "A makeshift structure not approved by a local authority and not intended as a permanent dwelling. Typically built with found materials (corrugated iron, cardboard, plastic, etc.) and is contrasted with formal dwelling and traditional dwelling" (Statistics South Africa, 2012).

c. Commercial Agricultural Communities

Commercial agriculture includes farms where the farmer earns a livelihood from agriculture, such as crop, livestock, or game farming. Areas with smallholdings are categorised according to their character. If the residents of the smallholdings practise agriculture, they are grouped with commercial agriculture; if they just reside in the area or have a business on the smallholding not related to agriculture, the area is classified as formal residential.

d. Small-scale Subsistence Farming

Small-scale subsistence farming can be described as food gardening taking place on a large scale on a piece of land that is not in someone's backyard. The land is usually cultivated by different members of the community, and they may belong to a formalised group. Food gardens in the backyard of an organisation, like a school or crèche, would also be grouped in this category. Keeping livestock in the community or on the outskirts of the community would form part of this group.

Agricultural projects conducted as part of a Social and Labour Plan of a mine can contain characteristics of both commercial agriculture and subsistence farming. To classify these projects, the following guideline is used: if the projects have reached a stage where it is sustainable and function with minimal to no input from the mine, they are classified as commercial agriculture. However, if the mine is still heavily involved, it is classified as small-scale subsistence farming, as the Project has not yet proved its sustainability.

Figure 90 shows a 5 km radius around the Project surface infrastructure, as well as the potentially sensitive receptors within a 5 km radius. The following residential areas were identified in 2015 near the Project:

a. AngloGold Ashanti residences (now part of GCTI operations)

   The West Wits (GCTI) Operations had four residences for employees in 2015, namely Ntshonalanga, Matabong, Ekhayalihle and Numba Wani, which were converted to single rooms or family quarters. The family quarters were at Ekhayalihle and could host up to 25 people who became paraplegic after injuries on duty. Matabong housed employees from the TauTona mine, while Ntshonalanga housed employees who worked at the Savuka mine, which was integrated with the TauTona mine. Numba Wani hosted employees from the Mponeng mine. The operations also had facilities for visiting wives.

b. The TauTona and Savuka mines were placed in orderly closure in 2017, and as such, the only residence where the activity is expected is the Numba Wani residence. The Merafong City Local Municipality (2019/2020) has indicated that Mponeng has a good locality relative to the N12 that could be exploited once mine closure looms, and that there is possibly good potential for non-residential uses.

c. West Wits Village

   In 2015, the West Wits Village housed employees of AngloGold Ashanti. The 2019/2020 IDP of the Merafong City Local Municipality indicates that township establishment is underway. The municipality is looking into the feasibility of a Mining Industrial Park as part of the second phase of Mining Phakisa implementation. The re-use potential of the area is considered good, with the possibility of developing into a significant node

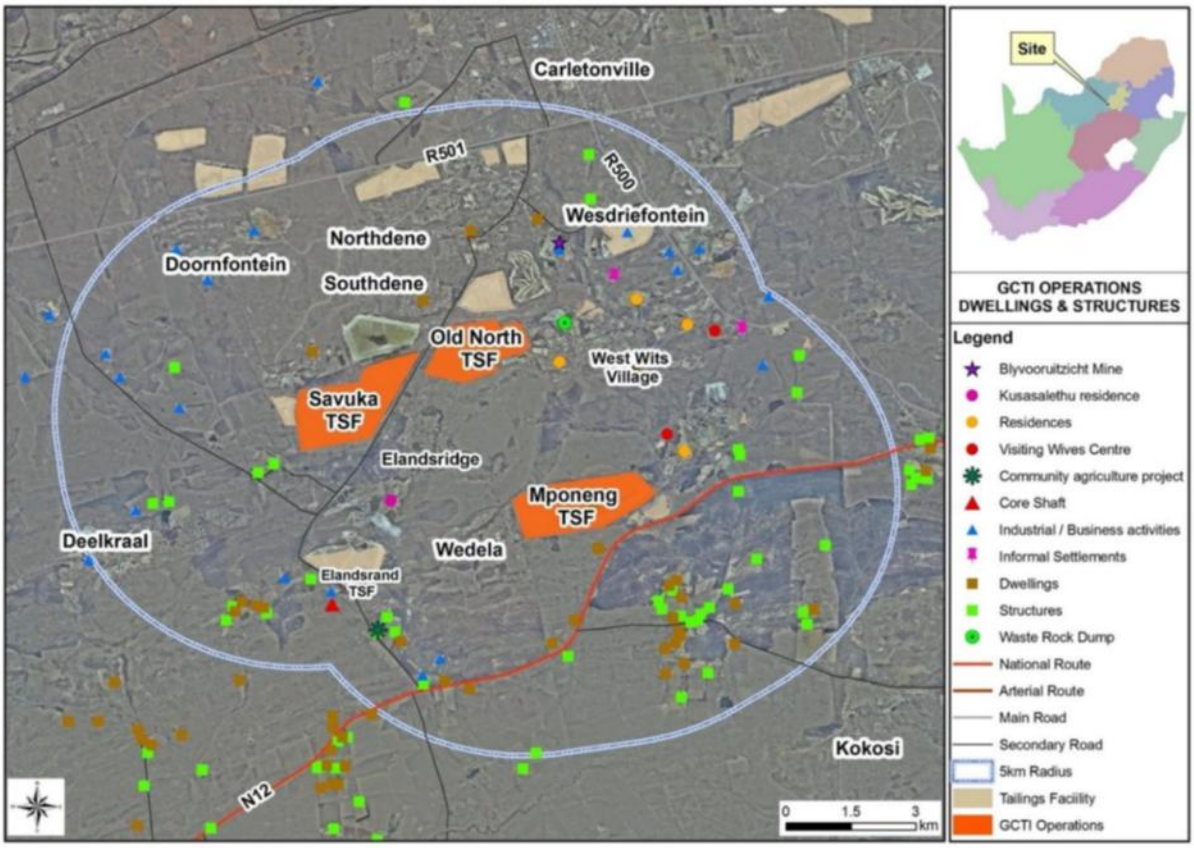


Figure 90: Map indicating the study Project Baseline Social and Land Use Assessment (Equispectives, 2020)

d. Deelkraal Estate

Deelkraal Estate used to be a mining village, but was in private ownership in 2015, with the owners being in the process of having the estate declared as a township. In the 2019/2020 IDP document of the Merafong City Local Municipality, Deelkraal is still indicated as a mining village with limited supportive land uses and limited economic potential. Although most residences are in fair condition, the municipality anticipates that the market for rental or buying in Deelkraal to collapse within the next few years due to new rental options in Carletonville and Fochville, as well as the mineshaft closure at Kusasalethu mine. The municipality will not take over services in the area and anticipates that Deelkraal will be demolished and that the area will be rehabilitated.

e. Elandsridge

Elandsridge/Elandsrand is a mining village where employees of Harmony's Kusasalethu mine reside. The Merafong City Local Municipality (2019/2020 IDP) has indicated that the Kusasalethu mine is expected to close within a few years, and if it does open again, it would be operated through mechanisation and automation. The municipality would not take over services, and the residential viability is regarded as low due to the lack of a new economic foundation, few facilities and the isolated location. It is anticipated that the area will be demolished and rehabilitated, possibly for agriculture or renewable energy.

f. Wedela

Wedela is situated between Harmony's Kusasalethu Operations and the Mponeng tailings storage facility. It was established in 1978 and granted municipal status in January 1990. Wedela is mostly a formal settlement, but there is an informal settlement on the edge of Wedela, and many houses have backyard shacks. It is currently located close to mining operations that will not be sustained indefinitely.

g. Mohaleshoek Informal Settlement

This informal settlement is located on private land adjacent to the R500, between the TauTona and Mponeng mines. Many residents are rumoured to be illegal immigrants. The Merafong City Local Municipality (IDP 2019/2020) has indicated that the informal settlements located at Blyvooruitzicht and Western Deep Levels can be accommodated at the West Wits township, either through subsidised housing or a CRU (Community Residential Units) project. The CRU programme aims to facilitate the provision of secure, stable rental tenure for lower-income individuals (www.gov.za).

h. Farming Community

The farming community consists of farms and smallholdings that are located in the Deelkraal area as well as adjacent to the Mponeng mine. Farming activities consist of crop farming, livestock, game breeding and hunting. Some of the farms offer tourist activities. Some farms have workers residing on the farm, while the workers from other farms do not reside on the farm, but somewhere else in the vicinity.

i. Residential areas around the Blyvooruitzicht mine

In 2015 people living in the area around the Blyvooruitzicht mine that was put in provisional liquidation in August 2013 lived in dire socio-economic conditions. The Merafong City Local Municipality (2019/2020 IDP) has indicated that the mine's gold mining component has been revived recently. According to the municipality, the village has significant potential to be integrated into Carletonville although buildings and infrastructure have been stripped and vandalised. The lawlessness that marked the area in 2015, seems to have been resolved by the new mine owner. There are dolomitic constraints in the area and the Housing Development Agency is conducting a feasibility study on the potential of reviving the village

Figure 90 also shows the location of dwellings and structures relative to the Project that are not located in a town or a village. The number of dwelling groups has remained more or less the same, as observed through aerial photography. At some of the dwelling clusters, new buildings have been observed. **Table 44** presents the breakdown for households according to geo types as per Census 2011.

Table 44: Breakdown of households according to geo types (source: Census 2011; Equispectives, 2020)

Geo Type	Merafong City Local Municipality	Mining Wards				Mixed Wards			
		Ward 5	Ward 11	Ward 14	Ward 27	Ward 12	Ward 20	Ward 22	Ward 23
Urban Area	68,199	2,431	**3,586**	**4,575**	**3,827**	1,475	3,234	2,040	2,402
Traditional Area	0	0	**0**	**0**	**0**	0	0	0	0
Farm Area	2,207	0	**0**	**75**	**0**	68	0	0	0
Total	70,406	2,431	**3,586**	**4,650**	**3,827**	1,543	3,234	2,040	2,402

It can be concluded that the land use near the Project is dominated by open grassland, agricultural (cultivated cropland), mining and residential land use conditions. Equispectives (2020) divided communities into those living in formal structures, communities living in informal structures, commercial agricultural communities, and small-scale subsistence farming communities.

7.12.2.4 SOCIO-ECONOMIC CONDITIONS

Gauteng is the economic hub of the country, with over 35% of the economic activity taking place in the province. However, Gauteng continues to bear the brunt of high poverty, inequality, and unemployment levels. At the centre of the development of the Growing Gauteng Together 2030 (GGT2030) strategy, which is the provincial expression of the National Development Plan (NDP), the provincial government aims to address the challenges noted above. The GGT2030 goal is to reduce poverty to about 16 per cent of the total population by 2030 from 25.3 per cent in 2019. The plan also aims to reduce income inequality levels (as measured by the Gini coefficient) to 62 per cent in Gauteng. Since the dawn of democracy, significant progress has been made to reduce the high levels of poverty and inequality. However, the deterioration in economic performance in recent years due to domestic and external factors has regressed some of the progress made, with levels of inequality being more prevalent within population groups.

Table 45 shows different measures of poverty for the West Rand district and the local regions. In 2020, over 50 per cent of the districts were living below the UBPL. With economic activity in negative territory in the district before the pandemic and the unemployment rate at its highest level, these did not favour the initiatives targeted at reducing poverty in the district. The Upper-Bound Poverty Line (UBPL) was the highest in Rand West City at 54.2% in 2020, followed by Merafong City at 53.1%. Refer to **Table 45** for the poverty and inequality trends.

Table 45: Selected Poverty Indicators (source: Draft IDP Merafong City 2025-26)

Regions	2010	2012	2014	2016	2018	2020
Food Poverty Line (ZAR 624)						
West Rand	16,7%	14,8%	16,0%	19,2%	21,0%	24,3%
Mogale City	16,9%	14,6%	15,7%	18,7%	20,6%	24,0%
Merafong City	15,0%	14,0%	15,2%	18,6%	20,3%	23,2%
Rand West City	17,6%	15,6%	16,9%	20,2%	22,0%	25,3%
Lower Poverty Line (ZAR 890)						
West Rand	28,6%	26,4%	28,1%	31,5%	33,9%	37,6%
Mogale City	28,8%	26,1%	27,6%	30,7%	33,1%	36,9%
Merafong City	26,4%	25,3%	27,1%	31,1%	33,5%	36,9%
Rand West City	30,0%	27,6%	29,4%	32,9%	35,2%	38,9%
Upper Poverty Line (ZAR1 335)						
West Rand	45,0%	42,7%	44,0%	46,6%	49,0%	52,7%
Mogale City	44,5%	41,7%	42,9%	45,2%	47,6%	51,4%
Merafong City	43,8%	42,7%	44,0%	47,2%	49,5%	53,1%
Rand West City	46,7%	44,1%	45,5%	48,3%	50,6%	54,2%
Poverty Gap Rate						
West Rand	31,4%	30,4%	30,4%	30,7%	31,1%	31,8%
Mogale City	31,4%	30,4%	30,5%	30,8%	31,1%	31,8%
Merafong City	31,5%	30,4%	30,5%	30,9%	31,2%	32,0%
Rand West City	31,2%	30,2%	30,3%	30,6%	31,0%	31,7%

Based on the income inequality as measured by the Gini coefficient for the West Rand district and its local regions, over the period of 2012 to 2020, not much change or movement happened in all the regions, as the increases in later years were marginal. However, the numbers have maintained a level just above 0.6. Much of the inequality is in Mogale City, the region with relatively high activity in the whole district. The Gini coefficient in the region increased from 0.642 in 2012 to 0.644 in 2020.

The better-than-expected recovery in the first half of 2021 improved business activity in municipalities, amid a strong rebound in global demand and higher commodity prices. Going forward, the recovery in economic activity is dependent on various factors, including effective vaccination rollout and sustained provision of energy to all the sectors of the economy. Similarly, in the West Rand, like other regions, economic output has declined for several years, with negative growth rates going back to the start of the review period. The decline in the mining activity of the district over the years has resulted in reduced total output. Mining accounted for 31% of the West Rand's economic output in 1996; it shrunk to an estimated 19.5% by 2021. However, the sector still accounts for the second highest share of economic activity in the region (refer to **Figure 91**).

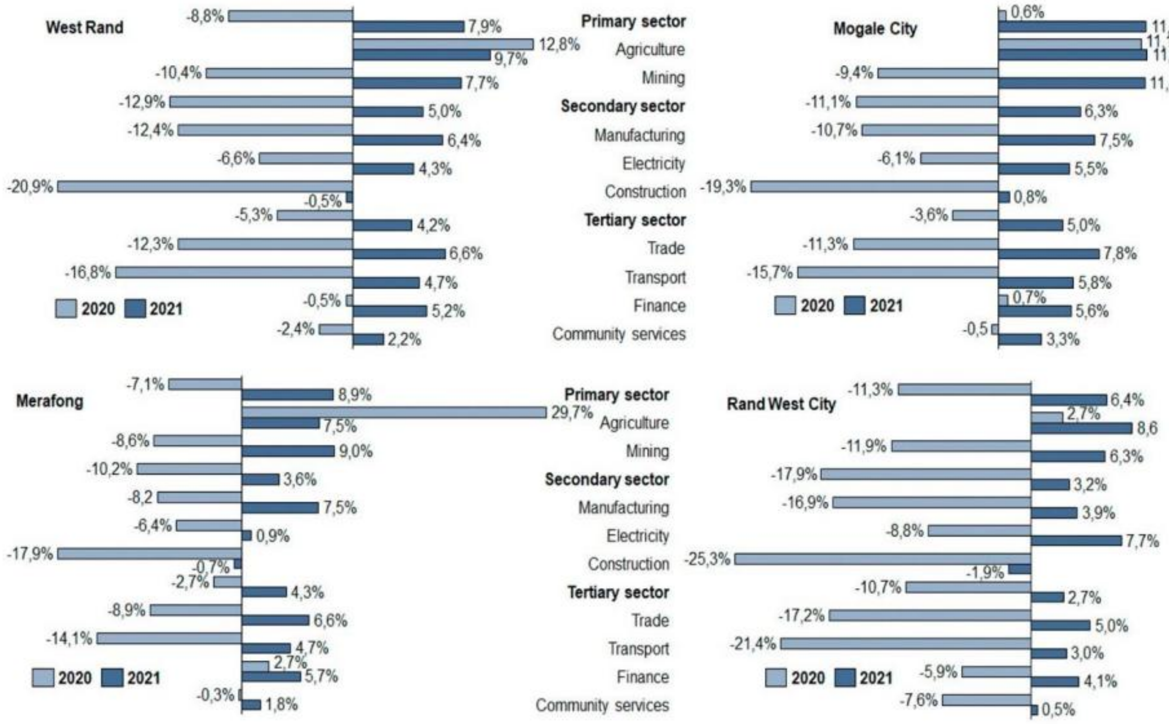


Figure 91: Sector Output Growth (IHS Markit, 2022; Draft IDP Merafong City 2025-26)

The district has also seen the highest contractions in the construction sector, recording a decline of 20.9 per cent in 2020 before a relative improvement however, still negative at 0.5 per cent. In Mogale City, construction decreased by 19.3 per cent, while it declined by 25.2 per cent in Rand West city and by 17.9 per cent in Merafong in the same period. The restriction of mobility of people and the halt of existing and planned projects affected the sector across regions. The agriculture sector has recorded growth for 2020 and is expected to record positive growth for 2021. Mining activity in the district region grew by 7.7 per cent, following a decrease of 10.4 per cent in 2020.

7.12.2.5 **SERVICE DELIVERY**

All Municipalities in West Rand had more than 90% of households having access to electricity for lighting in 2022. Merafong City had an increase from 82,8% in 2011 to 98,1% in 2022. West Rand District had the third highest (76,7%) proportion of households with access to piped water inside dwelling. Merafong City had the highest (81,9%) proportion of households with access to piped water inside the dwelling. While households using flush toilets only increased by 4,3 percentage points between 2011 and 2022 in Gauteng, households using flush toilets increased by 10 percentage points between 2011 and 2022 in West Rand. Households in Merafong City (94,1%) had the highest access to flush toilets than other municipalities. Approximately 84,3% of households in West Rand had their refuse removed by a local authority once a week. Refuse removal by local authority at least once a week increased from 77,7% in 1996 to 84,3% in 2022 in West Rand. Merafong City had the lowest percentage (81.9%) of refuse removal by local authority at least once a week as compared to other municipalities. Households with no access to internet declined by 40 percentage points, from 53,6% in 2011 to only 13,6% in 2022 in Gauteng Province.

7.13 CULTURAL HERITAGE RESOURCES

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The Act defines a 'heritage resource' as any place or object of cultural significance (aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance). The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act. This section of the report presents the heritage status of the proposed Mponeng Lower Compartment TSF project.

7.13.1 REGIONAL HERITAGE

According to the Heritage Impact Assessment Report (PGS Heritage, 2025), the study area is situated in-between Klipsriviersberg (75km east) and Potchefstroom (56km west). This is important to note, as there is Sotho-Tswana stonewalling in the general area, which consists commonly of Klipsriviersberg stonewalling (SWS: 18th – 19th century) in the Klipsriviersberg area and Type Z (18th – 19th century) stonewalling near Potchefstroom. Since the site sits in between these areas, there is a possible influence from both types of stonewalling. However, Sadr (2012: 3) suggests Type Z is typically located south of the Vaal River. The Klipsriviersberg stonewalling (also known as SWS) contains an outer wall which commonly includes scallops which demarcate back courtyards, small stock kraals, and contains more linear stonewalls in between households to demarcate such areas (Sadr 2012: 3). Type Z settlements are typically more distributed and can contain narrow entrances for defensive purposes (Huffman et al., 2007).

Furthermore, there are Sotho-Tswana Iron Age stonewall ruins found 12km south of Carletonville, just outside Fochville, known as the Tlokwe Ruins. These ruins date to between the 1500s – 1820s. Based on the limited research conducted and available within the archaeological fraternity about Tolkwe, it is known that the people of the settlement grew sorghum and maize, and herded cattle within the region of the nearby fertile valley (Vorster 1969). When the Difaqane started and Mzilikazi pushed groups out of the area around the 1820s, the Sotho-Tswana people at Tlokwe were forced to move northward toward Brits. The hills surrounding Fochville, just south of the study area, were inhabited by the Bakwena baMare-a-Phogole people, who were known to have settled in the area during the LIA (Vorster 1969). However, during the late 1820s, when the Difaqane started, Kokosi, the chief of the baMare-a-Phogole people, was forced to lead his people north due to Mzilikazi and his people driving many Iron Age communities at the time out of the area (Sadr 2020). There are also some Later Iron Age sites located on the farm Kraalkop 8.9km south-east of the study area, which belonged to the baMare-a-Phogole people. As such, it is likely that the baMare-a-Phogole people also inhabited the area surrounding the study area due to the closeness in proximity. However, these Later Iron Age sites located on the farm Kraalkop are believed to be Molokwane type stonewalling, which, according to Huffman (2007), extends from Gauteng westwards towards Zeerust.

7.13.2 HERITAGE SCREENING

A heritage screening was conducted by means of the South African DFFE National Web-based Environmental Screening Tool as required by GN 982**.** According to the heritage screening report, the project area has a **Low Heritage Sensitivity** (**Figure 92**). The fieldwork has shown that some archaeological and heritage resources were present in the area and thus have a higher rating than the original screening rating. This is in part due to the low resolution of the available data which the screening data is based.

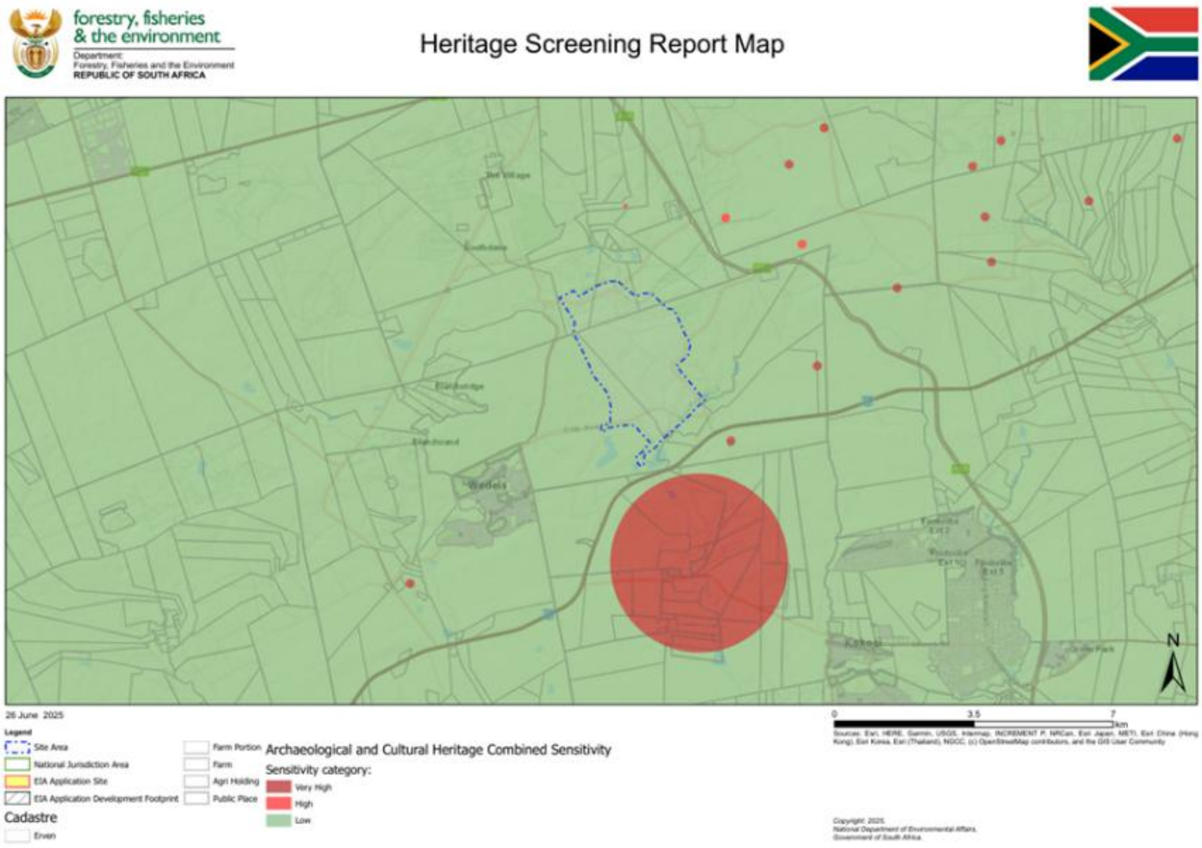


Figure 92: Map of relative archaeological and cultural heritage theme sensitivity (DFFE, 2025)

7.13.3 SITE-SPECIFIC HERITAGE

Site-specific fieldwork was conducted in June 2025 and a follow up site in January 2026 by a PGS field team. During the fieldwork, a total of two heritage features were identified within the study area (see **Figure 93** and **Figure 94**). These consist of one stonewalling feature (MPnr1) and one stonewalling feature which contains four circular segments, some of which are likely kraals (MPnr2). MPnr1 is a more linear stonewalling of approximately 1m high and is constructed of medium – large compactly placed stones. MPnr1 is located down the hill from MPnr2. It is rated as high significance and graded as Grade IIIA, as through further investigation of satellite imagery of the area, it was determined that MPnr1 was a part of a full stonewalling circle, which is 15m in diameter. As such, it is hypothesised as possibly being a kraal. MPnr2 consists of four large, connected circles, which form one stonewalling feature. Each circle is 4m, 6m, 7m and 12m in diameter, respectively. These stonewalled circles are located on top of a hill, in relative proximity of MPnr1. It can be surmised that some of these circles of this stonewalling feature are kraals. As such, this feature is rated as **high significance** and is graded as **Grade IIIA** due to the traditional practice of many African cultures of burying their deceased within the kraal space. Furthermore, both sites were identified to be a part of a larger stonewalling group in the area, which is at present under-research within the archaeological fraternity. As such, the area has a high potential to yield valuable information, supporting the high significance rating.

However, due to the dense vegetation in the field, not all features were identified during the fieldwork but further sites were identified during further investigation utilising satellite imagery and background research of the area. As depicted in **Figure 95**, more stonewalled sites adjacent to the study area were located. As discussed at the onset of the report, it is likely that the area was inhabited by the baMare-a-Phogole people during the LIA (from about the 1500s to the late 1820s). The baMare-a-Phogole had built similar stonewalling 8.9km south-east on a farm called Kraalkop, as well as 12km south near Fochville at a site referred to as "The Tlokwe Ruins". It is noted that some of these sites have already been destroyed in the surrounding local area. Due to the destruction of other similar stonewalled settlements in the area, as well as the relevance of these sites on a bigger scale, they have both **a high significance and a higher cumulative impact** (rating of 2). Consequently, these sites hold the potential to yield information on a group of settlements for which little research has been completed and can offer deeper insight into the history of the local area.

The two archaeological sites (MPnr1 and MPnr2) have a high heritage significance and are both graded as Grade IIIA due to their significance as part of a larger stonewalling group, as well as due to the possibility of burials within the kraal space.

Figure 93: View of archaeological sites MPnr1 (top) and MPnr2 (bottom) (PGS Heritage, 2026)

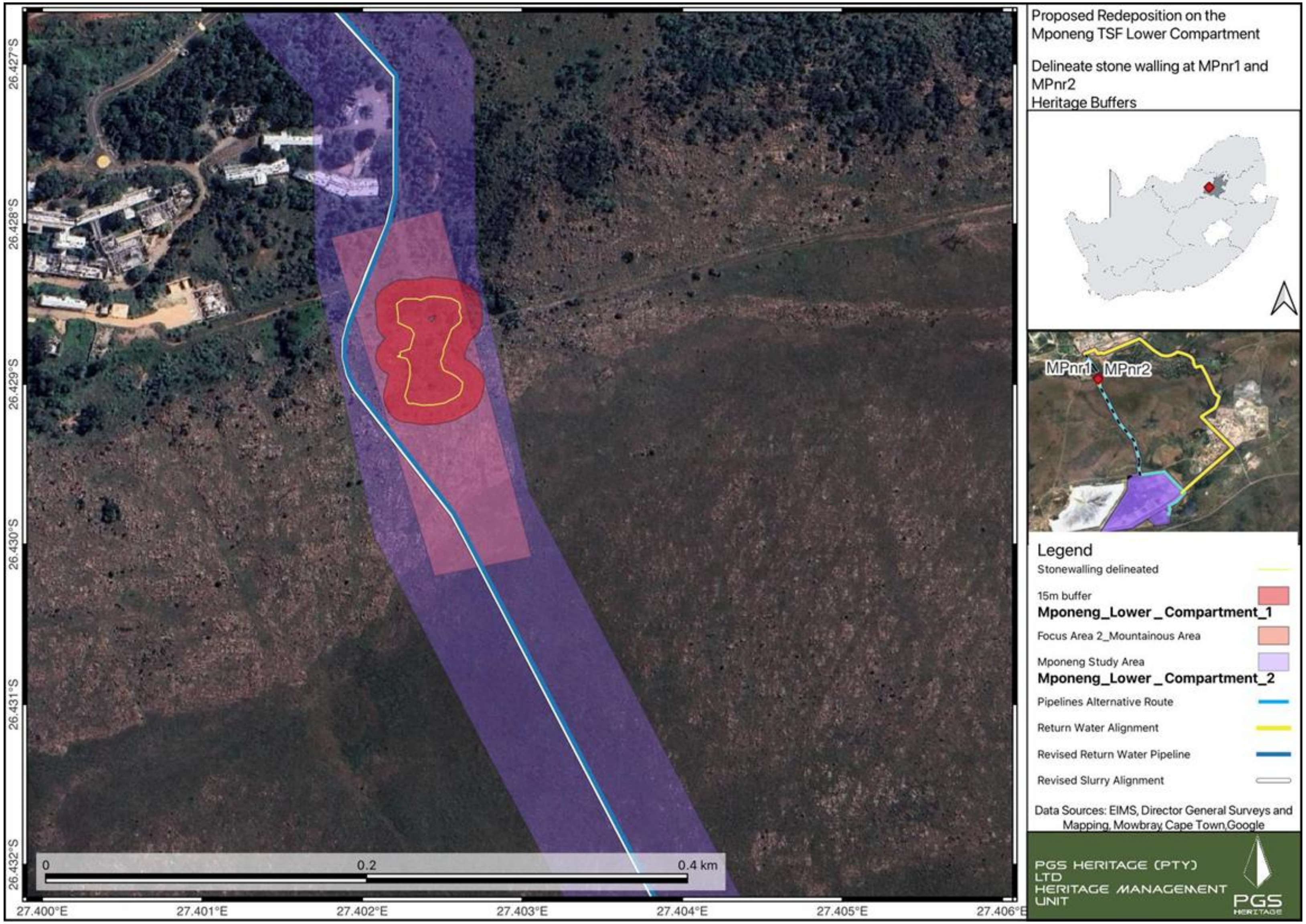


Figure 94: Identified heritage resources within the Mponeng TSF development area (PGS Heritage, 2026)

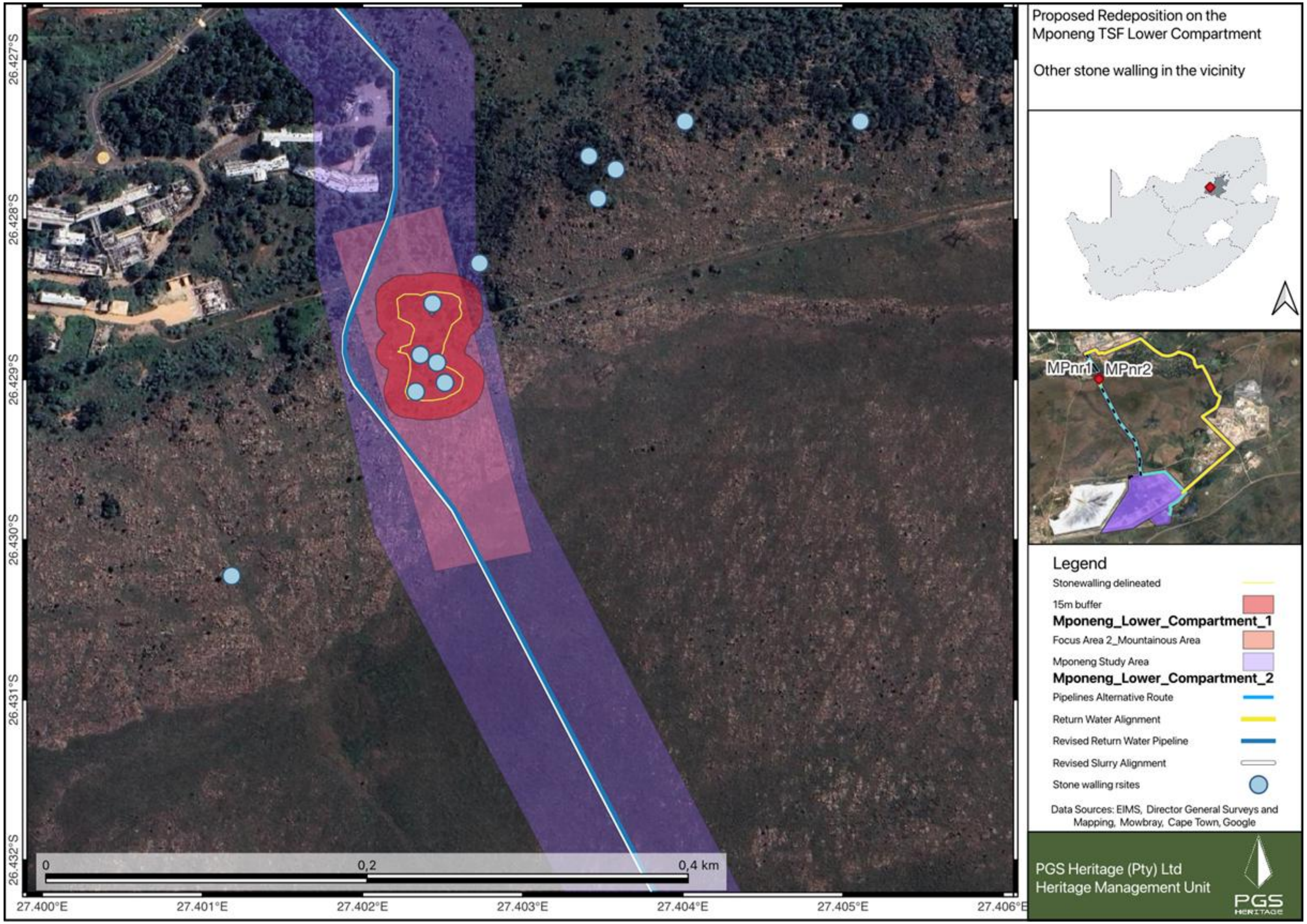


Figure 95: Stone-walled sites both within the Mponeng TSF development area and adjacent to the study area (PGS Heritage, 2026)

7.14 PALAEONTOLOGY

Cultural Heritage in South Africa, including all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include "all objects recovered from the soil or waters of South Africa, including archaeological and **palaeontological objects** and material, meteorites and rare geological specimens". Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

According to the Palaeontological Impact Assessment Report (Banzai Environmental, 20256) attached in **Appendix G**, the local geology comprises sedimentary and volcanic strata of the Pretoria Group, namely the Rooihoogte, Timeball Hill, and Hekpoort Formations (Vt and Vh), which form part of the Transvaal Supergroup, as well as post-depositional diabase (di) intrusions (**Figure 96**). According to the SAHRIS Palaeosensitivity map, the Rooihoogte and Timeball Hill Formations are classified as High sensitivity (orange), the Hekpoort Formation has a Moderate sensitivity (green), and the diabase is rated as having Zero palaeontological sensitivity (grey) (Almond *et al.*, 2013; SAHRIS website, **Figure 97**, **Table 46**). In alignment with these sensitivities, the Department of Forestry, Fisheries and the Environment (DFFE) screening tool identifies the broader study area as falling within a High (red) palaeontological sensitivity zone (**Figure 98**).

The Rooihoogte Formation is the earliest stratigraphic unit in the study area and is part of the Pretoria Group's lowermost succession. It is predominantly composed of reddish-brown to greenish-grey shales, ferruginous mudstones, and subordinate siltstones and sandstones, which were deposited in fluvial and deltaic environments. The preservation of palaeobiological structures, particularly Microbially Induced Sedimentary Structures (MISS) and rare stromatolitic horizons, has been facilitated by the fine-grained nature of these sediments. These structures represent some of the oldest preserved evidence of life on the Kaapvaal Craton (Altermann & Nelson, 1998; Button, 1986).

The Timeball Hill Formation, which is situated above the Rooihoogte Formation, is composed of well-bedded shales, mudstones, and characteristic banded iron formations (BIFs). These formations were deposited under low-energy, prodelta to distal marine shelf conditions. The unit is known for its preservation of rare acritarchs, stromatolites, and laminated organic-rich shales, which are microscopic organic-walled microfossils that are considered among the earliest indicators of eukaryotic life (Eriksson & Catuneanu, 2004; Altermann, 2001).

The Hekpoort Formation is primarily composed of subaerial basaltic and andesitic lava flows, with infrequent volcaniclastic interbeds, and it conformably overlies the Timeball Hill Formation. This formation, which dates back to approximately 2.05 billion years ago, documents a substantial volcanic event in the Pretoria Basin. The Hekpoort Formation is primarily unfossiliferous due to its status as an igneous unit. Nevertheless, rare instances of weathered interflow sedimentary horizons may contain microbial textures or MISS, which offer substantial but limited insights into the evolution of the terrestrial biosphere during the Paleoproterozoic (Eriksson *et al*., 2001). This limited but scientifically pertinent potential is reflected in its Moderate palaeontological sensitivity rating.

The diabase intrusions in the study area are Jurassic in age and generally newer than the sedimentary and volcanic strata they cut. They were emplaced during later tectono-thermal events associated with Gondwana rifting. The sills and dykes formed by these medium-grained, mafic intrusive rocks are exclusively igneous in origin and, as a result, are considered palaeontologically sterile in nature. Furthermore, the placement of diabase may result in the local thermal alteration or obliteration of fossil preservation in the host rocks in the vicinity (Johnson et al., 2006).

Table 46: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (SAHRIS, 2025)

COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

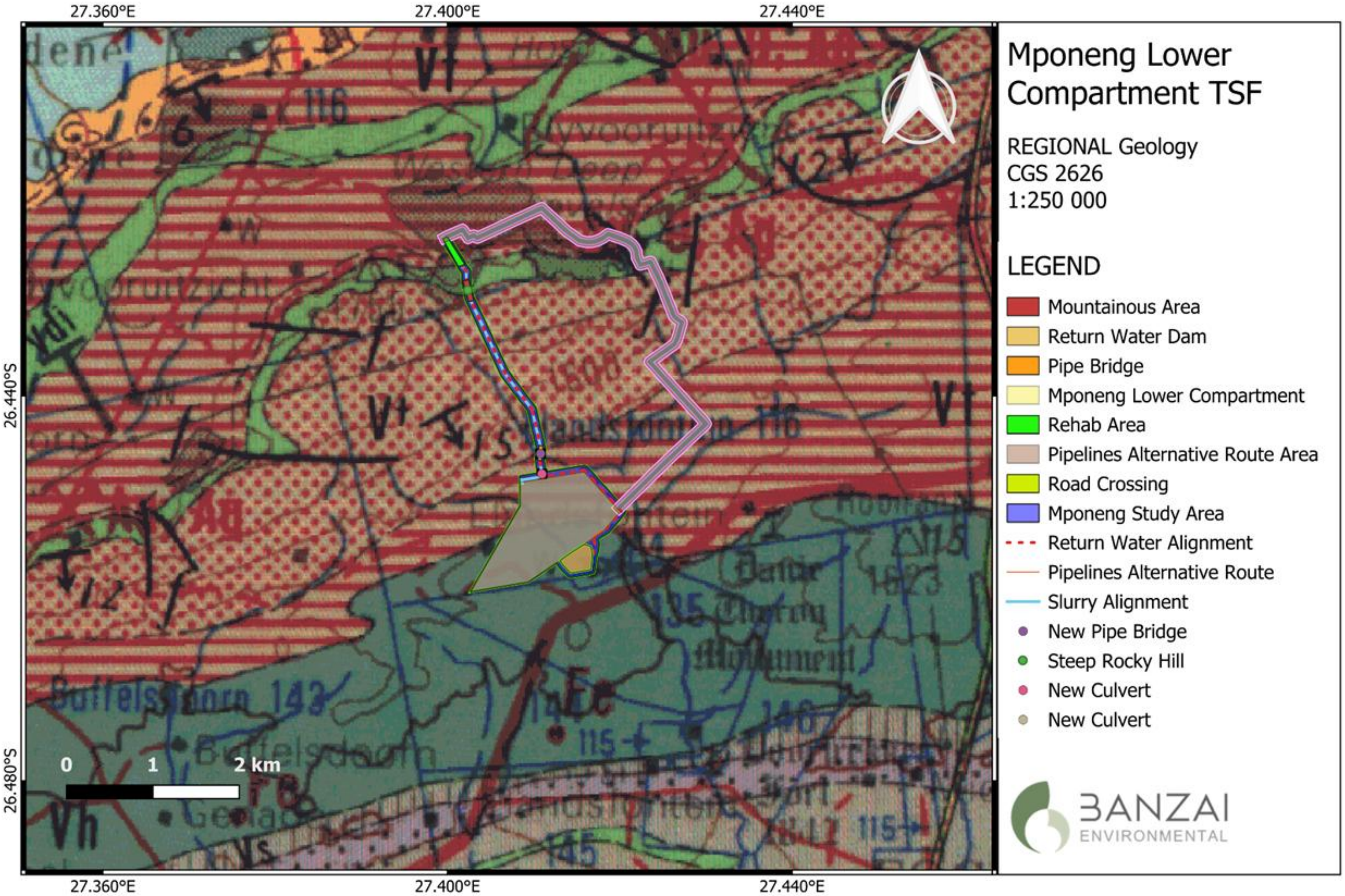


Figure 96: Extract of the 1:250 000 West Rand 2626 (1986) Geological Map (Council for Geosciences, 1986; Banzai Environmental, 2025)

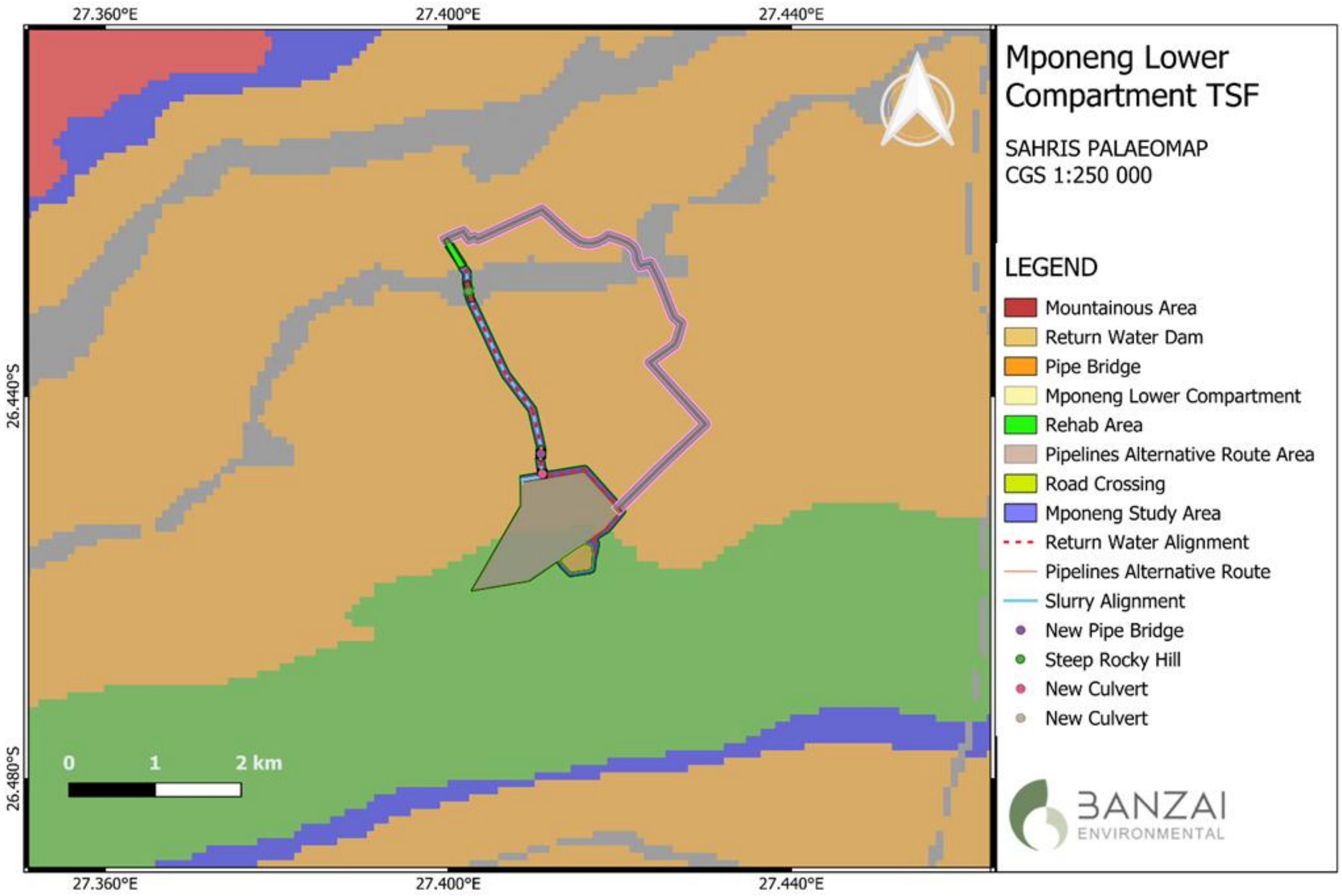
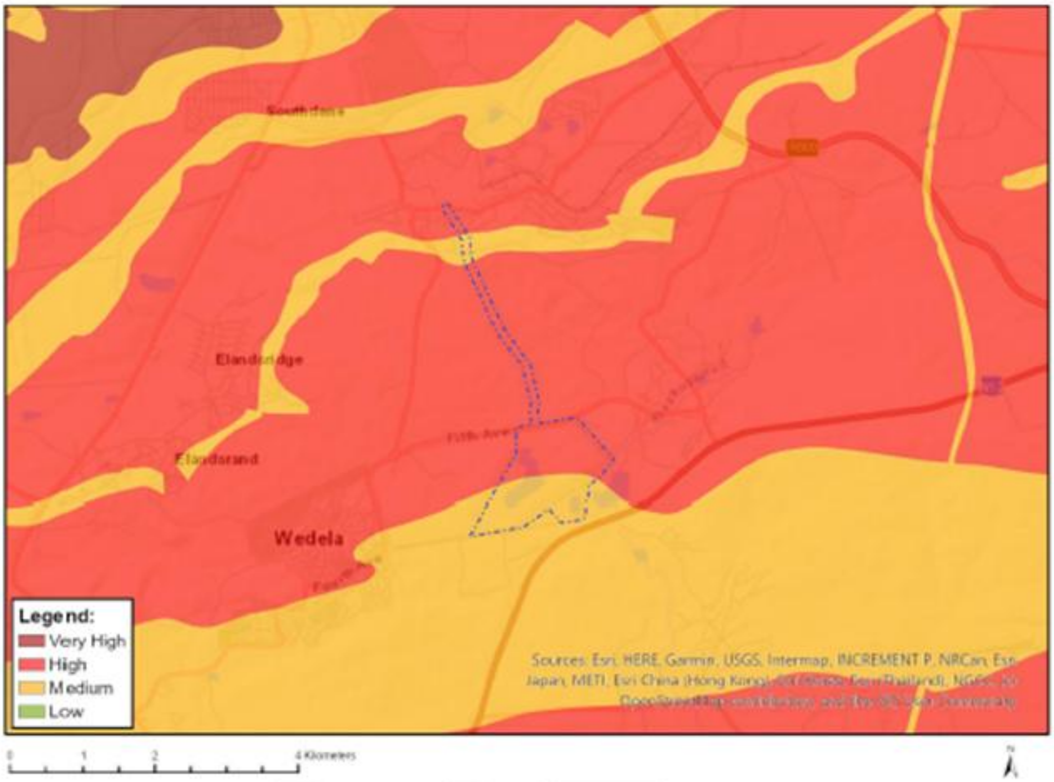


Figure 97: Extract of the SAHRIS PalaeoMap indicating the High (orange), Moderate (green) and Zero (grey) Palaeontological Sensitivity of the proposed study area (Banzai Environmental, 2025)

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Features with a High paleontological sensitivity
Medium	Features with a Medium paleontological sensitivity

Figure 98: Map of relative palaeontology theme sensitivity (DFFE, 2025)

The SAHRIS PalaeoMap (**Figure 97**) indicates a High (orange) Palaeontological Sensitivity which is in agreement with the DFFE Screening Tool (**Figure 98**). A site-specific field survey of the assessment area was conducted on foot in August 2025. No fossiliferous outcrops were detected during the site investigation. The Very High Palaeontological Sensitivity of the SAHRIS Palaeomap and DFFE Screening Tool Report is thus contested with actual findings in the field. The study area is mantled by lush grassy vegetation and mainly utilised for agricultural activities as indicated in **Section 7.3**.

8 ENVIRONMENTAL IMPACT ASSESSMENT

This section aims to identify and assess the potential environmental impacts associated with the proposed Mponeng Lower Compartment TSF. This impact assessment has been used to guide the identification and selection of preferred alternatives, and management and mitigation measures, applicable to the proposed activities.

8.1 IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The approach may be altered or substituted on a case-by-case basis if the specific aspect being assessed requires such- such instances require prior EIMS Project Manager approval. The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the S to determine the overall final significance rating (FS). The impact assessment was applied to identified alternatives (where applicable).

8.1.1 DETERMINATION OF ENVIRONMENTAL RISK

The final significance (FS) of an impact or risk is determined by applying a prioritisation factor (PF) to the post-mitigation environmental significance. The significance is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact. For the purpose of this methodology the consequence of the impact is represented by:

$$\boldsymbol{C = \frac{(E + D + M + R) * N}{4}}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in **Table 47** below.

Table 47: Criteria for Determining Impact Consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).

	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)
	2	Short term (1-5 years, less than project lifespan)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction/ operation/ decommissioning).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected, or affected environmental components are already degraded)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; moderate improvement for +ve impacts; or where change affects area of potential conservation or other value, or use of resources).
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease; high improvement for +ve impacts; or where change affects high conservation value areas or species of conservation concern)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts; or disturbance to pristine areas of critical conservation value or critically endangered species)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring very high time and cost.
	5	Irreversible Impact.

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per **Table 48**. It is noted that both environmental risks as well as environmental impacts should be identified and assessed. Environmental Risk can be regarded as the potential for something harmful to happen to the environment, and in many instances is not regarded as something that is expected to occur during normal operations or events (e.g. unplanned fuel or oil spills at a construction site). Probability and likelihood are key determinants or variables of environmental risk. Environmental Impact can be regarded as the actual effect or change that happens to the environment because of an activity and is typically an effect that is expected from normal operations or events (e.g. vegetation clearance from site development results in loss of species of concern). Typically, the probability of an unmitigated environmental impact is regarded as highly likely or certain (management and mitigation measures would ideally aim to reduce this likelihood where possible). In summary, environmental risk is about what could happen, while environmental impact is about what does happen

Table 48: Probability Scoring / Likelihood Scoring

Probability	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

The result is a qualitative representation of relative significance associated with the impact. Significance is therefore calculated as follows:

$$S = C \; x \; P$$

Table 49: Determination of Significance

Consequence	5- Very High[3]	**5**	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
	Probability					

The outcome of the significance assessment will result in a range of scores, ranging from 1 through to 25. These significance scores are then grouped into respective classes as described in **Table 50**.

[3] In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative important of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.

Table 50: Significance Scores

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
>4,25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact significance was determined for each impact without relevant management and mitigation measures (pre-mitigation significance), as well as post implementation of relevant management and mitigation measures (post-mitigation significance). This allows for a prediction in the degree to which the impact can be managed/mitigated.

8.1.2 IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

i. Cumulative impacts; and

ii. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) was applied to each impacts' post-mitigation significance (post-mitigation). This prioritisation factor does not aim to detract from the significance ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF is applied to the post-mitigation significance based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 51: Criteria for Determining Prioritisation

Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in **Table 51**. The impact priority is therefore determined as follows:

Priority = CI + LR

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 1.5 (Refer to **Table 52**).

Table 52: Determination of Prioritisation Factor

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance (FS), the PF is multiplied by the post-mitigation significance scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a higher significance).

Table 53: Final Environmental Significance Rating

Significance Rating	Description
<-25	**Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offset's may be necessary.**
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated.

Significance Rating	Description
0	No impact
1 to 4.25	Low positive
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive
>13.75	High positive

The significance ratings and additional considerations applied to each impact is used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants is applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

8.2 IMPACTS IDENTIFIED

This Section presents the potential impacts that have been identified during the EIA. It should be noted that the Scoping Report was made available to I&AP's for review and comment and their comments and concerns were addressed in the final Scoping report submitted to the CA for adjudication. The results of the public consultation was used to update the identified potential impacts during this EIA Phase. It should be further noted that this EIA Report was made available to I&APs for review and comments, all comments and/or recommendations to assess other potential impacts not currently identified by the EAP and specialists will be considered by the EAP and specialists for the Final EIA Report to be submitted to the Competent Authority.

Table 54 provides the list of potential impacts identified while **Table 55** provides the type of impact and the anticipated phase of the impact. Without proper mitigation measures and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested.

When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, such as regional deterioration of air quality, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a cumulative effect on a regional scale are related to the transportation vectors that they act upon. For example, air movement patterns result in localised air quality impacts having a cumulative effect on air quality in the region. Similarly, water acts as a vector for distribution of impacts such as contamination across a much wider area than the localised extent of the impacts source. At a finer scale, there are also impacts that have the potential to result in a cumulative effect, although due to the smaller scale at which these operate, the significance of the cumulative impact is lower in the broader context.

Table 54: Identified potential environmental impacts

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Site preparation (Planning)	Vegetation clearance for pipelines, return water dam, pipeline bridge, pipeline culvert, TSF stabilization, access roads Planned placement of infrastructure Decommissioning of landfill and removal of waste material Stabilization of Landfill / TSF material Topsoil stripping for pipelines and access roads	○ Surface water contamination	○ Temporary disturbance of wildlife	○ Employment opportunities	○ Disturbance / destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
Human resources management (Planning)	Employment/recruitment I&AP consultations Environmental awareness training Integration with Municipalities' strategic long-term planning			○ Employment opportunities	
Earthworks (Construction)	Stripping and stockpiling of soils Levelling, grubbing and bulldozing Removal of waste and cleared vegetation Preparing trenches and foundations Establishing storm water management measures Establishment of firebreak	○ Erosion due to storm water runoff ○ Impact due to topsoil stripping ○ Surface water contamination ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands	○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e., noise, dust, etc.). ○ Health and safety aspects related to radiation and health as well as TSF stability ○ Impact on existing infrastructure (i.e., roads, fences, etc.) ○ Perceptions and expectations ○ Employment opportunities	○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
Civil Works (Construction)	Establishment of infrastructure and services Mixing of concrete and concrete works Establishment of surface and sub-surface dirty water systems	○ Erosion due to storm water runoff ○ Impact due to topsoil stripping	○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e., noise, dust, etc.).	○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
	Temporary sewage and sanitation Establishment of waste area and upgrade of RWD Construction of bridge and culvert General site management	○ Surface water contamination ○ Ground water contamination ○ Cone of depression ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands	○ Displacement of faunal species	○ Health and safety aspects related to radiation and health as well as TSF stability ○ Impact on existing infrastructure (i.e., roads, fences, etc.) ○ Perceptions and expectations ○ Employment opportunities	
Deposition at TSF (Operation)	Deposition of tailings Maintenance and management of stormwater system Water management	○ Cone of depression ○ Impacts on surface water quality due to leachate ○ Impacts on groundwater quality due to leachate ○ Loss of flow paths ○ Emissions and dust		○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e., noise, dust, etc.) ○ Health and safety aspects related to radiation and health as well as TSF stability	
Closure and Rehabilitation of TSF (Decommissioning and Closure)	Revegetation Slope stabilisation Erosion control	○ Emissions and dust	○ Alien and invasive species	○ Safety and security (i.e., access to properties, theft, fire hazards, etc.) ○ Visual and dust	
Maintenance (Post closure)	Initiate maintenance and aftercare program Environmental aspect monitoring	○ Surface and groundwater quality	○ Alien and invasive species	○ Visual ○ Site security and access control ○ Health and safety aspects related to radiation and health as well as TSF stability	

Table 55: Impact identification matrix

Phase	Activity	Environmental Component (- = negative impact; + = positive impact)													
		Air Quality (AQ)	Geology (G)	Hydrology (H)	Groundwater (GW)	Surface water/ wetlands (W)	Noise (N)	Soils (S)	Visual / Landscape (V)	Flora (FL)	Fauna (FA)	Health and safety (H&S)	Socio-economic (SE)	Palaeontology (P)	Cultural Heritage (C)
Construction	Site establishment	-			-	-	-	-	-	-	-		+	-	-
	Spring Diversion		-	-	-	-		-		-	-				
	Decommissioning of landfill and TSF Stabilization	-					-			-	-	+	+		
	Establishment of necessary infrastructure	-	-	-	-	-	-	-	-	-	-			-	-
Operation	Deposition of tailings onto existing TSFs	-		-	-		-		-			-	-		
	Maintenance and management of infrastructure				-	-		-		-	-				
	Clean and Dirty water management			-	-	-		-				+	+		
Closure and Rehabilitation	Revegetation	+				+		+	+	+	+	+	+		
	Erosion control			+	+	+		+		+	+	+	+		
Post Closure	Initiate maintenance and monitoring programmes				+	+		+		+	+	+	-		
	Environmental aspect monitoring and remediation	+		+	+	+		+	+	+	+	+	-		

8.3 DESCRIPTION AND ASSESSMENT OF POTENTIAL IMPACTS

The following potential impacts were identified during the assessment and were assessed in terms of nature, significance, consequence, extent, duration and probability. Mitigation / management measures to minimise potential negative impacts or enhance potential benefits are put forward in this EIA Report. Refer to **Appendix H** for the detailed impact assessment matrix.

8.3.1 GROUNDWATER (GEOHYDROLOGICAL) IMPACTS

This section presents the identified geohydrological impacts as per the Geohydrological Impact Assessment undertaken by MvB Consulting (2025).

8.3.1.1 DESCRIPTION OF IMPACT

The primary risk from a geohydrological point is that the proposed project poses is the seepage of contaminants from the TSF into the aquifer, and the migration of these contaminants into downgradient receptors. It was established that there is a risk of contaminants from the Mponeng Lower Compartment TSF seeping into the groundwater. This risk is, however, minimal considering that seepage rates are currently low - ranging from 12 to 20 mm/year. In addition, groundwater occurrences in the study area are predominantly restricted to the weathered and fractured rock aquifer in the Transvaal Formations and Dolomitic and Karst Aquifers. Although the dolomite aquifer is the most prominent aquifer in the region, it does not play any role in the activities at the Mponeng Lower Compartment TSF. The dolomite is ±400m below surface at the Mponeng Lower Compartment TSF site. Evidence has shown that there is no connectivity between the weathered / fractured aquifer and the underlying dolomite aquifer. Even in compartments where the dolomite aquifer is dewatered the groundwater levels in the weathered / fractured aquifer remains unaffected. Groundwater recharge in the fractured aquifer is estimated at 31mm / annum with water occurring in the shallow weathered zone and water bearing fractures only. This is equal to approximately 4% of mean annual precipitation. The study found that the TSF is possibly impacting on the baseflow of the Elandsfonteinspruit. This stream is the only down-gradient receptor that may be directly impacted on by the current and proposed tailings deposition.

Recommencement of deposition on Mponeng Lower Compartment TSF requires the necessary environmental approval and the geohydrological study was conducted as part of this environmental process. The purpose of the study was to assess the potential impact from the Mponeng Lower Compartment TSF on the groundwater regime. A calibrated numerical groundwater flow and mass transport model was developed to simulate the following potential impacts:

- Contaminant seepage from the Mponeng Lower Compartment TSF with the additional deposition; and
- Effectiveness of proposed remedial options

A calibrated numerical groundwater flow and mass transport model was developed to simulate the following potential impacts on groundwater based on the specific scenario:

- No mitigation measures.
- A liner between the existing lower compartment and the proposed new tailings deposition.
- Plume containment through scavenger wells.
- Plume containment through tree plantations.

For purposes of the model, it is assumed that all mitigation measures start at the same time and are 100% effective on commencement. A comparison between the different scenarios, showing its effectiveness, is presented in **Table 56**. The modelling result is presented in **Table 56** and **Figure 99** to **Figure 102** indicate that the plume movement is in a south easterly direction towards the Elandsfontein Spruit. Based on the current impact using the 600 mg/L SO_4 Impact Area (m^2) impact matrix, the TSF in its current condition with no additional deposition, it was modelled to have 2 049 823m^2 impact area compared to 2 843 514m^2 for the no liner option, 1 720 106m^2 for lined facility, 2 638 597m^2 for Scavenger Boreholes and 1 767 158m^2 for an unlined TSF with phytoremediation.

Table 56: Comparison of the effectiveness of each remedial option (2060) (MvB, 2025).

Remedial Option	600 mg/L SO_4 Impact Area (m^2)	Improvement (m^2)
Current Impact Area	2 049 823	-
Do-Nothing Scenario after 35 Years	2 843 514	-
Lower Compartment TSF (Lined)	1 720 106	1 123 408 (39.5%)
Scavenger Boreholes	2 638 597	204 917 (7.2 %)
Evapotranspiration (Phytoremediation)	1 767 158	1 076 356 (37.9%)

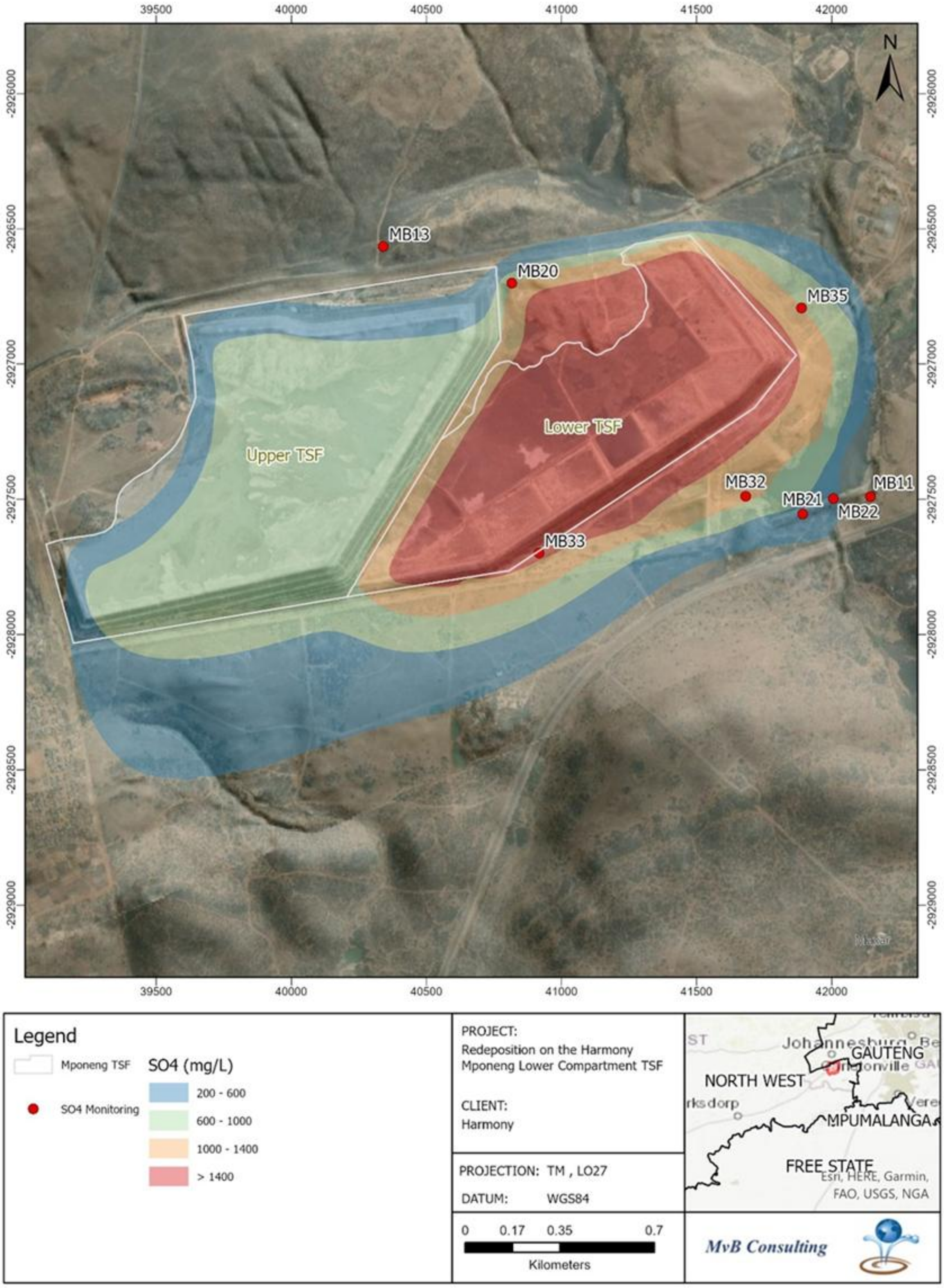


Figure 99: Plume migration by 2060 for Scenario 1 – No Mitigation (MvB, 2025)

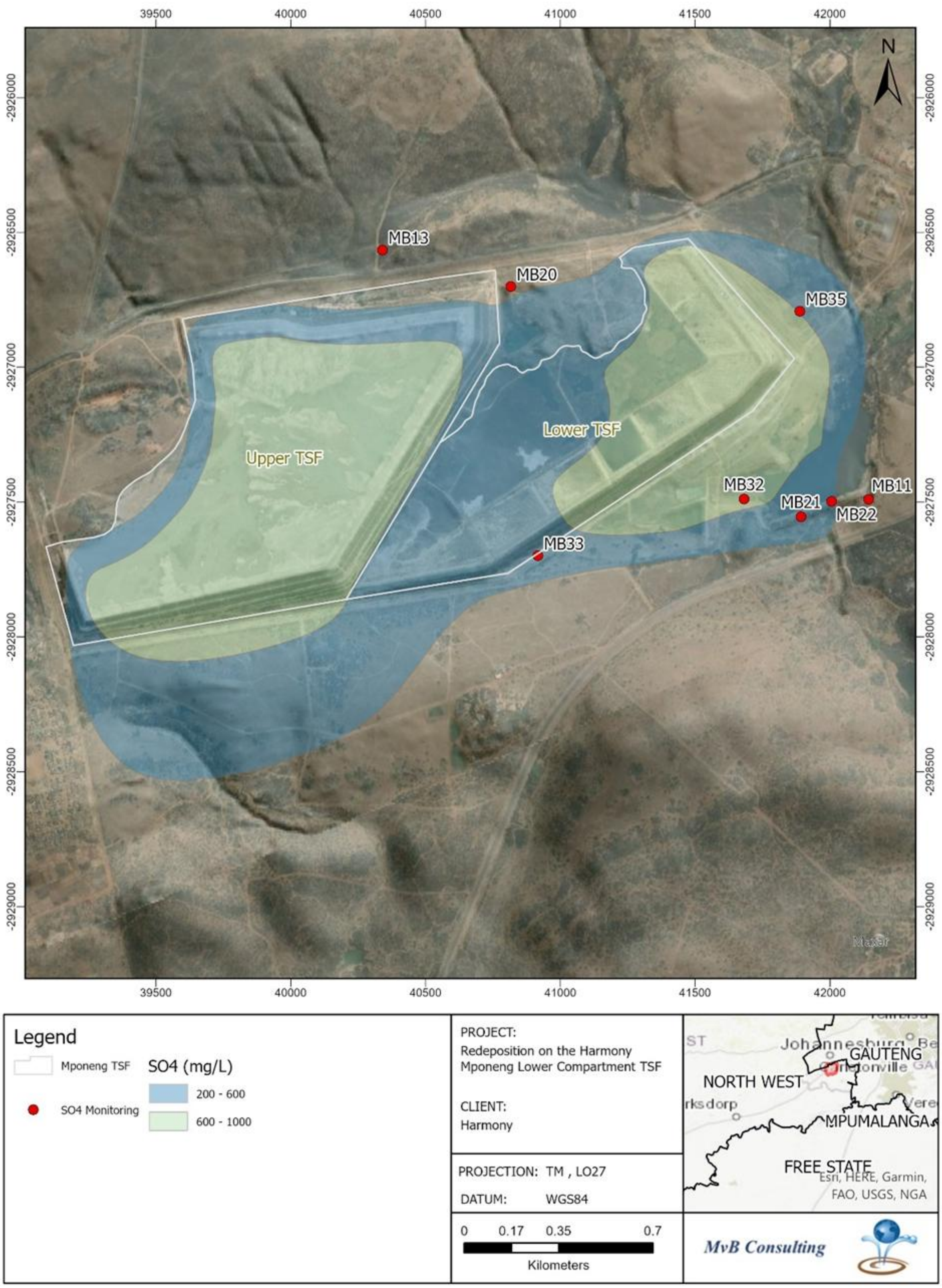


Figure 100: Plume migration by 2060 for Scenario 2 – Liner installation (MvB, 2025)

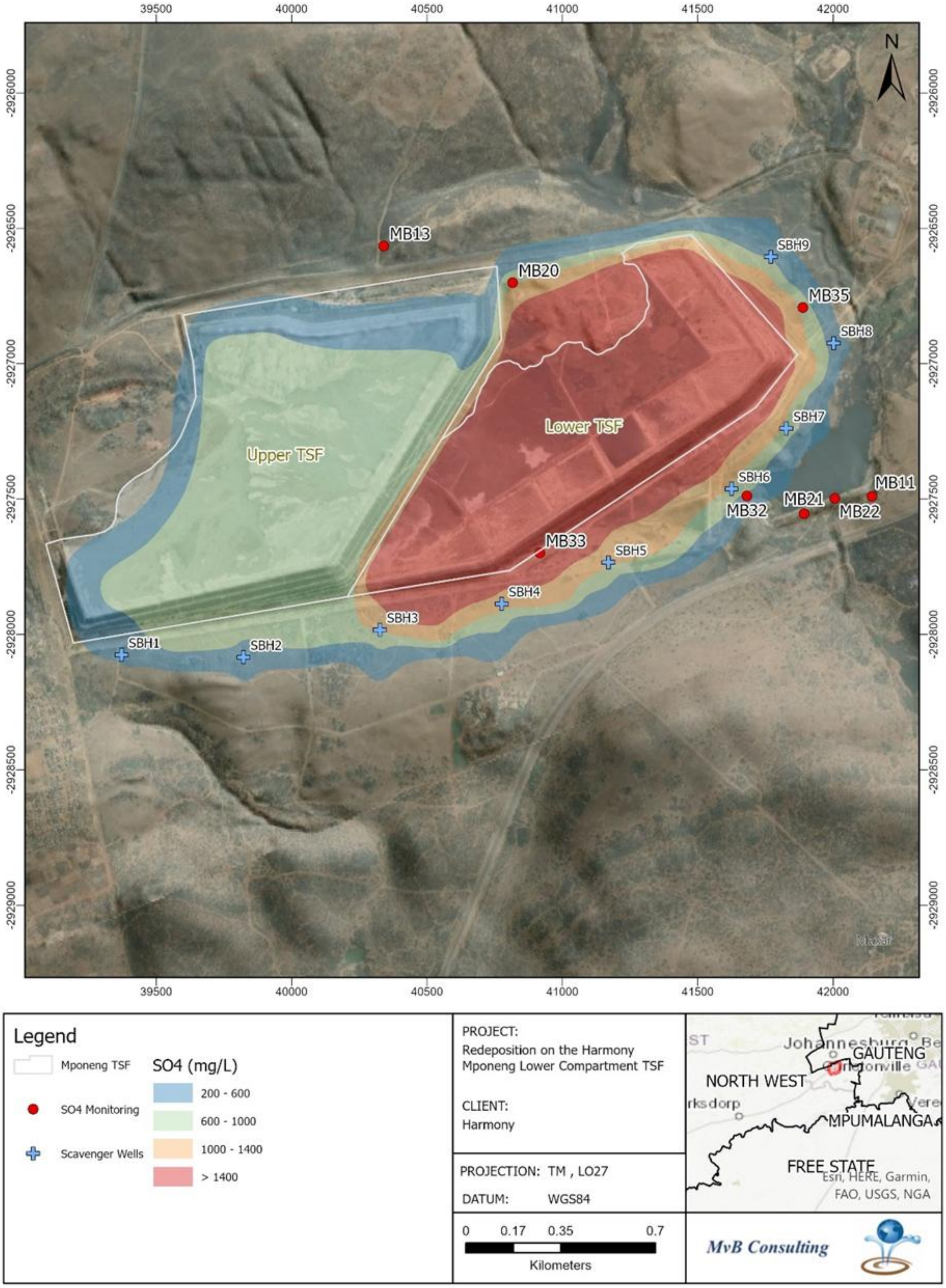


Figure 101: Plume migration by 2060 for Scenario 3 – No Liner with scavenger wells (MvB, 2025)

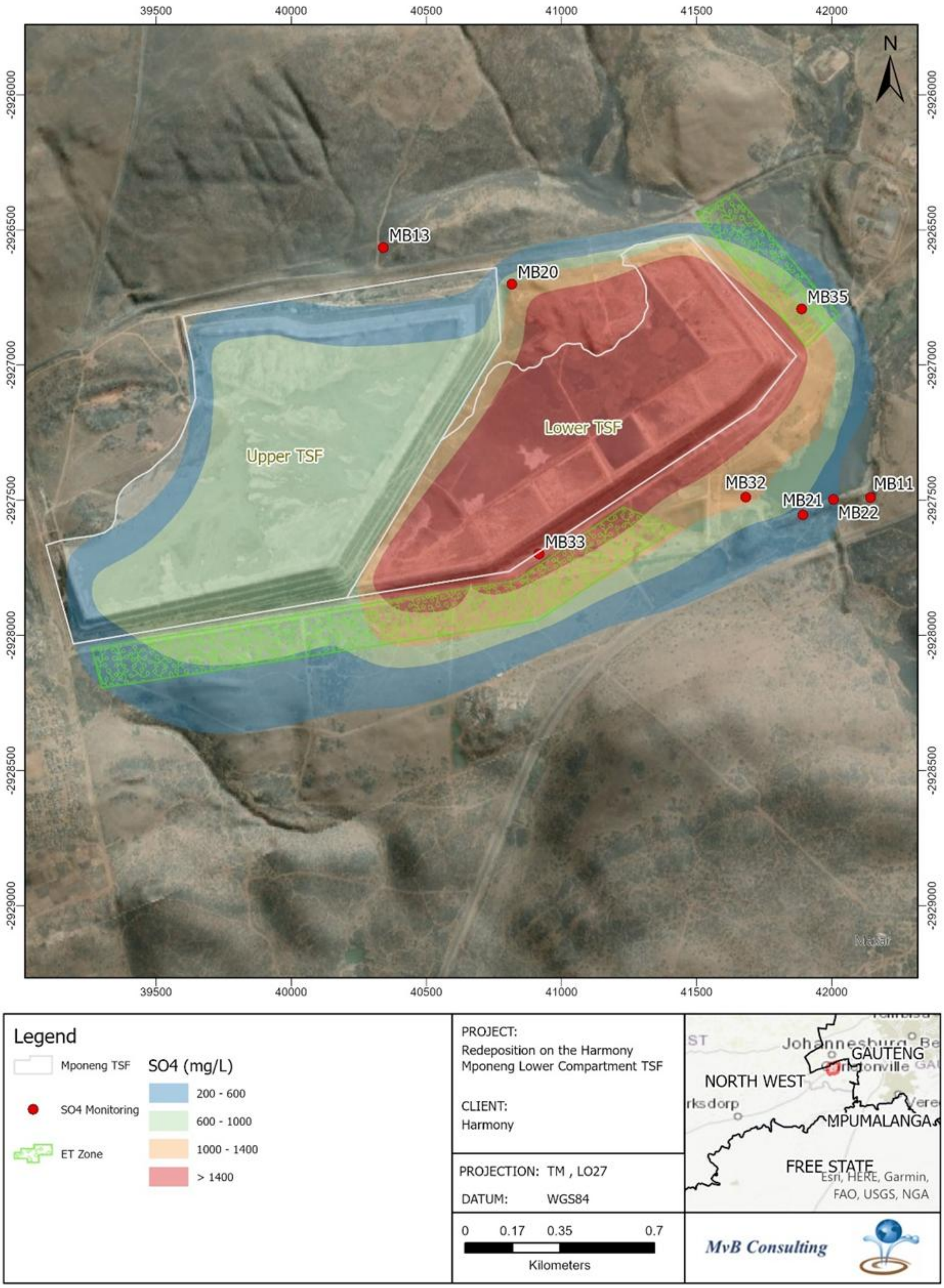


Figure 102: Plume migration by 2060 for Scenario 4 – No liner installed with evapotranspiration measures (MvB, 2025)

It is evident that lining the Mponeng Lower Compartment TSF is the best option. The benefit is, however, minimal when comparing it to the phytoremediation option, which is a much more cost-effective option. This option is therefore recommended as a suitable management option.

8.3.1.2 IMPACT RATING

The geohydrological impact assessment for the Mponeng Lower Compartment TSF is presented in **Table 57**.

Table 57: Mponeng Lower Compartment TSF groundwater impact assessment table (MvB, 2025).

Scenario	Impact Description	Phase	Pre-Mitigation	Post Mitigation	Final score
1	Groundwater contamination from MLC TSF (Unlined)	Operation	High Negative	High Negative	High Negative
2	Groundwater contamination from MLC TSF (Lined)	Operation	High Negative	Medium Negative	Medium Negative
3	Groundwater contamination from MLC TSF (Scavenger BH's)	Operation	High Negative	Medium Negative	Medium Negative
4	Groundwater contamination from MLC TSF (Phyto-Remediation)	Operation	High Negative	Medium Negative	Medium Negative
1	Groundwater contamination from MLC TSF (Unlined)	Decommissioning	High Negative	High Negative	High Negative
2	Groundwater contamination from MLC TSF (Lined)	Decommissioning	High Negative	Medium Negative	Medium Negative
3	Groundwater contamination from MLC TSF (Scavenger BH's)	Decommissioning	High Negative	Medium Negative	Medium Negative
4	Groundwater contamination from MLC TSF (Phyto-Remediation)	Decommissioning	High Negative	Medium Negative	Medium Negative

It is important to note that a numerical groundwater model is a representation of the real system. It is therefore at most an approximation, and the level of accuracy depends on the quality of the data that is available. This implies that there are always errors associated with groundwater models due to uncertainty in the data and the capability of numerical methods to describe natural physical processes.

8.3.1.3 CUMULATIVE IMPACT

The proposed project entails the disposal of hazardous waste to land in an area with similar facilities. Therefore, it would be generally anticipated that the cumulative impact would be significant. However, the area currently has low seepage rates ranging from 12 to 20 mm/year. In addition, evidence has shown that there is no connectivity between the weathered / fractured aquifer and the underlying dolomite aquifer. Even in compartments where the dolomite aquifer is dewatered the groundwater levels in the weathered / fractured aquifer remains unaffected. Subsequently, the cumulative impact is rated as medium-low, which means considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.

8.3.1.4 PROPOSED MITIGATION MEASURES

The following mitigation measures have been recommended:

- Implementing a spring capture system to divert clean groundwater away from the TSF.
- Diverting clean stormwater runoff from the northern area to prevent it from entering the seepage control infrastructure.
- For the “do-nothing” option (scenario 1) the Mponeng Lower Compartment TSF remains unlined. The only mitigation is the rehabilitation and decommissioning of the TSF during the closure (decommissioning) phase.
- For scenario 2, the Mponeng Lower Compartment TSF will be lined. This option will change the risk from High Negative to Low Negative during the operational and closure phases. This option has the best rating.
- For scenario 3, the drilling of scavenger boreholes were considered. This option will change the risk from High Negative to Low Negative during the operational and closure phases. This option has the lowest rating due to the maintenance requirements for scavenger boreholes.
- For scenario 4, the Mponeng Lower Compartment TSF will remain unlined, but the proposed phyto-remediation will be fully functional. This option will change the risk from High Negative to Low Negative during the operational and closure phases. This option has lower rating than a liner, but a better rating than the scavenger boreholes and is the recommended long-term management option.

It is evident from the assessment that the phyto-remediation is effective, and it is recommended that this option be considered. The installation of a liner and / or scavenger boreholes may improve the rehabilitation of the groundwater, but it is considered unnecessary as the phyto-remediation is effective on its own.

The Mponeng Operations WUL (Licence No: 08/C23E/AFGJCEl/12157 File No: 27/212/C523/12/1), dated 27 September 2022, list several requirements in terms of surface water monitoring. The geohydrologist recommended that this monitoring programme be maintained in additions to the following amendments: The exiting monitoring network is comprehensive and sufficient to quantify the impact from the RWD and the TSF. The boreholes are generally close to the TSF, referred to as source boreholes. It is important to drill monitoring boreholes further from the contaminant sources to be able to quantify plume migration, as well as close to the property boundary or receptors. The following is recommended in terms of monitoring:

- Groundwater levels.
- Groundwater quality.
- Data should be stored electronically in an acceptable database.
- On the completion of every sampling run a monitoring report should be written.
- Any changes in the groundwater levels and quality should be flagged and explained in the report.
- A compliance report can be submitted to DWS once a year, if required.
- A comprehensive bi-annual analysis of the dedicated monitoring boreholes.
- Groundwater levels should be monitored quarterly in the dedicated groundwater monitoring boreholes.
- Rainfall should be monitored daily.
- Samples should be submitted to a SANAS accredited laboratory. The following recommended parameters to be analysed for include:
    - pH.
    - Electrical Conductivity.
    - Total Dissolved Solids.
    - Total Alkalinity.

- Anions and Cations (Ca, Mg, Na, K, NO3, NH4, Cl, SO4, F, Fe, Mn, Al, Cr).

8.3.2 SURFACE WATER (HYDROLOGICAL) IMPACTS

This section presents the identified hydrological impacts as per the Hydrological Impact Assessment undertaken by Hydrologic Consulting (2026).

8.3.2.1 EROSION OF SOILS

8.3.2.1.1 DESCRIPTION OF IMPACT

Eroded soils have the potential to cause sedimentation in downstream watercourses. The construction of infrastructure will lead to new areas being disturbed, resulting in the potential for soil erosion to occur during times of rainfall or through persistent streamflow, while the decommissioning of this infrastructure will result in the same. If not mitigated, erosion could continue during the operational phase, although it is expected that soils would settle to a degree, reducing the potential volume of erosion for any given rainfall event. The rehab/closure phase would have a similar risk of erosion to the construction phase.

The recommencement of deposition to the lower TSF compartment and its associated RW dam will limit the potential for eroded soils or sediment to enter the environment. Potential erosion is exacerbated by the moderately high runoff potential of soils which would cause a higher proportion of rainfall to be converted into runoff, thereby increasing the runoff potential erosivity. The limited surface area of the deposition line (consolidated area to be disturbed) will limit the overall erosion of soils from the deposition line during all project phases.

8.3.2.1.2 IMPACT RATING

The impact on surface water from soil erosion for the Mponeng Lower Compartment TSF is presented in **Table 58**.

Table 58: Impact on surface water from soil erosion (Hydrologic, 2026)

Scenario	Nature of Impact	Phase	Pre-Mitigation	Post Mitigation	Final score
All project Activities (Proposed route)	Negative	All	Medium Negative	Low Negative	Low Negative
All project Activities (Alternative Route)	Negative	All	Medium Negative	Low Negative	Low Negative

8.3.2.1.3 CUMULATIVE IMPACT

The cumulative impact on surface water from erosion of soils from the additional deposition of gold tailings on existing TSF involves an increase in the long-term risk of contamination. However, the current conditions and the additional deposition would likely result in moderate additional impacts on surface water from the TSF project. Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change of medium-low significance.

8.3.2.1.4 PROPOSED MITIGATION MEASURES

The following mitigation measures have been recommended:

- Ensure the existing stormwater management plan is sufficient (per GN704 and TSF-specific requirements).
- Monitor the TSFs to ensure areas of potential erosion are identified and managed appropriately.

- Rehabilitation should include topsoil replacement, re-vegetation, and maintenance/aftercare for disturbed areas, insofar as it should be developed for disturbed areas.
- The disturbed footprint should be minimised as far as practically possible.
- Rehabilitation should include topsoil replacement, re-vegetation, and maintenance/aftercare for disturbed areas, insofar as it should be developed for disturbed areas.
- Clearing of vegetation and associated excavation should be kept to a minimum, particularly in areas where soils are unstable.
- All disturbed areas must be rehabilitated (as soon as practically possible) to represent the previous undisturbed environment (soil, land-cover, slope) to limit the impact on receiving water resources (by limiting soil erosion).
- Disturbed areas or areas rehabilitated with soils should be stabilised as soon as possible using plants (e.g. grass) or other mechanical methods (e.g. profiling or erosion control blankets).
- Where erosion is nevertheless likely to occur, it is recommended to use settling facilities or silt fences.
- Construction should, where possible, be scheduled to take place during the dry season when rainfall and associated erosion potential is at its lowest. For longer construction periods of more than six months, construction should be scheduled such that exposure of soils (before the addition of hardstanding or rehabilitation) occurs mostly within the dry season as far as possible.
- Concurrent rehabilitation of the TSFs should ideally occur during the life of the TSFs. This would likely include revegetation with the final TSF's rehabilitation resulting in a fully vegetated site.
- River channels, furrows and trenches should not have any infrastructure placed within them unless essential.
- In considering the pipeline options, the resulting impact scoring shows no preference for either; however, the shorter (western) pipeline route would tend to be more favourable, given its reduced length and lower incidence of watercourse proximity.

8.3.2.2 POLLUTANTS ENTERING THE SURFACE WATER ENVIRONMENT

8.3.2.2.1 DESCRIPTION OF IMPACT

Potential pollutants are already limited by the design of the project, given the containing nature of the existing TSFs. Uncontrolled release of tailings or contaminated return water is possible and would be considered a residual risk (post-mitigation). A TSF failure, while a highly unlikely event, has the potential to cause severe pollution of the downstream environment, while poor operation of the TSF and RWD could see an unplanned spill from the RW Dam. Adequate engineering and operation of the TSF would mitigate these two potential impacts.

Operation of earthmoving machinery or maintenance of vehicles on-site during construction, operation, decommissioning, and rehab/closure (including the possible storage or handling of hydrocarbons) poses a potential source of hydrocarbon contamination regarding the surface water environment. Vehicles and machinery should consequently be well maintained and stored/parked with drip trays and with an emergency response strategy for unforeseen hydrocarbon spills. With regards to the TSF, potential pollutants are already limited by the design of the project, given the containment nature of the TSF.

8.3.2.2.2 IMPACT RATING

The impact on surface water from potential pollutants entering surface water is presented in **Table 59.**

Table 59: Impact on surface water from potential pollutants (Hydrologic, 2026)

Scenario	Nature of Impact	Phase	Pre-Mitigation	Post Mitigation	Final score
All project Activities (Proposed route)	Negative	Construction	Medium Negative	Low Negative	Low Negative
All project Activities (Alternative Route)	Negative	Construction	Medium Negative	Low Negative	Low Negative
All project Activities (Proposed route)	Negative	Operation & Decommissioning	High Negative	Low Negative	Medium Negative
All project Activities (Alternative Route)	Negative	Operation & Decommissioning	High Negative	Low Negative	Medium Negative

8.3.2.2.3 CUMULATIVE IMPACT

The cumulative impact on surface water from erosion of soils from the additional deposition of gold tailings on existing TSF involves an increase in the long-term risk of contamination, primarily through enhanced seepage and surface water runoff. However, the current conditions and the additional deposition would likely result in moderate additional impacts on surface water from the TSF project provided that the project aspects such as clean and dirty water diversion systems, liner (if required) and/or phytoremediation. It is highly probable/definite that the impact will result in spatial and temporal cumulative change of medium-low significance.

8.3.2.2.4 PROPOSED MITIGATION MEASURES

The following mitigation measures have been recommended:

- Ensure the existing stormwater management plan is sufficient (per GN704 and TSF-specific requirements).
- Monitor the TSFs and pipelines to identify any potential failures/slumps.
- Maintain and operate the TSFs/RWD to limit the potential for overfilling of the RWD that leads to a spill.
- Keep activity within the managed dirty water footprint where possible.
- Ensure vehicles are regularly serviced so that hydrocarbon leaks are limited.
- Use drip trays for stationary vehicles or otherwise park over areas suited to their storage (e.g. with an oil interceptor)
- Designate a single location for refuelling and maintenance where possible.
- Keep a spill kit on site to deal with any hydrocarbon leaks.
- All hydrocarbon spillages must be clean and the contaminated soil must be removed from site and disposed at a hazardous waste facility.
- Undertake surface water monitoring to enable change detection related to contaminants originating from the site.

8.3.2.3 INCREASE IN RUNOFF

8.3.2.3.1 DESCRIPTION OF IMPACT

The Mponeng Lower Compartment TSF is a decommissioned TSF that was presumably already managed from a stormwater perspective. It is assumed that the TSF had a containment philosophy in place, as enabled by the self-containing TSF basin, toe paddocks, and RW Dam, with overall runoff from the TSF site decreased to near zero (before any treatment and discharge). As such, the recommencement of the Mponeng TSF will result in a negligible change in runoff given a similar footprint and containment philosophy. Changes in runoff are consequently due to the construction of the slurry and return water lines alone (based on the brownfield status of the TSF).

The proposed construction of the slurry and return water lines (plinths) will increase impermeable hardstanding, although the impermeable area is negligible compared to the greater Mponeng operation. **Figure 7** illustrates the area of hardstanding (plinths) associated with a pipeline. The potential use of a gravel or dirt-based access road is expected, in which case its impact will relate more to compaction. There is consequently a limited area of hardstanding that would increase runoff, with changes in runoff potentially immeasurable. This minimal impact informs the recommended mitigation, which has been kept.

Impermeable areas would relate to the construction, operational, and decommissioning phases and not the rehab/closure phase. Compaction resulting from the movement of machinery and use of laydown areas may be basic (in association with the limited impact). The minor nature of the impact and recommended mitigation means that there is little difference between the impact before and after mitigation noticeable at the activity level; however, it is not at the site level due to the small area of work. Reducing the duration and area over which machinery operates, or over which laydown areas are utilised, would reduce the influence of compaction. Compaction would primarily relate to the construction, decommissioning, and rehab/closure phases.

8.3.2.3.2 IMPACT RATING

The impact on surface water from increased runoff is presented in **Table 60**.

Table 60: Impact on surface water from increased runoff (Hydrologic, 2026)

Scenario	Nature of Impact	Phase	Pre-Mitigation	Post Mitigation	Final score
All project Activities (Proposed route)	Negative	Construction, Operation & Decommissioning	Medium Negative	Medium Negative	Medium Negative
All project Activities (Alternative Route)	Negative	Construction, Operation & Decommissioning	Medium Negative	Medium Negative	Medium Negative
All project Activities (Proposed route)	Negative	Rehabilitation / Closure	Medium Negative	Medium Negative	Medium Negative
All project Activities (Alternative Route)	Negative	Rehabilitation / Closure	Medium Negative	Medium Negative	Medium Negative

8.3.2.3.3 CUMULATIVE IMPACT

The cumulative impact on surface water from erosion of soils from the additional deposition of gold tailings on existing TSF involves an increase in the long-term risk of contamination, primarily through enhanced seepage and surface water runoff. However, the current conditions and the additional deposition would likely result in moderate-low additional impacts on surface water from the TSF project provided that the project aspects such as clean and dirty water diversion systems, liner (if required) and/or phytoremediation. It is highly probable/definite that the impact will result in spatial and temporal cumulative change of medium-low significance.

8.3.2.3.4 PROPOSED MITIGATION MEASURES

The following mitigation measures have been recommended:

- Limiting the time and area over which machinery operates will limit the compaction of soils on the site.
- Divert clean water run-on away from the TSF.
- Undertaking the activities preferably in dry conditions. Avoid construction activities during wet / rainy days or implement adequate additional controls.

8.3.2.4 **FLOOD RISK**

8.3.2.4.1 DESCRIPTION OF IMPACT

Flood risk is both an impact on the proposed recommencement of deposition on the Mponeng Lower Compartment TSF (flooding originating beyond the TSF) and on the environment (flooding originating from the TSFs) and includes:

- A TSF failure resulting in downstream flooding (flooding originating from the TSF);
- Flooding from the either river system to the north or south of the TSFs (flooding originating beyond the TSFs); and
- Surface water run-on towards the TSFs (flooding originating beyond the TSFs).

This risk is expected to be present during the construction, operational, decommissioning and rehab/closure phases (flooding originating beyond the TSFs) and during the operational, decommissioning and rehab/closure phases (flooding originating from the TSFs). The proposed recommencement of deposition will likely have minimal flood risk in relation to the increase height of the TSF, however, flood risk from the TSF may be increased due to increased TSF volume. A quantified assessment of flooding would need to consider the actual fluvial flood risk to the TSFs (from the adjacent river systems).

A quantified assessment of flooding would need to consider the actual fluvial flood risk to the TSF and pipelines (from the adjacent river systems). This understanding of flooding is important given the pipelines which cross rivers or come close to them (within 100m) and the position of the Lower TSF Compartments and associated RW Dam. At its closest, the RW Dam is offset approximately 100m from the dam to the south-east, while the TSF is 168m away from the dam. A TSF (given its high risk regarding failure) warrants the consideration of the most significant of flood events, including the probable maximum flood (PMF), which may be sufficiently large to overtop the RW dam or reach the base of the Lower TSF Compartment.

The consequence of flooding is potentially severe, however, flooding originating beyond the TSFs is expected to have been mitigated (to at least a degree) through the toe paddocks and associated bunding that hydraulically separates the TSFs from the adjacent environment. TSF failure (while highly unlikely to occur), has both flooding and pollutant implications.

It is important to note that the impact assessment will be revised through the detailed and site-specific floodline risk assessment anticipated in February / March 2026 and will be submitted to the competent authority as part of the final submission. It should also be noted that the potentially severe impact of flood risk is not adequately conveyed by the impact table below since the probability of extreme flooding is low, resulting in the impact appearing less significant than may be warranted

8.3.2.4.2 IMPACT RATING

The impact on surface water from river and surface water flood risk is presented in **Table 61**.

Table 61: River and surface water flood risk (Hydrologic, 2026)

Scenario	Nature of Impact	Phase	Pre-Mitigation	Post Mitigation	Final score
All project Activities (Proposed route)	Negative	Construction & Rehabilitation / Closure	Low Negative	Low Negative	Low Negative
All project Activities (Alternative route)	Negative	Construction & Rehabilitation / Closure	Low Negative	Low Negative	Low Negative
All project Activities (Proposed route)	Negative	Operation & Decommission	Low Negative	Low Negative	Low Negative
All project Activities (Alternative route)	Negative	Operation & Decommission	Low Negative	Low Negative	Low Negative

8.3.2.4.3 CUMULATIVE IMPACT

The cumulative impact of additional gold tailings deposition on an existing TSF areas on surface water flood risk is primarily characterized by increased potential for overtopping, higher erosion rates, and greater magnitude of contamination during flooding events. Because gold tailings are fine-grained (silt) and often uncompacted, they are highly vulnerable to water erosion, which can lead to structural failure and the release of contaminated sediments into nearby water bodies. Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change of moderate-high cumulative impact of flood risk on the surface water bodies in the area especially due to the presence of spring in the area as well as the potential differential settling of material between the existing material deposited a couple of decades ago and the new material. However, it should be noted that engineering designs proposes the undertaking of dynamic ground compaction and spring diversion system to improve the stability and reduce the risk of structural failure which can reduce the cumulative impact.

8.3.2.4.4 PROPOSED MITIGATION MEASURES

The following mitigation measures have been recommended:

- Ensure the existing stormwater management plan is sufficient (per GN704 and TSF-specific requirements).
- Ensure that flood protection of the TSFs is sufficient to manage flood risk from both adjacent river systems (north and south) and stormwater run-on.
- Develop the TSFs using sound engineering to limit the likelihood of a failure.
- Monitor the TSFs to identify any potential failures/slumps.
- Works should ideally not take place, nor infrastructure placed within 100m of any defined watercourse or within the 1:100-year flood-line given the applicability of GN 704. The linear nature of the deposition line means that some watercourse crossings, proximity to a watercourse, or intersection with a flood line are expected.
- The probable maximum flood (PMF) should be considered with regards to the safety of the TSF.
- Pipelines are to be installed above-ground on pre-cast concrete plinths. These plinths should make adequate allowance for flooding, whether from a river, drainage canal, furrow or from surface water (runoff).

8.3.3 IMPACTS ON FRESHWATER AND WETLANDS

This section presents the identified impacts on freshwater and wetlands features as per the Aquatics and Wetlands Impact Assessment undertaken by The Biodiversity Company (TBC) (2026).

8.3.3.1.1 DESCRIPTION OF IMPACTS

The assessed wetlands exhibit impacts at local scale. These impacts result from present and historical land use relating to agricultural practice, impoundments, access roads and to a large degree, 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 other mining practises, development of dams, urban build-up and traffic;
- Altered hydrological inputs resulting from changes to the surrounding landscape;
- Erosion induced from altered hydrodynamics in combination with the loss of wetland vegetation;
- Altered geomorphology from historical mining practises and development of dams within the wetlands; and
- Loss of wetland vegetation from continual disturbances, historical land use and the establishment of alien invasive flora species in some approaches of the wetlands).

Table 62 illustrates the potential aspects expected to threaten the integrity of sensitive receptors during the proposed activities. The pre- and post- mitigation significance ratings have been calculated considering various parameters, these results are presented in the subsequent tables. It should be noted that a decommissioning phase was not considered for this project due to TSFs sustaining extensive durations that exceed mining operations

Table 62: Activities and impacts relevant to the proposed activity (The Biodiversity Company, 2026)

Activity	Aspects and Impacts
Construction Phase	
Vegetation Clearing and Site Preparation; Excavation, Installation of pipelines; Construction of Culverts; Construction of pipe bridge; Storage of chemicals, mixes, and fuels with associated accident spills; Indiscriminate dumping of waste products or construction materials; Soil stockpiling and building material stockpiles; Operation of vehicles, equipment, and machinery.	Disturbance and degradation of wetland vegetation
	Alteration of surface topography (excavations, reshaping and compacting)
	Increased bare surfaces, runoff and potential for erosion
	Introduction and spread of alien and invasive vegetation
	Waste and pollutant spills
	Increased sediment loads to downstream reaches
	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
	Terrain alteration for pipeline and bridges
	Final Landscaping and reshaping
Operational Phase	
Vehicles and machinery driving in and through wetlands. Maintenance of vehicles and machinery. Storage of chemicals, mixes and fuel (Leak and spill hazard). Clearing of vegetation. Discharge of slurry, solvents, chemicals and hydrocarbons. Pipeline system failures TSF failure	Alteration of surface drainage and runoff
	Stormwater Management
	Trampling of wetland vegetation
	Proliferation of alien and invasive species
	Slurry and pollutant spills into water resources
	Water quality impairment

Indirect impacts from the TSF are potential to the wetlands identified to be at risk, whereas direct impacts are expected from the pipelines and bridges for the wetlands. Emphasis was therefore placed on minimising impacts by means of mitigation. The potential impacts on HGM 3 are mitigated by distance, while impacts on HGM 4 are mitigated by the presence of existing infrastructure. It should be noted that the project presents an opportunity to rehabilitate the watercourses which would result in a positive impact.

8.3.3.1.2 IMPACTS RATING AND MITIGATION MEASURES

The impacts and mitigation measures on freshwater and wetlands is presented in **Table 63.**

Table 63: Summative results of the Impact Assessment conducted for the proposed project, along with the prescribed mitigation measures (TBC, 2026)

<table>
<tr><th>Impact</th><th>Phase</th><th>Pre-mitigation ER</th><th>Post-mitigation ER</th><th>Final score</th></tr>
<tr><td>Direct loss, disturbance and degradation of wetlands</td><td>Construction</td><td>Medium Negative</td><td>Low Negative</td><td>Low Negative</td></tr>
<tr><td colspan="5">Mitigation
Minimise the construction footprint and restrict vegetation clearing to the designated construction area.
Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.
Limit vehicle and machinery movement near the wetland to designated routes.
Limit all other activities in watercourse areas to those explicitly authorised.</td></tr>
<tr><td>Alteration of surface topography (reshaping and compacting)</td><td>Construction</td><td>Medium Negative</td><td>Low Negative</td><td>Medium Negative</td></tr>
<tr><td colspan="5">Mitigation
Restrict vehicle and machinery usage to designated paths.
Ensure that sediment and erosion controls are incorporated into the suggested stormwater management plan.
Limit construction where possible to the dry season, especially for activities that occur within the watercourse or its buffer area.
Ensure that any unplanned establishment of concentrated flow paths together with any denuded areas are appropriately rehabilitated and revegetated.
Ensure that soil stockpiles are located out of the watercourse, on flat terrain and is safe guarded against wind and rain erosion by bunding or temporary covering</td></tr>
<tr><td>Increased bare surfaces, runoff and potential for erosion</td><td>Construction</td><td>Medium Negative</td><td>Low Negative</td><td>Medium Negative</td></tr>
<tr><td colspan="5">Mitigation
Maintain access roads to prevent erosion and sedimentation.
If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion.
Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.</td></tr>
<tr><td>Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation</td><td>Construction</td><td>Medium Negative</td><td>Low Negative</td><td>Low Negative</td></tr>
</table>

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Final score
Mitigation • Monitor and manage invasive species in disturbed areas. • Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.				
Waste and pollutant spills	Construction	Medium Negative	Medium Negative	Medium Negative
Mitigation • Restrict the use of machinery and vehicles within the watercourse and buffer unless for the use on existing roads. • Ensure that all temporary sanitation structures are situated out of the watercourse and its buffer and that these facilities are regularly maintained and monitored for early detection of leaks. • Ensure that no machinery of vehicles is allowed to park within the wetland or buffer. • Ensure that all machinery and equipment is inspected and serviced regularly in a designated area situated out of the wetland and buffer areas. • Ensure that contractors are equipped with spill kits to timeously respond to spillages. • Ensure that all hydrocarbons, oils or other potentially hazardous substances are contained in a designated area which is located on flat terrain out of the watercourse and buffer and is safe guarded from leaking out of the designated area. Use spill containment systems like drip trays and barriers around machinery and storage areas. • Implement spill prevention plans and provide training for workers on spill response procedures.				
Increased sediment loads to downstream reaches	Construction	Medium Negative	Low Negative	Low Negative
Mitigation • Maintain access roads to prevent erosion and sedimentation. • If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion. • Loose soils are particularly prone to loss due to wind or water. It is therefore preferable that construction takes place during the dry season, where possible, to reduce the erosion potential of the exposed surfaces. • Practice good soil management across the construction footprint. • Implement a suitable stormwater management plan for the construction and operation phases. • 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. • 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 marginal and riparian areas				
Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste	Construction	Medium Negative	Low Negative	Medium Negative

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Final score
Mitigation • Prohibit mixing of chemicals or concrete within the watercourse. Store all fuels and chemical mixtures in a bunded area, away from the watercourse. • Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage. • Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities. • Prevent any waste dumping or littering near the wetland. • Ensure all dirty water reports to a PCD (Pollution Control Dam). • All machinery and equipment should be inspected regularly for faults and possible leaks; these should be out of watercourses and in a designated area that is flat and bunded. • 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. • The stormwater management plan must aim to release only clean water in the environment.				
Terrain alteration for pipeline and bridges	Construction	Medium Negative	Low Negative	Low Negative
Mitigation • Maintain access roads to prevent erosion and sedimentation. • If supports must be constructed within the watercourse, remove and replace soil in the order it was excavated, with topsoil and subsoil stockpiled separately. Store stockpiles on a flat surface outside the watercourse, protected from rain and erosion. • Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.				
Final Landscaping and reshaping	Construction	Medium Negative	Low Negative	Low Negative
Activities relating to landscaping should be quick, along with a reduced machinery footprint.				
Alteration of surface runoff and drainage	Operation	Medium Negative	Low Negative	Low Negative
Mitigation • Install the pipeline above ground when crossing the watercourse, ensuring supports span the entire width wherever feasible. • Limit all other activities in watercourse areas to those explicitly authorised. • Design and implement an effective stormwater management plan. • Re-vegetate denuded areas as soon as possible to increase surface roughness and promote infiltration. • Regularly clear drains to prevent uncalled for accumulation of surface water and the establishment of concentrated flow paths out of the accumulation areas				
Increased water inputs (clean) to downstream wetlands	Operation	High Negative	Low Negative	Medium Negative
Mitigation • Implement and maintain a stormwater management system that diverts clean runoff away from contaminated areas and directs potentially contaminated water to treatment facilities before discharge.				

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Final score
• Perform regular maintenance and inspections of the pipelines and other water outlets to ensure their integrity and prevent increased volumes of water (with potential contaminates) from entering the watercourse. • Develop and implement emergency response protocols for potential pipeline leaks and retention dam breakages.				
Disruption of wetland soil profile, hydrological regime and increased sediment loads	Operation	Medium Negative	Low Negative	Low Negative
Mitigation • Restrict unauthorised and unnecessary activities within the wetlands and their respective buffers. No laydown areas or storage of equipment and material should be allowed within the wetlands and only activities necessary for construction of the relevant infrastructure (within watercourses) must be permitted. Authorised activities within the watercourse must be overseen by an ECO. • Minimise the disturbance footprint of the development or the proposed infrastructure areas and avoid land clearing outside of these areas to prevent indirect impact to the wetlands. • Clearly demarcate the construction footprint and restrict all activities to within the proposed infrastructure area. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the making them aware of the overall site plan which should indicate sensitive areas, waste disposal areas and any other relevant project specifics. • Limit vehicle and machinery movement near the wetland to designated routes. • Maintain access roads to prevent erosion and sedimentation.				
Degradation of wetland vegetation and proliferation of alien and invasive species	Operation	Medium Negative	Low Negative	Low Negative
Mitigation • Monitor and manage invasive species in disturbed areas. • Minimise the construction footprint and restrict vegetation clearing to the designated construction area. Rehabilitate any disturbances within the watercourse by manually tilling the soil and replanting with native vegetation.				
Slurry and pollutant spills into water resources	Operation	High Negative	Medium Negative	High Negative
Mitigation • Monitor and manage TSF carrying capacity. • Consideration / investigations of feasible measures to contain the slurry in the event of a failure should be made. Investigations / considerations could include amongst others, rapidly deploying silt barriers, absorbent booms, and/or temporary gabion berms directly downstream of the breach to physically contain the slurry plume. • Use pumps and temporary diversion channels to reroute clean upstream water away from the contaminated wetland flow path. • Construct in-channel weirs and offline settling ponds or any other similar infrastructure / system within the wetland to slow water velocity and promote sedimentation. • Implement a dense network of continuous water quality monitoring to dynamically adjust treatment. • Re-establish the natural wetland hydroperiod and morphology by restoring original topography and natural inlets/outlets.				

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Final score
• Replant remediated areas using indigenous, metal-tolerant wetland plant species for phyto-remediation and stabilization.				
Water quality impairment	Operation	High Negative	Medium Negative	Medium Negative
Mitigation • Prohibit mixing of chemicals or concrete within the watercourse. Store all fuels and chemical mixtures in a bunded area, away from the watercourse. • Regularly inspect and maintain bunded areas around fuel, chemical, and waste storage. • Ensure all solid and hazardous waste is stored in designated, impermeable areas and regularly removed to licensed facilities. • Prevent any waste dumping or littering near the wetland. • Ensure all dirty water reports to a PCD (Pollution Control Dam). • All machinery and equipment should be inspected regularly for faults and possible leaks, these should be out of watercourses and in a designated area that is flat and bunded. • 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. • The stormwater management plan must aim to release only clean water in the environment				

8.3.3.1.3 CUMULATIVE IMPACT

Four distinct wetland types, each corresponding to a Hydrogeomorphic (HGM) unit, have been identified in relation to the proposed project site and its respective extended study area. These wetland types are classified as follows; one channelled valley-bottom (HGM 1), one Unchannelled valley bottom (HGM 2), one hillslope seep (HGM 3) and one seep (HGM 4) wetland. All of the identified HGM units except for HGM 4 were intersected by the proposed infrastructure. In addition to these four HGM units, several artificial watercourses were identified within the extended study area. These artificial watercourses include wetlands (seep), dams (holding dam, in-stream and off-channel dam) and artificial features. Furthermore, multiple non-perennial drainages were identified within the extended study area along with a spring within the existing Mponeng Lower Compartment TSF, which is also being used as a holding dam and landfill facility. The cumulative impact on wetlands from additional deposition of gold tailings onto an existing TSF and mining area at large, is generally characterized as a long-term, compounding degradation of water quality and ecosystem health. Because majority of the gold TSFs are unlined or poorly lined, increased deposition amplifies the volume of contaminants, leading to severe, persistent pollution of surrounding wetlands for decades. Therefore, the cumulative impact on freshwater and wetlands is anticipated to be moderate-high. However, as per the proposed project aspects including lining of the RWD, lining of the TSF (if required by DWS), clean and dirty water separations as well as spring water diversion, it is anticipated that the cumulative impact will be reduced to moderate-low negative.

8.3.4 AIR QUALITY IMPACTS

This section presents the identified air quality impacts as per the Air Quality Impact Assessment undertaken by Airshed Planning Professionals (Airshed) (2026).

8.3.4.1 DESCRIPTION OF IMPACTS

Construction normally comprises a series of different operations including land clearing, topsoil removal, material loading and hauling, stockpiling, grading, bulldozing, compaction, etc. The redeposition on the Mponeng Lower Compartment TSF will require the removal of vegetation cover and topsoil at some areas for the establishment of the TSF basis (i.e. material compaction, surface lining, digging of trenches and laying of pipes, etc.) which will cover an area of approximately 102 ha. The design is for a capacity of 43 meggatonne (Mt) which will result in a final height of 60 m. The Return Water Dam (RWD) needs to be enlarged to a footprint of approximately 8.20 ha and a capacity of 327 000 m^3 to handle future operational demand. In addition, construction of slurry and return water pipelines between the Savuka Plant and Mponeng Lower Compartment TSF needs to be established – 3.36 km of new residue pipeline and 4.85 km of return water pipeline. These will be above-ground on pre-cast concrete plinths, with the construction of a 100 m pipeline bridge across the channelled valley bottom wetland and a new 12 m long pipeline culvert crossing the surfaced road north of the Mponeng Lower Compartment TSF. In addition, construction vehicles and trucks will drive along the roads between Savuka and Mponeng Lower Compartment TSF, with 17.8 km of these roads with paved- and 22 km with unpaved surfaces. These activities will give rise to dust emissions if not controlled.

The main pollutant of concern from construction operations is particulate matter, including PM_{10}, $PM_{2.5}$ and Total Suspended Particulates (TSP). PM_{10} and $PM_{2.5}$ concentrations are associated with potential health impacts due to the size of the particulates being small enough to be inhaled. Nuisance effects are caused by the TSP fraction (20 µm to 75 µm in diameter) resulting in soiling of materials and visibility reductions. This could in effect also have financial implications due to the requirement for more cleaning materials.

All operations associated with the construction phase of the Mponeng Lower Compartment TSF has their own duration and potential for dust generation. It is therefore often necessary to estimate area wide construction emissions, without regard to the actual plans of individual construction process. Dispersion simulation was not undertaken for construction emissions since a construction schedule was not known. Impacts from construction operations are usually lower than operational phase due to their temporary nature and duration, and the likelihood that these activities will not occur concurrently at all portions of the site.

The proposed activities will result in emissions to air from a variety of activities and sources. The only source of air emissions due to the Project is wind erosion due to the re-instatement of the Mponeng Lower TSF as a tailings deposit area, where it is currently used as a holding dam and Landfill facility. Slurry and return water pipes will have to be constructed between the Savuka Plant and the Mponeng TSF. The main air pollution activities are listed in **Table 64**.

Table 64: Activities and associated air pollutants from the Savuka and Mponeng Operations (Airshed, 2026)

Activity	Associated pollutants
Construction Operations	
Slurry and return water pipelines infrastructure	Sulfur dioxide (SO_2); oxides of nitrogen (NOx); carbon monoxide (CO); carbon dioxide (CO_2); particulate matter (PM)
Clearing and other earth moving activities	Mostly PM, gaseous emissions from earth moving equipment (SO_2; NOx; CO; CO_2)
Stockpiling topsoil and sub-soil	Mostly PM, gaseous emissions from front-end-loaders (FEL) (SO_2; NOx; CO; CO_2)
Delivery of materials – storage and handling of material such as sand, rock, cement, chemical additives, etc.	Mostly PM, gaseous emissions from trucks (SO_2; NOx; CO; CO_2)
General construction activities including mixing of concrete; operation of vehicles; refuelling; civil, mechanical works; etc.	Mostly PM, gaseous emissions from construction vehicles and machinery (SO_2; NOx; CO; CO_2)
Current Operations	
Underground Mining (emissions released via vent shafts)	
Drilling and blasting	particulate matter (PM)[(a)(c)], sulfur dioxide (SO_2); oxides of nitrogen (NOx); carbon monoxide (CO); Total Organic Compounds (TOC) and carbon dioxide (CO_2)[(b)]

Activity	Associated pollutants
Loading and tipping of ore and waste	mostly PM, gaseous emissions from mining equipment (Diesel Particulate Matter [DPM], SO_2; NOx; CO; CO_2)
Primary crusher (assumed to be underground)	mostly PM, gaseous emissions from machinery (PM, SO_2; NOx; CO; CO_2)
Materials handling (loading of ore and waste)	mostly PM, gaseous emissions from Front-end-Loaders (FELs) (PM, SO_2; NOx; CO; CO_2)
Surface Operations	
Secondary & tertiary crushing and screening	mostly PM[(c)], gaseous emissions from machinery (PM, SO_2; NOx; CO; CO_2)
Materials handling (loading & off-loading)	mostly PM[(c)] and windblown dust from storage piles
Trucks transporting ore and waste	PM from vehicle entrainment on unpaved road sections and gaseous emissions from truck exhaust (PM, SO_2; NOx; CO; CO_2)
Tailings Storage Facilities (TSFs)	PM[(c)] from windblown dust and radon
Marginal Ore Dumps (MOD)	PM[(c)] from windblown dust and radon
Processing plant stacks	PM[(c)], SO_2; NOx; CO; CO_2
Proposed Operations	
Mponeng Lower Compartment TSFs	PM[(c)] from windblown dust and radon

8.3.4.1.1 RESPIRABLE PARTICULATE MATTER (PM2.5) IMPACT ASSESSMENT

The simulated $PM_{2.5}$ 24-hour concentrations are within compliance with the NAAQS (4 days of exceedance of 40 µg/m^3) at all the AQSRs, for both current and future operations (**Figure 103**). The annual $PM_{2.5}$ concentrations for current (**Figure 104**) and future (**Figure 105**) operations are also within compliance with the NAAQS. A summary of the results is presented in **Table 65**. The recommencement of deposition on the Mponeng Lower Compartment TSF would result on average in a 3.8% increase in daily GLCs at the various AQSRs, and a 2.1% increase annually. By adding the assumed background concentration of 11 µg/m^3 (Sectio 3.3.2) the future daily concentrations range between 11.8 µg/m^3 and 20.1 µg/m^3, falling within compliance with the NAAQS.

Table 65: Simulated $PM_{2.5}$ concentrations at the AQSRs (Airshed, 2026)

ID	AQ Sensitive Receptor	Current			Future		
		Highest Daily (µg/m³)	Annual (µg/m³)	No of Exceedances	Highest Daily (µg/m³)	Annual (µg/m³)	No of Exceedances
1	Doornfontein	0.8	0.1	0	0.8	0.1	0
2	Northdene	3.3	0.1	0	3.3	0.1	0
3	Southdene	5.1	0.2	0	5.1	0.2	0
4	The Village	4.6	0.2	0	4.6	0.2	0
5	Lesley Williams Private Hospital	2.4	0.2	0	2.4	0.2	0
6	AngloGold Hospital	8.1	2.1	0	8.1	2.1	0
7	Western Deep Levels	7.8	0.7	0	7.8	0.7	0
8	Elandsridge	8.7	0.3	0	9.1	0.3	0
9	Elandsrand	5.5	0.2	0	5.9	0.3	0
10	Harmony Hostel	4.3	0.2	0	4.8	0.2	0
11	Wedela	8.0	0.3	0	8.5	0.3	0

ID	AQ Sensitive Receptor	Current			Future		
		Highest Daily (µg/m³)	Annual (µg/m³)	No of Exceedances	Highest Daily (µg/m³)	Annual (µg/m³)	No of Exceedances
12	Deelkraal	2.8	0.1	0	3.4	0.1	0

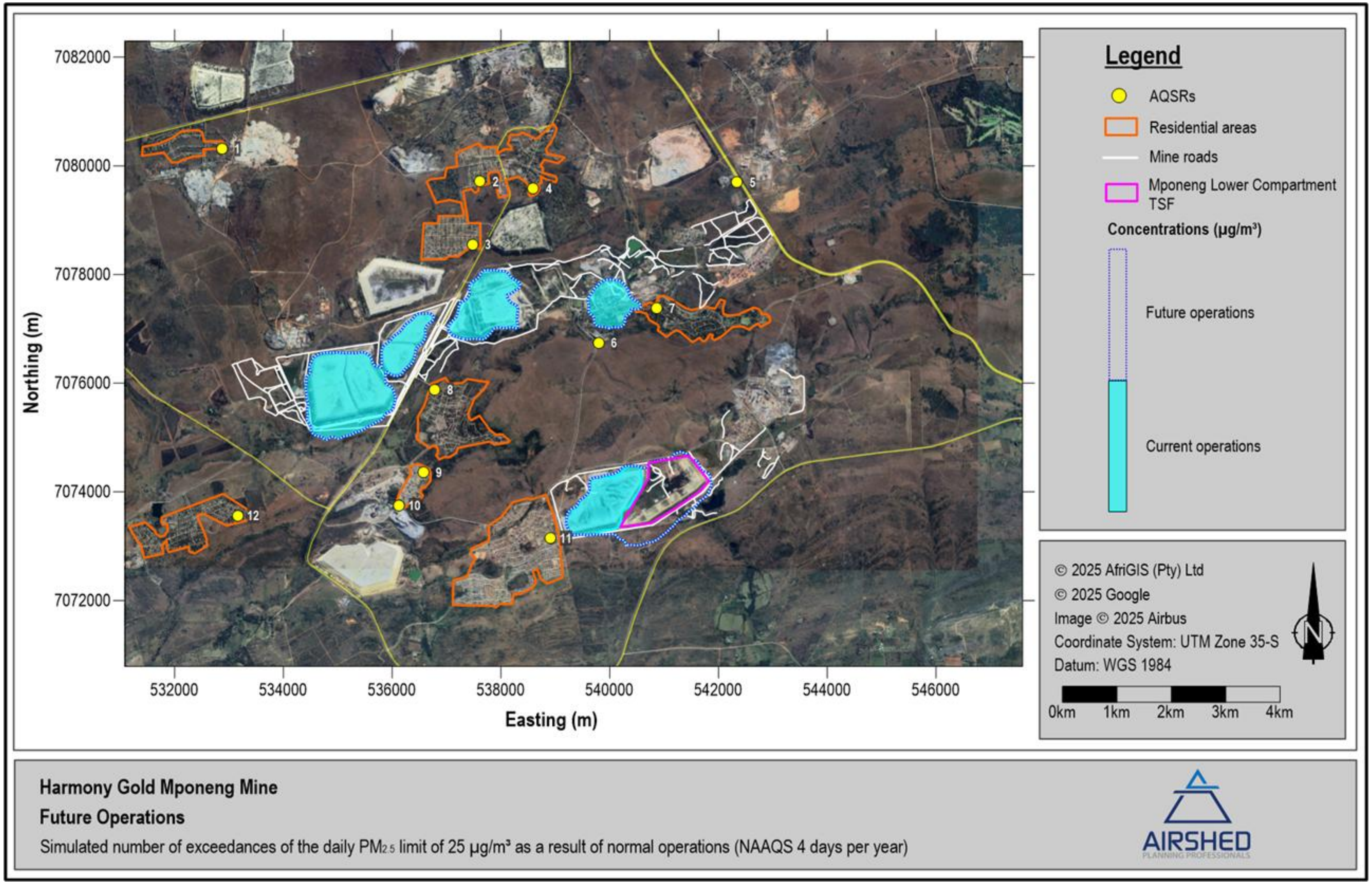


Figure 103: Simulated area of exceedance of the 24-hour $PM_{2.5}$ NAAQS as a result of current and future operations with mitigation measures applied (Airshed, 2026)

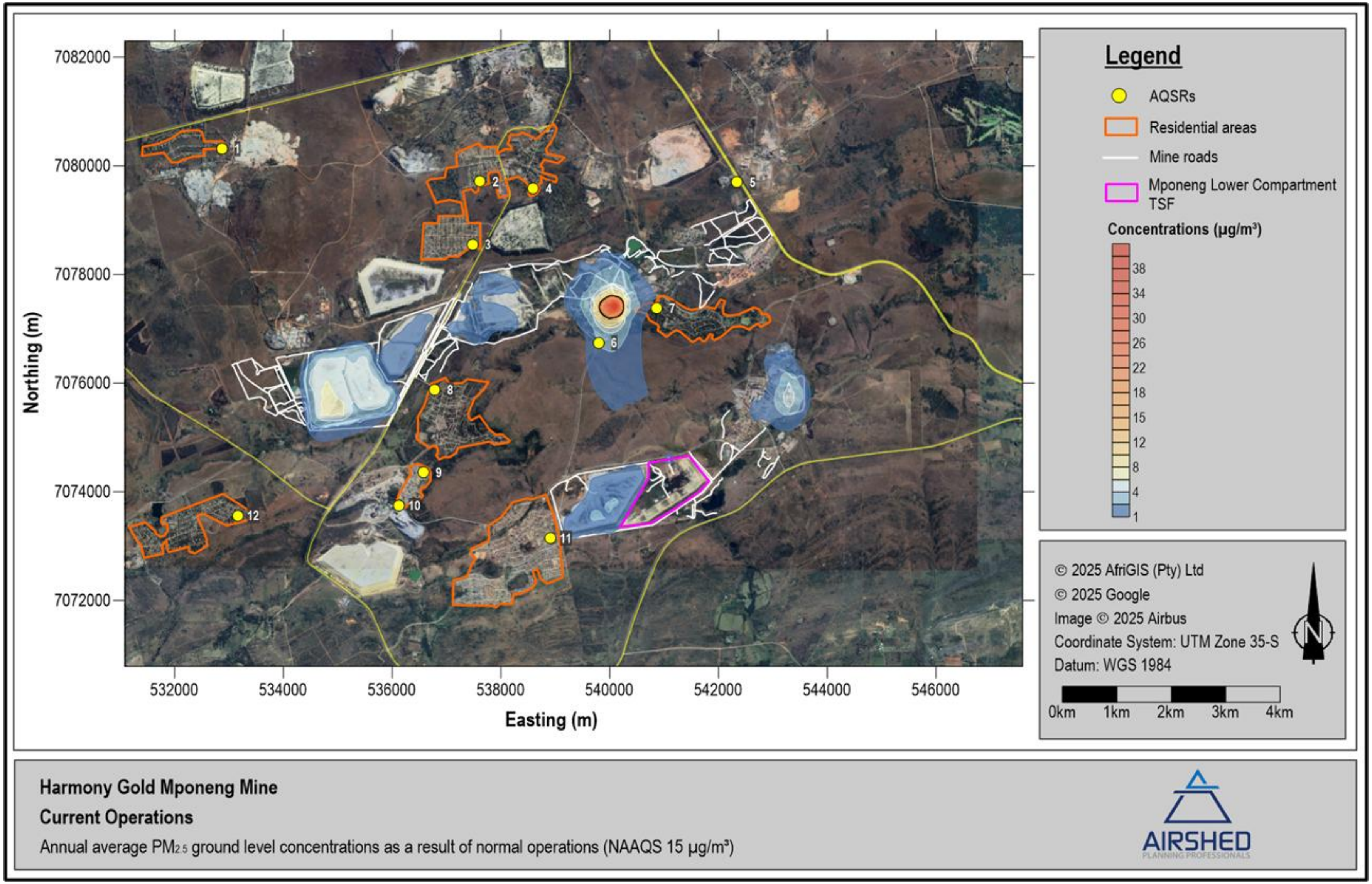


Figure 104: Simulated annual average $PM_{2.5}$ concentrations as a result of current operations with mitigation measures applied (Airshed, 2026)

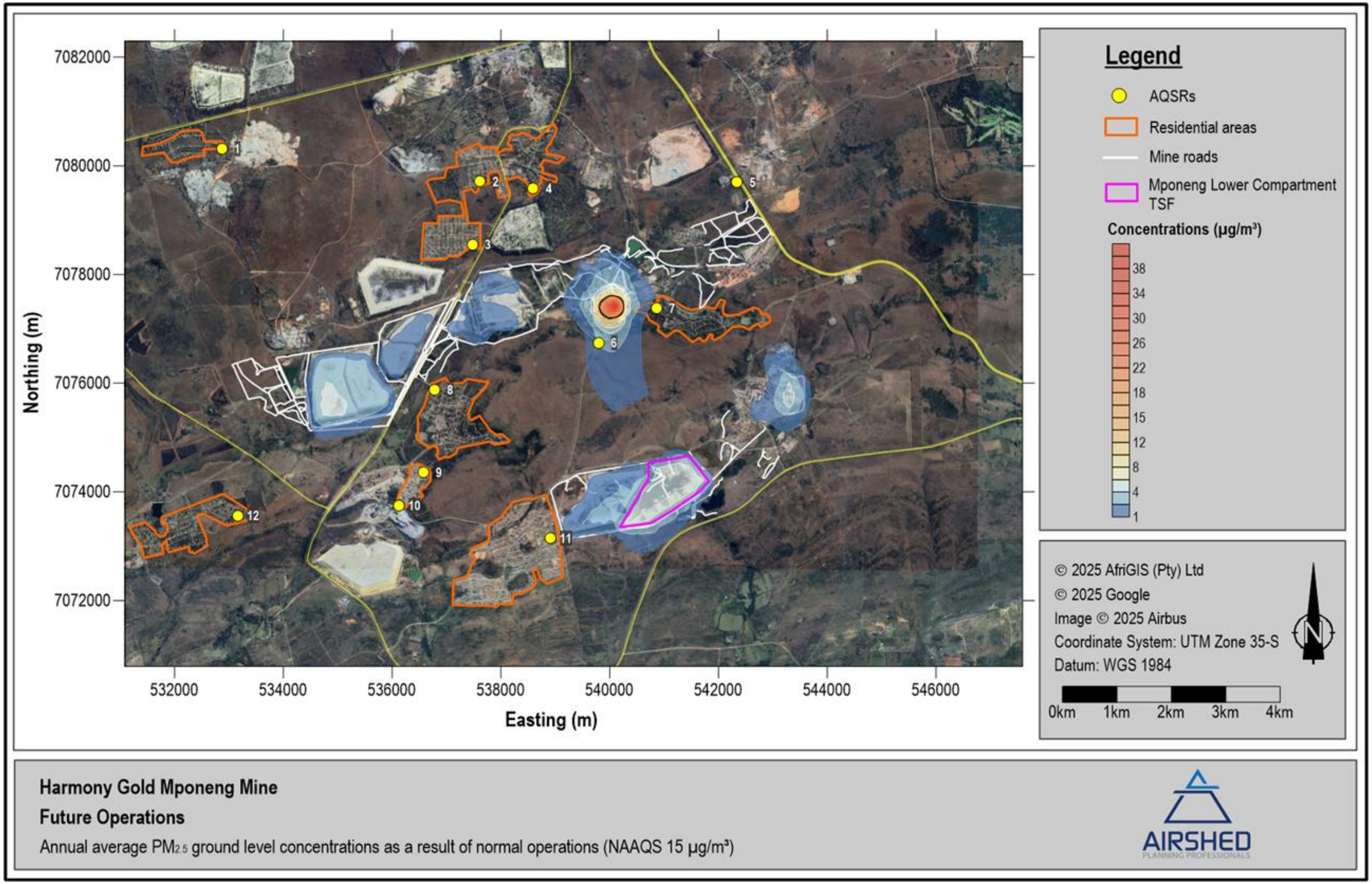


Figure 105: Simulated annual average $PM_{2.5}$ concentrations as a result of future operations with mitigation measures applied (Airshed, 2026)

8.3.4.1.2 INHALABLE PARTICULATE MATTER (PM10) IMPACT ASSESSMENT

The simulated PM_{10} 24-hour GLCs are within compliance with the NAAQS (4 days of exceedance of 75 µg/m^3) at all the AQSRs, for both current and future operations (**Table 66**). The annual PM_{10} concentrations for current (**Figure 107**) and future (**Figure 108**) operations are also within compliance with the NAAQS. A summary of the results is presented in **Table 66**.

The recommencement of deposition on the Mponeng Lower Compartment TSF would result on average in a 3.9% increase in daily GLCs at the various AQSRs, and a 0.4 % increase annually. By adding the assumed background concentration of 20 µg/m^3 (Section 3.3.2) the future daily concentrations range between 21.5 µg/m^3 and 89.8 µg/m^3, with potential non-compliance with the NAAQS at Elandsridge and Wedela. However up to four days of exceedances are allowed and it is not known whether the background concentration will result in more than the allowed exceedances.

Table 66: Simulated PM_{10} concentrations at the AQSRs (Airshed, 2026)

ID	AQ Sensitive Receptor	Current			Future		
		Highest Daily (µg/m^3)	Annual (µg/m^3)	No of Exceedances	Highest Daily (µg/m^3)	Annual (µg/m^3)	No of Exceedances
1	Doornfontein	1.5	0.1	0	1.5	0.1	0
2	Northdene	6.3	0.2	0	6.7	0.2	0
3	Southdene	7.0	0.3	0	7.0	0.3	0
4	The Village	12.5	0.3	0	12.5	0.3	0
5	Lesley Williams Private Hospital	4.1	0.2	0	4.1	0.2	0
6	AngloGold Hospital	12.6	2.8	0	12.6	2.8	0
7	Western Deep Levels	9.2	1.0	0	9.2	1.0	0
8	Elandsridge	61.3	0.8	0	64.9	0.8	0
9	Elandsrand	32.9	0.6	0	35.5	0.6	0
10	Harmony Hostel	24.1	0.5	0	25.6	0.5	0
11	Wedela	69.8	0.8	0	69.8	0.8	0
12	Deelkraal	19.8	0.3	0	22.4	0.3	0

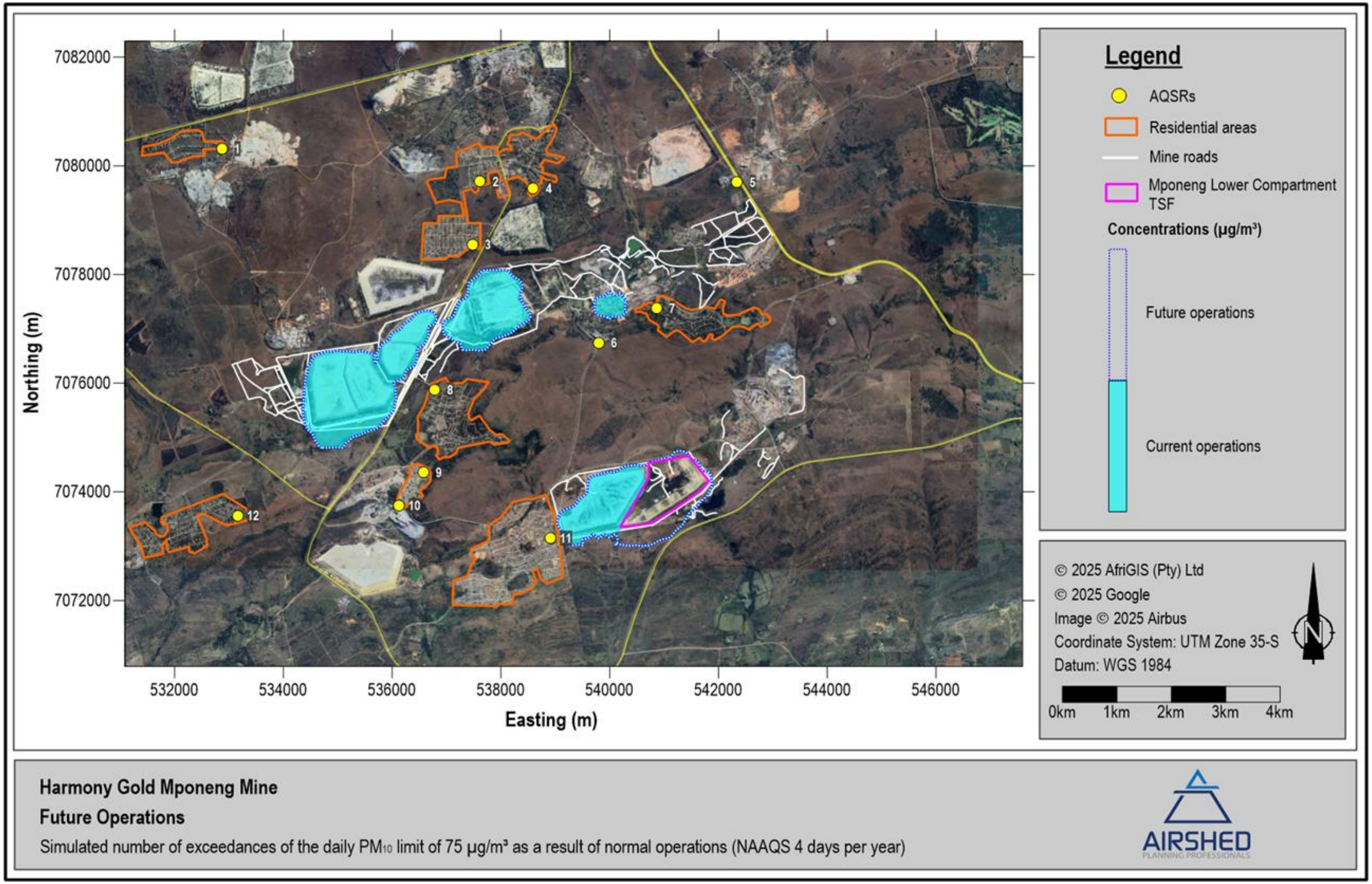


Figure 106: Simulated area of exceedance of the 24-hour PM_{10} NAAQS as a result of current and future operations with mitigation measures applied (Airshed, 2026)

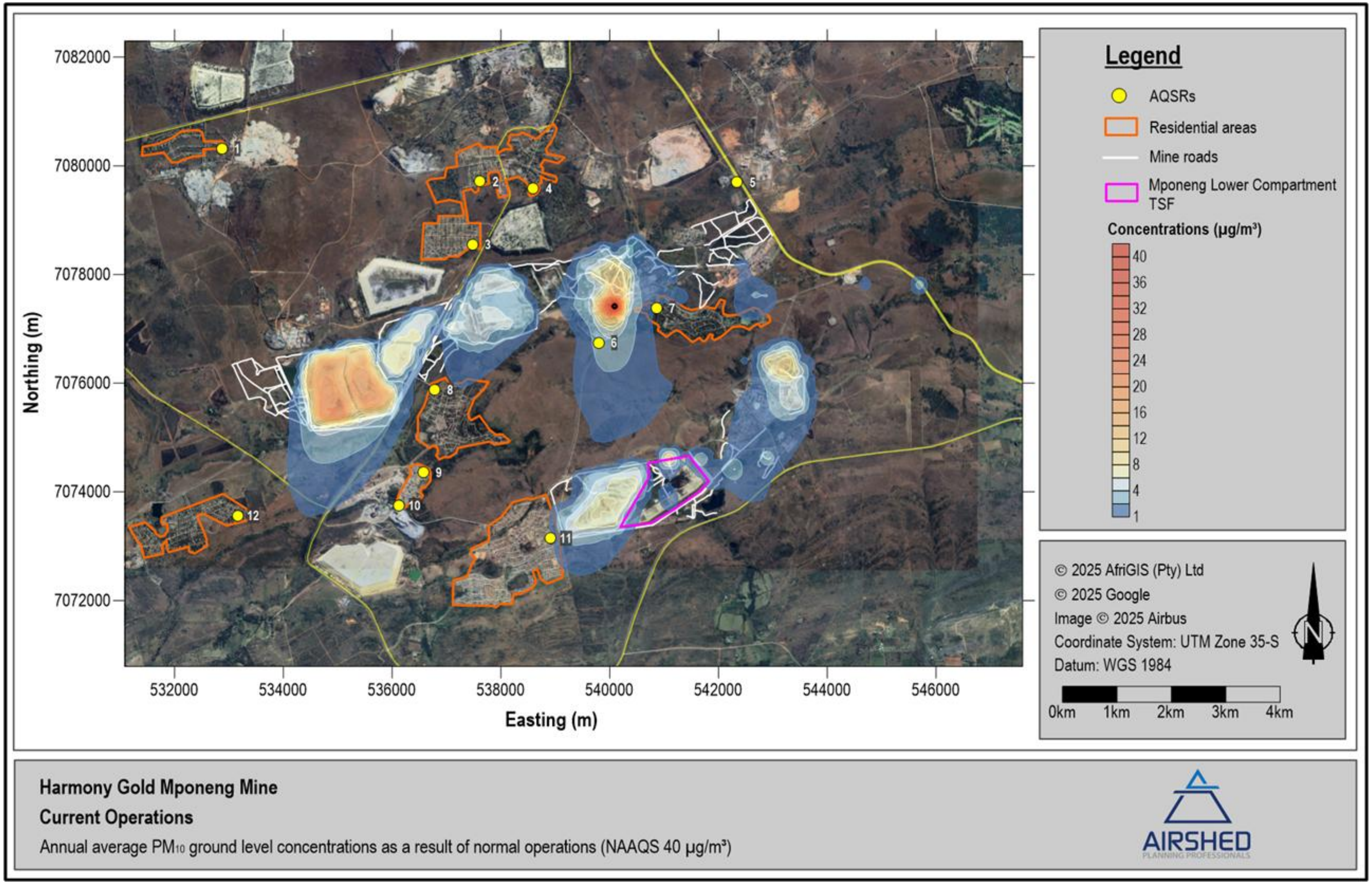


Figure 107: Simulated annual average PM_{10} concentrations as a result of current operations with mitigation measures applied (Airshed, 2026)

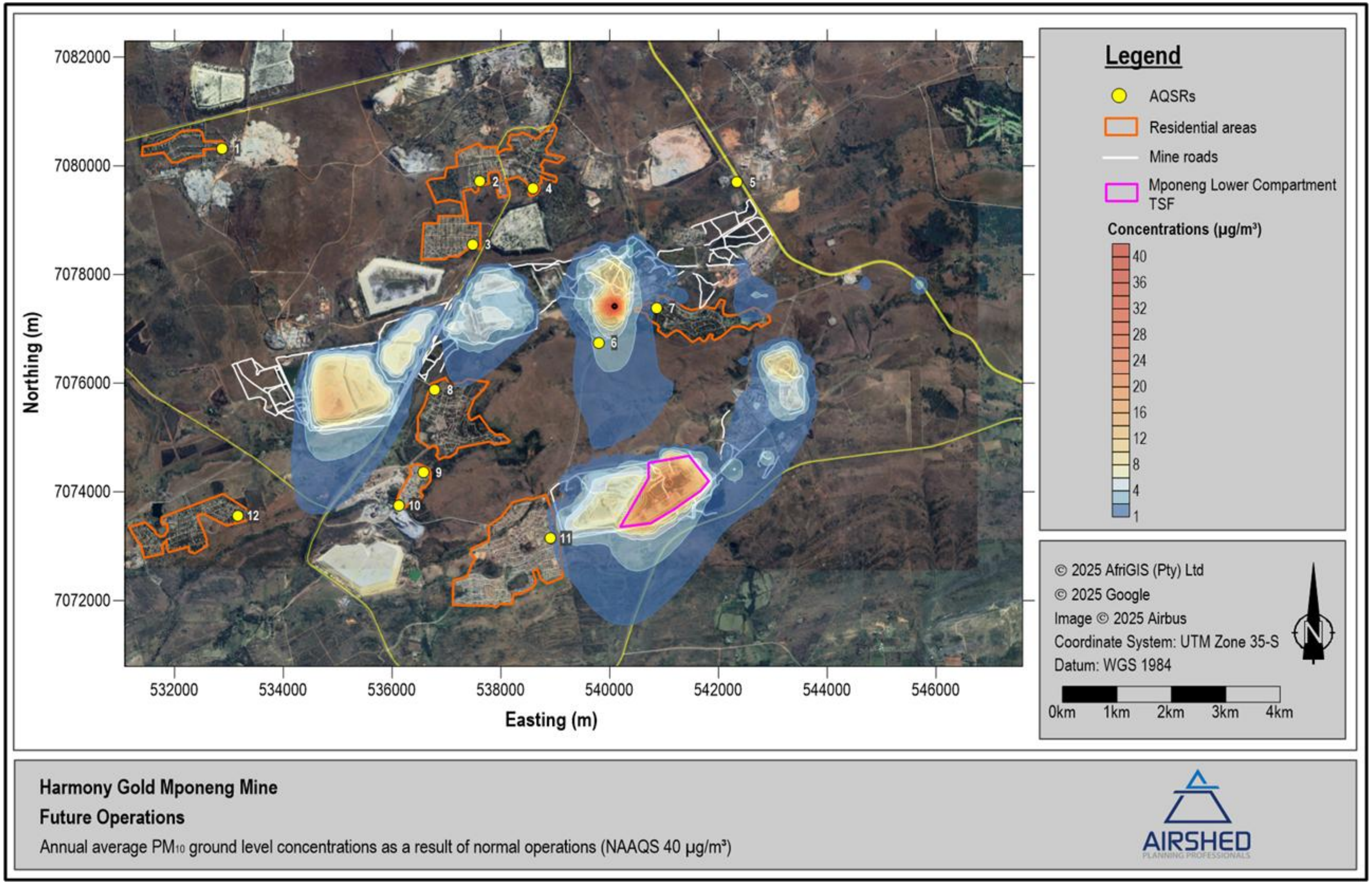


Figure 108: Simulated annual average PM_{10} concentrations as a result of future operations with mitigation measures applied (Airshed, 2026)

8.3.4.1.3 FALLOUT DUST IMPACT ASSESSMENT

The simulated daily average dustfall rates with mitigation measures applied to the current operations exceed the NDCR limit for residential areas (600 mg/m²-day) at one AQSR (Elandsridge) but are below the NDCR limit for non-residential areas (1 200 mg/m²-day). The limit for agricultural areas is exceeded for up to 3.5 km to the south-southwest from the active TSFs at Savuka and up to 2.4 km south-southwest from the inactive TSF at Mponeng (**Figure 109**). The simulated daily average dustfall rates for the future operations show similar impact areas to the current operations but with exceedance of the agricultural limit for up to 4.0 km from the TSFs at Mponeng, and average increase of 1.6% in dustfall rates (**Figure 110**).

Measured dustfall rates are however below the NDCR limit for residential areas (600 mg/m²-day) at all AQSRs, including Elandsridge (see Section 3.3.2) which implies a possible overprediction of simulated dustfall rates[4]. The dustfall rates at the AQSRs are provided in **Table 67**.

Table 67: Simulated dustfall rates at the AQSRs (Airshed, 2026)

ID	AQ Sensitive Receptor	Current	Future
		Highest 30-day average	**Highest 30-day average**
1	Doornfontein	5	10
2	Northdene	27	27
3	Southdene	45	45
4	The Village	52	52
5	Lesley Williams Private Hospital	12	37
6	AngloGold Hospital	140	140
7	Western Deep Levels	56	59
8	Elandsridge	**723**	**723**
9	Elandsrand	441	442
10	Harmony Hostel	304	305
11	Wedela	538	542
12	Deelkraal	227	228
Notes: Bolded text indicates exceedance of NDCRs			

[4] The US EPA reports an "irreducible" uncertainty associated with Gaussian plume models for variation in concentrations of as much as +/- 50 percent (US EPA, 2024)

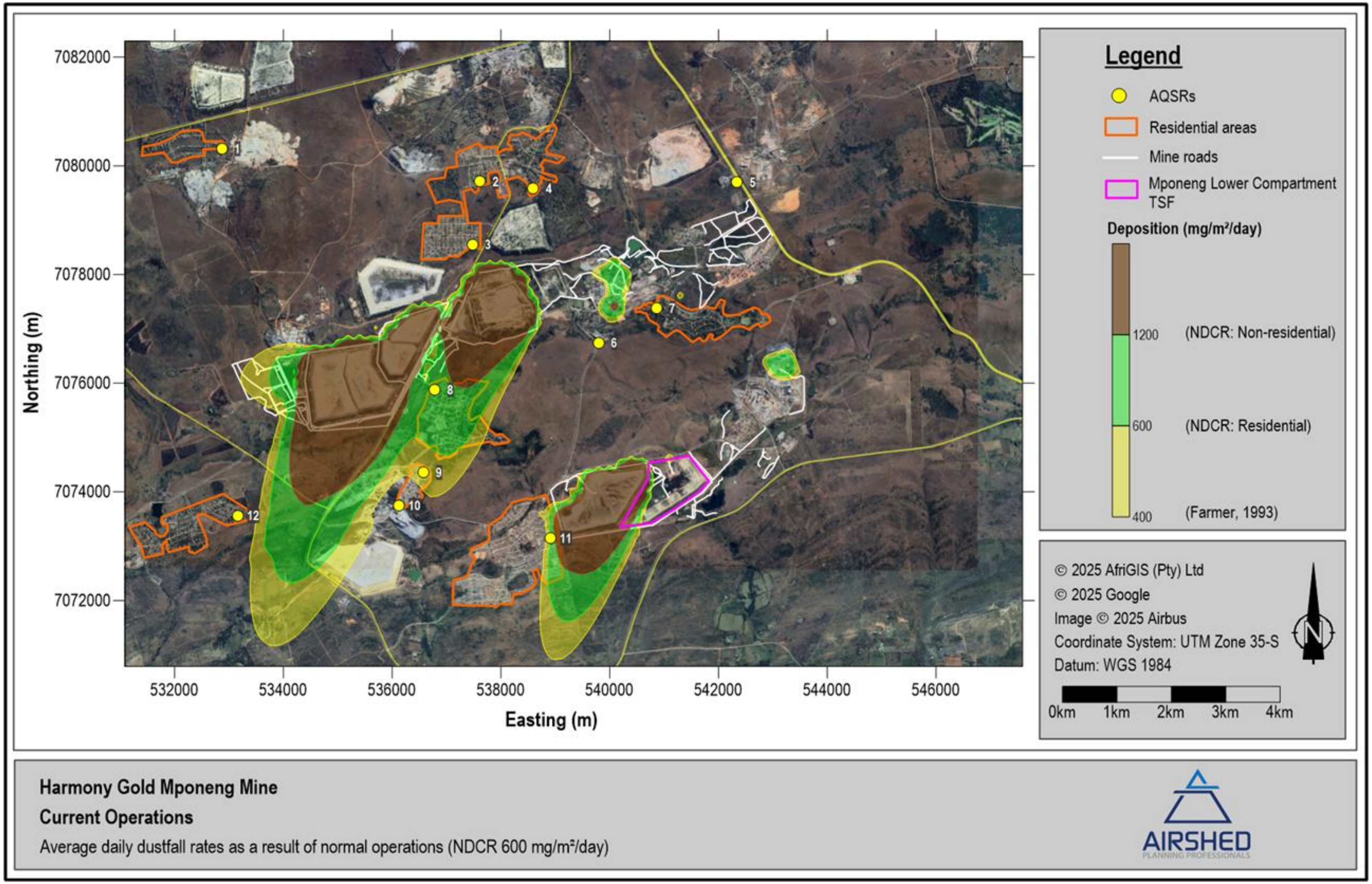


Figure 109: Simulated average daily dustfall rates because of current operations with mitigation measures applied (Airshed, 2026)

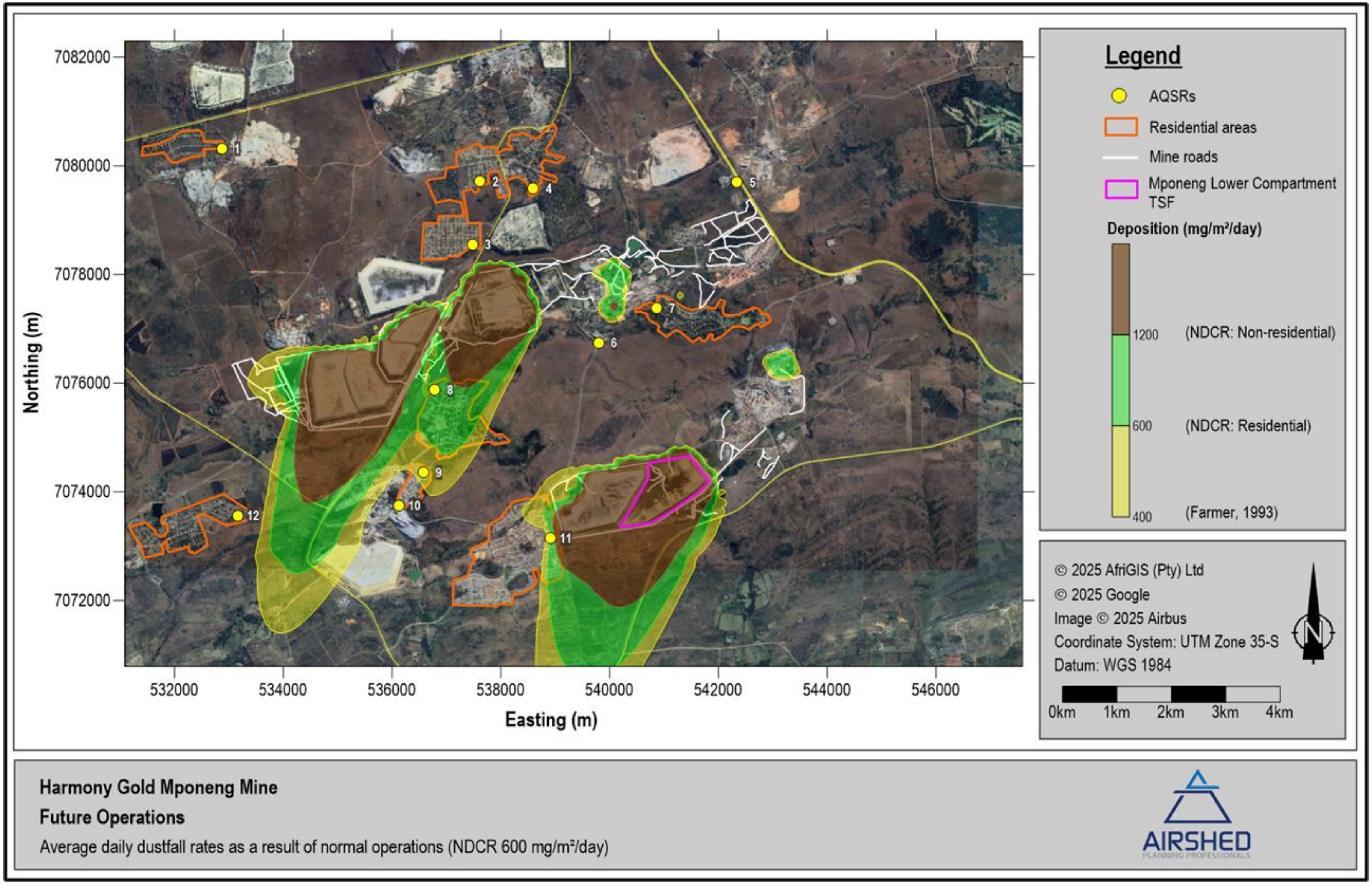


Figure 110: Simulated average daily dustfall rates as a result of future operations with mitigation measures applied (Airshed, 2026)

8.3.4.2 IMPACTS RATING

The geohydrological impact assessment for the Mponeng Lower Compartment TSF is presented in **Table 68**.

Table 68: Significance rating for potential air quality impacts due to the current operations

Impact Description	Phase	Pre-Mitigation	Post Mitigation	Final score
Air quality impacts due to current operations at Mponeng Mine	Operational (Current)	Low Negative	Low Negative	Medium Negative
Increase in air quality impacts due to recommencement of deposition on Mponeng Lower Compartment TSF	Operational (Future)	Low Negative	Low Negative	Medium Negative

8.3.4.3 CUMULATIVE IMPACT

Cumulative air quality impacts would be related to the combination effects of the project's air emissions with existing emission sources and planned emissions in the immediate area around the Project site, which could result in an elevation of ground level concentrations of pollutants and have an impact on the health of workers and local communities. Considering the baseline conditions (below the limits set by the normative for all the pollutants) and the modelling results, which highlighted that the contribution of the Project to the ground level concentrations of pollutants is negligible, the cumulative impacts on air quality are expected to be of minor priority. As such, no additional measures are proposed to manage cumulative effects. Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.

8.3.4.4 PROPOSED MITIGATION MEASURES

With the potential impacts from windblown dust from the active TSFs, especially for the proposed redeposition on Harmony Mponeng Lower Compartment TSF, the following recommendations are proposed:

- A Dust Management Plan (DMP) for the Mponeng Lower Compartment TSF should follow an iterative process, including: implementation, monitoring, reporting, reviewing and adjustment to the necessary steps.
- It is recommended that the current dustfall monitoring network be maintained and the monthly dustfall results used as indicators to tract the effectiveness of the applied mitigation measures.
- Mitigation measures aimed at reducing wind erosion from the active TSFs, i.e. the grassing of TSF side slopes should be implemented.

8.3.5 CLIMATE CHANGE IMPACTS

This section presents the brief impacts on climate change as per the Air Quality Impact Assessment undertaken by Airshed Planning Professionals (Airshed) (2026).

8.3.5.1 DESCRIPTION OF IMPACT

Since climate change is a global phenomenon, the criterion is not fully applicable to an assessment of the impacts of GHG emissions on climate change. Furthermore, the extent of climate change impact is always national or wider and therefore can result in an overly conservative significance, and since the overall consequence and significance are not influenced by the extent, but rather by the intensity of emissions, "extent" was not included in the significance rating.

Local reporting requirements have yet to be developed to describe and assess environmental impacts for GHGs. Guidance is thus taken from international guidelines such as that developed for the Sacramento Metropolitan Air Quality Management District (SMAQMD, 2014). As part of the process to determine if a full GHG analysis and mitigate programme is required, an Initial Study is implemented to determine if a project may have a significant effect on the environment. As such a threshold of 1.1 Gg CO_2e (project construction phase) and 10 Gg CO_2e (operational phase) for stationary source projects per year is applied to new projects (SMAQMD, 2014). These thresholds were based on capturing 90% of the development projects across the state, ensuring that small projects, which generally have low emission levels, and would generally not be considered significant.

As an alternative method of measure, a GHG threshold may be based on the classification of projects by the European Bank for Reconstruction and Development (EBRD), in which projects contributing more than 25 Gg CO_2e per year to have significant GHG emissions (EBRD 2019). This is in line with the International Finance Corporation (IFC 2012). Section 8 of the IFC Performance Standards on Environmental and Social Sustainability: "For projects that are expected to or currently produce more than 25 000 Gg CO_2e annually the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognised methodologies and good practice". In terms of the Equator Principles, a developer that is seeking funding from a financial institution that subscribes to the Equator Principles is required to publicly report on its combined Scope 1 and Scope 2 GHG emissions if it exceeds 100 Gg CO_2e annually, for the operational phase of the project, during the life of the loan (Equator Principles, 2013). The Equator Principles also encourage clients to report publicly on projects emitting over 25 Gg CO_2e, in line with the IFC Performance Standards (Equator Principles, 2013). As a further example, the South African Declaration of Greenhouse Gases as Priority Pollutants (Government Gazette 40966 of 21 July 2017) define production processes in Annexure A of the Declaration with the requirement to submit a Pollution Prevention Plan (PPP) to the Minister for approval with GHG in excess of 100 Gg CO_2e.

8.3.5.2 **IMPACT RATING**

When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects could replace existing development or baseline activity that has a higher GHG profile. Therefore, the significance of a project's emissions should be based on its net impact over its lifetime, which may be positive, negative or negligible. To meet the South African (SA) NDC targets and interim budgets, action is required to reduce GHG emissions from all sectors, including projects in the built and natural environment. The proposed project must therefore consider whether and how the project will contribute to or jeopardise the achievement of these targets. Such an assessment would however require a much broader evaluation of the project against all current energy mix and their resources practiced in South Africa. In the absence of such a comprehensive assessment, the climate change impact significance cannot be determined.

8.3.5.3 **CUMULATIVE IMPACT**

Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.

8.3.5.4 **MITIGATION MEASURES**

Mitigation measures for gold Tailings Storage Facilities (TSFs) aim to address both the physical impacts of climate change (e.g., extreme weather) and the reduction of the mine's carbon footprint. Key strategies include enhancing structural integrity, optimizing water usage, controlling dust, and implementing proactive, adaptive management. To minimise project specific GHG (Scope 1) emissions would require lower fuel use or use alternative lower-carbon fuels., for example conversion to compressed natural gas (CNG), where possible. Effective rehabilitation of above-ground and soil-based carbon stocks could be an effective carbon sink during rehabilitation after mining, and rehabilitation efforts should consider the establishment of artificial or reconstructed wetlands where these have been disturbed by mining operations and permanent infrastructure.

8.3.6 HEALTH AND RADIATION IMPACTS

This section presents the identified health and radiation impacts as per the Radiological Impact Assessment undertaken by AquiSim Consulting (2026).

8.3.6.1 DESCRIPTION OF IMPACT

The main objective of the radiological public safety assessment was to assess the potential impact on members of the public that may occur during the operational phase of the Projects, with due consideration of the impact that may occur during the post-closure phase. How members of the public are exposed to ionising radiation induced by the Projects may be different depending on the operational conditions and the specific point in time (either present or future).

Sources of radiation exposure to members of the public associated with mining and mineral processing facilities are often advertently induced. Although the key elements responsible for radiation exposure are naturally occurring radionuclides, human-induced conditions and activities may enhance concentrations of naturally occurring radionuclides in the accessible environment. Alternatively, the potential for human exposure to naturally occurring radionuclides in products, by-products, residues, and other wastes may be enhanced by moving these radionuclides from inaccessible locations to locations where humans can be subject to radiation exposure.

To pose a radiological risk to members of the public and the environment, the naturally occurring radionuclides must first be released from the sources of radiation exposure into the environment. As used here, sources refer to any entity that contains radioactivity and has the potential to release radioactivity into the environment. Release mechanisms can be generalised into the following natural and human-induced conditions:

- The release of radionuclides through natural conditions:
  - Solid release (e.g., windblown dust);
  - Water-mediated release (e.g., leaching through tailings storage facility); and
  - Gas-mediated release (e.g., radon gas exhalation).
- Direct gamma radiation; and
- Controlled or uncontrolled releases of radionuclides as solids or liquids into the environment.

Controlled releases are human induced as part of the normal operating conditions, while uncontrolled releases are associated with accidents and incidents that are outside the scope of normal operating conditions (e.g., excessive water erosion, pipeline bursts, releases from storage dams overflowing their capacity, or the breaking of dam walls).

A distinction can be made between primary and secondary sources of radiation exposure. The primary sources are associated with physical features or entities at a mining and mineral processing operation, with the potential of naturally occurring radionuclides to be released into the environment. Examples of primary sources that are generally associated with mining and mineral processing operations include:

- Tailings Storage Facilities (TSFs), Waste Rock Dumps (WRDs) or any other stockpile facility used to store waste or other residue material on the surface, from which naturally occurring radionuclides may be dispersed in solid (dust), liquid (seepage), or gaseous (radon gas) form;
- Mineral processing activities, where radioactive gasses and dust may be released from the commination (e.g., crushing, milling, and screening) and beneficiation of ore containing radionuclides;
- Water management facilities (e.g., return water dams, process control dams, and evaporation ponds), used to manage excess water generated through mining, mineral processing, and residue disposal activities, and where water may be released to the environment;
- Materials handling activities (e.g., the transfer of material containing naturally occurring radionuclides from one point or facility to another), during which radioactive dust may be released to the environment; and
- Mine ventilation shafts increase airflow in underground workings, where gasses and dust generated underground may be released with the outflowing air.

Radioactivity released from the primary sources into the environment may accumulate in the physical compartments of the environmental system (e.g., groundwater, surface water bodies, surface soils, sediments, etc.), potentially resulting in what can be termed secondary sources of radiation exposure. The following serve as examples of secondary radiation sources:

- Continuous deposition and accumulation of naturally occurring radionuclides associated with airborne dust or contaminated irrigation water on surface soils, resulting in the development of a secondary source at the soil surface;
- Continuous deposition of naturally occurring radionuclides associated with airborne dust in a surface water body, resulting in the development of a secondary source in the sediments and surface water body;
- Uncontrolled release of contaminated mine residue (e.g., tailings material) through surface water erosion of existing TSFs or other stockpile facilities;
- Uncontrolled release (e.g., spillage) of contaminated mine residue (e.g., tailings material) or water on surface soils from pipelines or storage dams, resulting in the development of a secondary source at the soil surface; or
- Uncontrolled release (e.g., spillage) of contaminated mine residue (e.g., tailings material) or water in a surface water body from pipelines or storage dams (as appropriate), resulting in the development of a secondary source in the sediments and surface water body.

Members of the public may potentially be subject to radiation exposure from both primary and secondary sources at a mining and mineral processing operation, with expected differences in modes and duration of exposure.

8.3.6.1.1 OPERATIONAL IMPACTS

The radiological impact assessment for the operational phase considers the potential contribution through all three environmental pathways (i.e., surface water, groundwater and atmospheric). However, due to the slow-moving nature of any radionuclide contaminant plume that originates from the facilities through the groundwater system, the potential radiological impact through the groundwater pathway will only occur during the post-closure phase

8.3.6.1.2 POST-CLOSURE IMPACTS

Before the actual closure of the proposed Mponeng Lower Compartment TSF and as part of the anticipated licensing conditions and requirements, a decommissioning and closure plan will be prepared for submission to the regulatory authorities. Amongst others, this plan will define in detail all the activities that will be performed and how the associated radiological impact during the decommissioning and closure phase will be managed.

Considering that a decommissioning plan of the proposed TSF is not available at present but will be defined and implemented, the following activities were identified that may result in a radiological impact on the receptors during the post-closure phase:

- Implementation of the decommissioning plan: implementation of the NNR-approved decommissioning plan will result in a positive impact in the sense that surface infrastructure that contained or that is contaminated with radionuclides is demolished, decontaminated (to the extent possible) and removed from the site and compliance with clearance criteria has been demonstrated. Generally, this would involve performing a gamma radiation survey supplemented with full-spectrum radio analysis of soil samples performed at the infrastructure sites, followed by appropriate rehabilitation and clean-up operations for conditional or unconditional clearance from the regulatory authority. However, in this case for the TSF that would remain at the surface during the post-closure period, the level of clean-up that can be performed is limited to areas outside the TSF footprint area that may have become contaminated during or because of operational activities. These areas outside the TSF footprint can still be rehabilitated and cleaned-up for conditional or unconditional clearance.

- From the commissioning of a TSF, radionuclides contained in the tailings material leach from the TSF to the underlying strata. The rate of leaching is controlled by complex geochemical and hydrological processes but generally is a slow process. Once in the underlying strata, migration of these radionuclides is equally slow along the groundwater flow path. Abstraction of groundwater for personal or agricultural purposes may result in a radiological impact on receptors through direct ingestion of water or the ingestion of crops and animal products as secondary pathways. The radiological impact along the groundwater pathway only manifests itself during the post-closure period hundreds to thousands of years after closure. Radionuclides will leach from the TSF into the underlying aquifer, after which they will migrate in the general groundwater flow direction. Abstraction and use of the contaminated water contribute to the total effective dose through the ingestion and possible external radiation exposure routes

8.3.6.2 IMPACTS RATING

The health and radiation impact assessment for the Mponeng Lower Compartment TSF is presented in **Table 69**.

Table 69: Radiation and Health Impact Assessment (AquiSim Consulting, 2026).

Impact	Phase	Pre-mitigation Impact	Post-mitigation Impact	Final Significance
Exhalation and dispersion of radon gas to the atmosphere during the redeposition of tailings	Operation	Medium-Low Negative	Low Negative	Low Negative
Implementation of the NNR-approved decommissioning plan (AQ4)	Decommissioning, Closure and Post-Closure	High Positive	Medium Positive	High Positive
Leaching and migration of radionuclides from the TSF during the post-closure phase (GW1)	Post-Closure	Medium-Low Negative	Medium-Low Negative	Medium-Low Negative

8.3.6.3 CUMULATIVE IMPACT

The cumulative radiological impact associated with a mining operation can be considered at different levels. Firstly, the radiological safety assessment process considers the cumulative contributions from all relevant exposure pathways, including surface water, groundwater, and the atmosphere, as appropriate. This means that the radiological impact assessment includes the cumulative impact of the exposure pathways, as appropriate and justified. Secondly, the radiological safety assessment process considers the cumulative contributions from all relevant exposure routes for each pathway. These include radon gas inhalation, dust inhalation, external gamma radiation (groundshine and cloudshine), and ingestion of soil, water, crops, and animal products, as appropriate and justified for each public exposure condition. This means that the radiological impact assessment includes the cumulative impact of the exposure routes, as appropriate and justified.

Thirdly, the radiological safety assessment process considers the cumulative contribution from all relevant sources of radiation exposure associated with the redepositioning of tailings at the lower Mponeng TSF, including those from existing TSFs in the area. This means that the radiological impact assessment includes the cumulative impact of these sources, as appropriate and justified. Finally, at the regional scale, the assessment context accounts for cumulative impacts from all contributing operations (or practices) in the area, which may increase the total effective dose to members of the public. This is important because the public dose limit of 1,000 µSv.year-1 is derived from all contributing sources and operations. Subsequently, considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is likely that the impact will result in spatial and temporal cumulative change of moderate significance.

8.3.6.4 **PROPOSED MITIGATION MEASURES**

The total effective dose from windblown dust and radon gas released from the remaining facilities is well below regulatory compliance criteria (dose constraints), indicating that, from a compliance perspective, no additional management or mitigation measures are required. The management objective is first to ensure that radiation exposure is below the regulatory compliance criteria (i.e., the dose constraint) and, secondly, to optimise radiation protection by applying the ALARA principle. From a dose-optimisation perspective, the following mitigation measures can be implemented. These measures, which are in line with the measures proposed in the air quality impact assessment (Airshed, 2026), will contribute to a reduction in the total effective dose if applied for the duration of the operational period:

- Develop an air quality management plan for the redepositing of tailings at the lower Mponeng TSF, including air quality monitoring to ensure compliance at upwind and downwind locations; and
- Vegetation of exposed areas of the TSF and wind barriers to reduce wind erosion and/or the application of dust suppressants.

Based on the outcome of the site characterisation and the outcome of the radiological public impact and safety assessment, the following is recommended as an extension of the baseline site characterisation programme of the project:

- Perform gamma radiation and dose-rate surveys on a grid covering all potentially affected areas.
- Perform an airborne radon gas survey in the area using RGMs on a campaign basis.
- Collect surface water, groundwater and sediment samples on an upstream and downstream basis that is representative of the area for full-spectrum radioanalysis of the U-238, U-235 and Th-232 decay chains.
- Collect soil samples at selected locations that correspond to potentially hot-spot areas identified during the gamma radiation survey for full-spectrum radioanalysis of the U-238, U-235, and Th-232 decay chains.

The proposed radiological monitoring programme for the area includes recommendations for monitoring surface water, groundwater, sediment, environmental radon, and dust fallout, including the frequency and type of analyses. Most proposed monitoring points coincide with the environmental pathways monitoring programme (e.g., soil, surface water, and groundwater).

8.3.7 ARCHAEOLOGICAL AND CULTURAL HERITAGE IMPACTS

This section presents the identified archaeological and cultural heritage impacts as per the Heritage Impact Assessment undertaken by PGS Heritage (2026).

8.3.7.1 **DESCRIPTION OF IMPACTS**

As indicated in **Section 7.13**, during the heritage fieldwork, a total of two heritage features, comprising one settlement unit, were identified within the study area. These consist of one stonewalling feature (MPnr1) and one stonewalling feature which contains four circular segments, some of which are likely stock enclosures (MPnr2). MPnr1 is located down the hill from MPnr2. It is rated as high significance and graded as Grade IIIA, as through further investigation of satellite imagery of the area, it was determined that MPnr1 was a part of a concentration of stonewalling with inter-leading smaller stone circles indicative of a LIA stock enclosures. MPnr1 covers an area of 30x34m and abuts a steep rock face that acts as the northern wall of the larger stock enclosure. Indications are that the enclosures were utilised by recent herders into the later part of the 20th century. MPnr2 consists of four large, connected circles, which form one stonewalling feature. The combined stock enclosures cover an area of approximately 30x 40m. On the periphery, two smaller enclosures utilised as shelter by herders are located, with an interleading footpath linking MPnr1 and MPnr2. The settlement unit is rated as having high cultural significance and is graded as Grade IIIA due to the traditional practice of many African cultures of burying their deceased within the stock enclosure space.

As indicated in **Section 2.2.2**, in order to redeposit on the Mponeng TSF, from the Savuka Plant, slurry pipelines will need to be constructed from the Savuka Plant to the TSF. The proposed slurry and return water pipes extend from the south of Savuka Plant at the starting point 26°25'24.95"S; 27°23'58.94"E, extending southwards, parallel to each other until reaching the northern extent of Mponeng TSF where they split. Thereafter, the slurry pipeline extends west before connecting to the Mponeng TSF while the return water pipeline extends east, then south around the TSF to the return water dam. There is an alternative slurry and return water pipeline route which extends to the east through Western Deep Levels, then south along Mponeng Gold Mine before heading to the west, where it connects to Mponeng TSF.

8.3.7.1.1 SENSITIVITY AND IMPACTS ON PROPOSED PIPELINE ROUTE

The heritage features stonewalling feature (MPnr1) and stock enclosures (MPnr2) identified by the archaeologist were located on this route. Due to the identified sites being located within the proposed route, the proposed route will have to deviate outside a 15m buffer around the extent of the sites. This reduced buffer is suggested due to the natural constraints the rocky outcrop creates around the site.

8.3.7.1.2 SENSITIVITY AND IMPACTS ON ALTERNATIVE PIPELINE ROUTE

Regarding the alternative route, no heritage resources were identified. As such, this route would not impact any heritage resources unless a chance find is identified, in which case the relevant chance finds procedure must then be put into place.

8.3.7.2 IMPACT RATING

The impact on archaeological and cultural heritage features from the proposed project is presented in Table 70.

Table 70: Impact on archaeological and cultural heritage features (PGS Heritage, 2026)

Alternative	Nature of Impact	Phase	Pre-Mitigation	Post Mitigation	Final score
All project Activities (Proposed route)	Negative	All	Medium Negative	Low Negative	Low Negative
All project Activities (Alternative Route)	Negative	All	Medium Negative	Low Negative	Low Negative

8.3.7.3 CUMULATIVE IMPACT

As discussed in **Section 7.13**, it is likely that the area was inhabited by the baMare-a-Phogole people during the LIA (from about the 1500s to the late 1820s). The baMare-a-Phogole had built similar stonewalling 8.9km south-east on a farm called Kraalkop, as well as 12km south near Fochville at a site referred to as “The Tlokwe Ruins”. It is noted that some of these sites have already been destroyed in the surrounding local area. Due to the destruction of other similar stonewalled settlements in the area, as well as the relevance of these sites on a bigger scale, they have both a high significance and a higher cumulative impact. Consequently, these sites hold the potential to yield information on a group of settlements for which little research has been completed and can offer deeper insight into the history of the local area.

8.3.7.4 PROPOSED MITIGATION MEASURES

The following mitigation measures are recommended:

- All Archaeological sites will require monitoring during site clearing within a 20m radius from the identified archaeological sites through the implementation of an archaeological watching brief.

- Archaeological sites MPnr1 and MPnr2 are to be avoided by a 15m buffer as per s25 of the NHRA. If the construction cannot deviate from the original layout, then further full mitigation and a destruction permit from SAHRA will be required.
- During the construction phase, it is important to recognise any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following Chance Finds Procedure (CFP) should be implemented:
  - A heritage practitioner/archaeologist should be appointed to develop a heritage induction program and conduct training for the Environmental Control Officer (ECO) as well as team leaders in the identification of heritage resources and artefacts during the implementation of the Environmental Management Program (EMPr).
  - An appropriately qualified heritage practitioner/archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified.
  - Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated by the designated environmental officer, and construction activities halted.
  - In the case of the discovery of human remains:
    - The South African Police Service (SAPS) needs to be notified. The SAPS will then confirm if the remains result from criminal activity, in which case they will be responsible for handling the process. In. the case where it is deemed to be archaeological, SAHRA must be informed who will then make recommendations on the process going forward.
  - In the case of archaeological or historical finds:
    - A qualified heritage practitioner/archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource. That will include notification of SAHRA, who will then confirm the mitigation process to be followed and if a permit will be required for the mitigation measures.
  - The contractor, therefore, should have a contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
  - Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner/archaeologist

8.3.8 PALAEONTOLOGY IMPACTS

This section presents the identified palaeontological heritage impacts as per the Palaeontological Impact Assessment undertaken by Banzai Environmental (2026).

8.3.8.1 DESCRIPTION OF IMPACTS

No fossiliferous outcrop was detected in the proposed footprint by the specialist. This could be attributed to the lack of outcrops as well as the lush grassy vegetation in the area. Based on the outcomes of both the field investigation and supporting desktop research, it is concluded that palaeontological heritage resources of scientific or conservation value are rare within the proposed assessment area. This finding is in contrast to the High Palaeontological Sensitivity rating assigned to the area by both the SAHRIS PalaeoSensitivity Map and the DFFE Screening Tool. The construction phase of the Mponeng Lower Compartment TSF study area has been assigned a Medium to High Palaeontological Significance rating prior to mitigation, which is expected to be reduced to Low Significance following the implementation of appropriate mitigation measures. Notably, the construction phase is the only phase of the development expected to impact fossil heritage. The operational and decommissioning phases are not anticipated to pose any significant palaeontological impact. Under the No-Go Alternative, where no development occurs, and the current land use remains unchanged, the palaeontological impact would be neutral.

Threats to palaeontological resources are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction activities.

8.3.8.2 IMPACT RATING

The impact ratings associated with the proposed activities related to palaeontological heritage are indicated in **Table 71.**

Table 71: Summary of impacts related to palaeontological heritage (Banzai Environmental, 2026)

Project Phase	Nature of Impact	Significance Without Mitigation	Significance With Mitigation	Final Significance Score
Construction	Negative	Medium – High Negative	Medium Negative	Medium Negative
Decommissioning	Negative	Medium Negative	Low Negative	Low Negative

8.3.8.3 CUMULATIVE IMPACT

Based on the outcomes of both the field investigation and supporting desktop research, it is concluded that palaeontological heritage resources of scientific or conservation value are rare in the area. Therefore, the cumulative palaeontological impacts are assessed as medium-high before mitigation and Low after mitigation and fall within acceptable limits for such a project

8.3.8.4 PROPOSED MITIGATION MEASURES

The proposed mitigation measures to avoid adverse impacts on palaeontological heritage features due to the proposed activities are provided below:

- An independent and suitably qualified ECO must be appointed and must train the Contractor to recognise potential palaeontological features; and
- Should any palaeontological features be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the ECO shall be notified within 24hours, and a Chance Find Protocol must be implemented. The responsible heritage resources authority (PHRAG), as well as the South African Police Service (SAPS) must be notified within 72hours.

8.3.9 SOILS AND AGRICULTURAL IMPACTS

This section presents the identified soils and agricultural potential impacts as per the Soils Assessment undertaken by The Biodiversity Company (2026).

8.3.9.1 DESCRIPTION OF IMPACTS

The following list and **Table 72** provides the identified impacts which contributed to the loss of land capability:

- Soil erosion: Bare soil surfaces within the proposed project area contributed to increased susceptibility to wind and water erosion, leading to loss of topsoil;
- Soil compaction from vehicle traffic: The movement and operation of vehicles within the project footprint, resulted in increased soil compaction, which adversely affected soil structure and permeability;
- Soil contamination: Surface flow from septic tank and bunded diesel storage can led to soil contamination, impacting soil health and productivity, and
- Soil compaction and degradation from the construction of existing infrastructure: The presence of existing infrastructure such as stockpiles, offices, firebreak, bunded diesel storages, to mention the

few caused further soil compaction and land degradation, disturbing soil structure and reducing overall soil quality.

Table 72: Anticipated impacts for the proposed support infrastructure on agricultural resources (The Biodiversity Company, 2026)

Main Impact	Project activities that can cause loss/impacts to Soils (especially regarding the proposed infrastructure areas)	Secondary impacts anticipated
Loss of land capability	• Construction, operation and decommissioning of roads; • Construction, operation and decommissioning of construction camps, layout areas and office space; • Potential waste water treatment leaks or spillage (i.e. hydrocarbons or untreated waste); • Mixing of soil; • Soil dust precipitation in surface or gravel access roads; • Dust precipitation; and • Removal of vegetation for the proposed support infrastructure	• Erosion; • Soil degradation; • Compaction; • Increase in salinity; • Land contamination; and • Loss of soil via aeolian processes.

8.3.9.2 **IMPACT RATING**

The following table (**Table 73**) provides the framework for the prospective impacts, albeit limited, for the proposed project.

Table 73: Summative results of the Impact Assessment conducted for the proposed project

Impact	Phase	Pre-Mitigation	Post-mitigation	Final Significance
Soil compaction, Soil erosion, Land degradation and Soil contamination	Construction	Medium to Low-	Low -	Low -
Loss of grazing potential	Construction	Medium to Low-	Low -	Medium to Low -
Soil compaction, Soil erosion, Land degradation and Soil contamination	Operation	Medium to low -	Low -	Medium to Low -
Loss of grazing potential	Operation	Medium to Low-	Low -	Low -
Soil compaction, Soil erosion, Land degradation and Soil contamination	Decommissioning	Low -	Low -	low -
Loss of grazing potential	Decommissioning	Low -	Low -	low -
Soil compaction, Soil erosion, Land degradation and Soil contamination	Rehab and Closure	Low -	Low -	Low -
Loss of grazing potential	Reb and Closure	Low -	Low -	low -

8.3.9.3 **CUMULATIVE IMPACT**

It is anticipated that there will be minimal impact on soil and agricultural potential. Considering the small extent of the new infrastructure within undisturbed areas, the rocky habitat units of the intact vegetation areas and the current minimal agricultural activities within the area, the proposed activities and associated infrastructure will not result in the segregation of any high production agricultural land. Therefore, the cumulative impact on soil and agricultural potential is low subject to adherence of the mitigation measures.

8.3.9.4 PROPOSED MITIGATION MEASURES

The proposed mitigation measures to avoid adverse impacts on soils and agricultural potential due to the proposed activities are provided below:

- Minimise project footprint as far as possible. Manage location of topsoil stripping stockpiling, demarcation of topsoil stockpiles and prevention of stockpile erosion and contamination. This can protect the topsoil stockpiles to keep it viable for rehabilitation purposes.
- Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. Usually, areas with sandy soils are avoided as far as possible for heavy vehicles, areas dominated with sandy soils, dust suppressions methods should be implemented to reduce wind erosion during this phase.
- Where necessary, implementation of embedded controls such as geotextiles, gabion baskets to effectively control soil erosion on-site should be implemented.
- Associated infrastructure foundations must be (preferably) located in already disturbed areas where possible.
- Losses of fuel and lubricants from vehicles to be contained during construction and the TSF activities, use of biodegradable fluids where possible, avoid waste disposal on undesigned areas which are not contained.
- Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.
- Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limits to enforce reduced speeds.
- No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.
- A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures.
- Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts.
- An alien invasive plant species and control programme must be implemented from the onset of the project.
- Install erosion and sediment control measures (silt fences, sediment basins, straw bales).
- Remove infrastructure, like office and electrical infrastructure.
- Remove hazardous materials (batteries, oils, chemicals) for proper disposal.
- Decompact soils in areas affected by heavy machinery (use subsoiling or deep ripping).
- Replace and evenly spread any stockpiled topsoil.
- Reseed or replant with native or pre-existing vegetation suited to the soil capability including the stockpiling areas.
- Maintain erosion and sediment controls until vegetation is re-established

- Conduct post-restoration soil assessments (compaction, fertility, structure).
- Document and report restoration outcomes to relevant authorities.

8.3.10 TERRESTRIAL BIODIVERSITY IMPACTS

This section presents the identified terrestrial biodiversity impacts as per the Terrestrial Biodiversity Impact Assessment undertaken by The Biodiversity Company (2026).

8.3.10.1 DESCRIPTION OF IMPACTS

The current impacts observed during surveys are listed below. Photographic evidence of a selection of these impacts is shown in **Figure 111**.

- Overgrazing and trampling of natural vegetation and wetlands by livestock.
- Secondary Roads (and associated traffic and wildlife road mortalities).
- Unregulated burning.
- Alien and/or Invasive Plants (AIP).
- Existing mine infrastructure.
- Servitudes and infrastructure (powerlines).
- Water contamination and sewage.
- Vegetation removal.

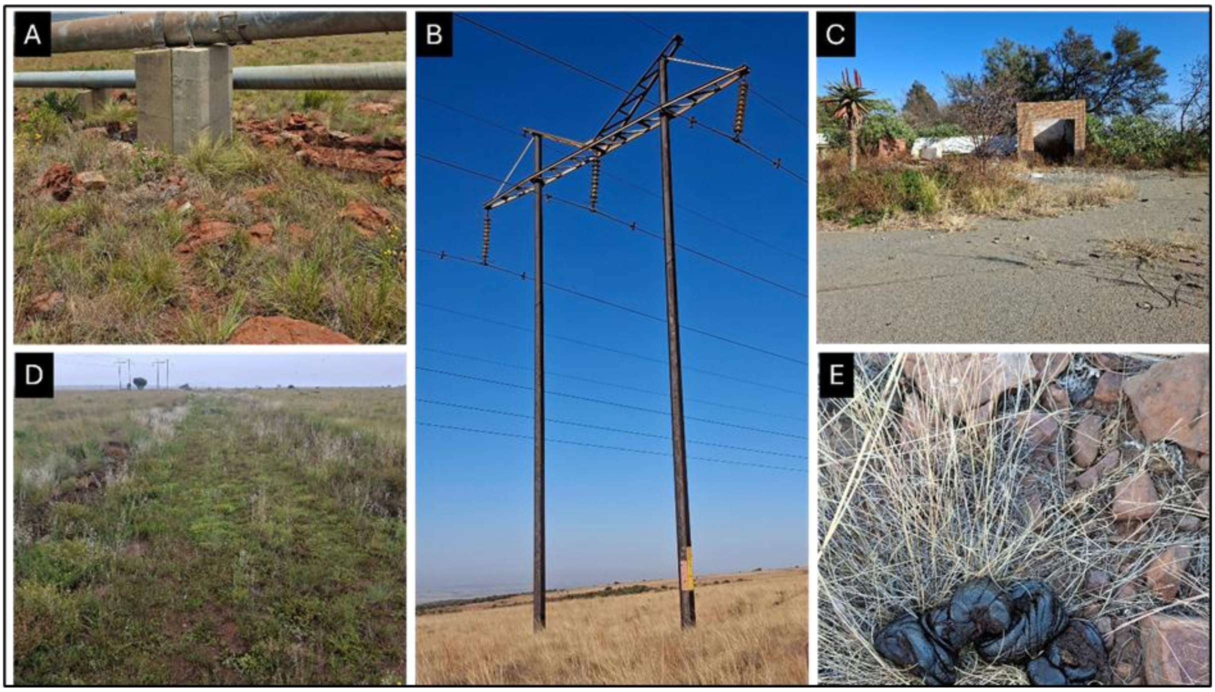


Figure 111: Some of the identified impacts within the study area; A) Existing Pipelines, B) Powerline infrastructure, C) Old Infrastructure, D) Roads and associated edge effects and E) Grazing (The Biodiversity Company, 2026)

The impacts regarding the proposed development were assessed for construction and the operational stages, no decommission/rehabilitation phases were considered. In the impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity (**Table 74**).

Table 74: Anticipated impacts for the proposed activities on terrestrial biodiversity (The Biodiversity Company, 2026)

Main Impact	Project activities that can cause loss of habitat	Secondary impacts anticipated
Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation	Displacement/loss of flora & fauna (including SCC) Increased potential for soil erosion Habitat fragmentation Increased potential for establishment of alien & invasive vegetation
	Access roads and servitudes	
	Soil dust precipitation	
	Dumping of waste products	
	Random events such as fire (cooking fires or cigarettes)	
Spread and/or establishment of alien and/or invasive species	Vegetation removal	Habitat loss for native flora & fauna (including SCC) Spreading of potentially dangerous diseases due to invasive and pest species Alteration of fauna assemblages due to habitat modification
	Vehicles potentially spreading seed	
	Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents	
	Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	
Direct mortality of fauna	Clearing of vegetation	Loss of ecosystem services Increase in rodent populations and associated disease risk
	Roadkill due to vehicle collision	
	Pollution of water resources due to dust effects, chemical spills or sewage leakages	
Reduced dispersal / migration of fauna	Loss of landscape used as corridor	Loss of ecosystem services Reduced plant seed dispersal
	Compacted roads	
	Removal of vegetation	
	Light, noise and dust disturbance	
Environmental pollution due to water/ Acid Mine Drainage (AMD) runoff	Chemical (organic/inorganic) spills	Faunal mortality (direct and indirectly) Groundwater pollution Loss of ecosystem services
	Erosion	
Disruption / alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, generators)	Loss of ecosystem services
	Vehicles	
Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Harm to fauna and/or staff

8.3.10.1.1 UNPLANNED EVENTS IMPACT

The planned activities will have anticipated impacts as discussed; however, unplanned events may occur on any project and may have potential impacts which will need management. **Table 75** is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 75: Summary of unplanned events for terrestrial biodiversity (The Biodiversity Company, 2026)

Unplanned Event	Potential Impact	Mitigation
Hydrocarbon spills into the surrounding environment	Contamination of habitat as well as water resources associated with spillage.	A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural grassland and wetlands	Appropriate/Adequate fire management plan need to be implemented.

8.3.10.1.2 CONSTRUCTION PHASE IMPACT

The following potential impacts on the biodiversity were considered for the construction phase of the project. This phase refers to the period during construction when the proposed infrastructure is constructed. This phase usually has the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered.

a) Pipeline impacts (Both pipeline routes and Pipe Bridge Area).

- Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community, and the loss of floral SCC.
- Introduction of invasive and alien species, especially plants.
- Direct loss and displacement of faunal community (including SCC) due to habitat loss, mortality and disturbance (noise, dust, vibration), including the reduced dispersal/migration of fauna.
- Destruction of non-resilient habitats (Rocky Outcrops).
- Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.
- Clearing of vegetation leading to soil erosion and loss of topsoil.

b) TSF Impacts (Mponeng Lower Compartment and Return Water Dam)

- Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community.
- Introduction of invasive and alien species, especially plants.
- Direct loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna.
- Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.
- Clearing of vegetation leading to soil erosion and loss of topsoil.

8.3.10.1.3 OPERATIONAL PHASE IMPACTS

The operational phase impacts of daily activities are anticipated to result in the further spreading of the AIP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. Moving maintenance vehicles don’t only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions.

a) Pipeline Impacts (Both pipeline routes and Pipe Bridge Area)

- Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.
- Continued encroachment by alien and invasive plant species.
- Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna. and
- Environmental pollution due to pipe leakage.

b) TSF Impacts (Mponeng Lower Compartment and Return Water Dam)

- Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.
- Continued encroachment by alien and invasive plant species.
- Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna.
- Continued risk of contamination (soil and water resource) from fuel spills and hazardous materials.
- Continuous stripping of topsoil, leading to ongoing land degradation, including erosion.
- Environmental pollution due to water/ Acid Mine drainage runoff.

8.3.10.2 IMPACT RATING

Table 76 shows the significance of potential impacts associated with the proposed activities and proposed pipeline route, on biodiversity before and after the implementation of mitigation measures.

Table 76: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the proposed linear infrastructure (The Biodiversity Company, 2026)

Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Significance
Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community, and the loss of floral SCC.	Construction	High -	Medium to High-	Medium to High-
Destruction of non-resilient habitats (Rocky Outcrops)		High -	Medium to high -	High -
Direct loss and displacement of faunal community due to habitat loss, mortality and disturbance (noise, dust, vibration), including the reduced dispersal/migration of fauna		Medium to high -	Medium to low -	Medium to low -
Clearing of vegetation leading to soil erosion and loss of topsoil.		Medium to high -	Medium to low -	Medium to low -
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.		Medium to high -	Medium to low -	Medium to low -
Introduction of alien species, especially plants		Medium to high -	Low -	Medium to low -
Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.	Operational	Medium to high -	Medium to low -	Medium to low -

Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna		High	Medium to high -	Medium to high -
Continued encroachment by alien and invasive plant species		Medium to High	Low -	Low -
Environmental pollution due to pipe leakage		Medium to High	Medium to low -	Medium to low

Table 77 shows the significance of potential impacts associated with the proposed activities and alternative pipeline route, on biodiversity before and after the implementation of mitigation measures.

Table 77: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the alternative linear infrastructure (The Biodiversity Company, 2026)

Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Significance
Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community, and the loss of floral SCC.	Construction	High -	Medium to High-	Medium to High-
Destruction of non-resilient habitats (Rocky Outcrops)	Construction	High -	Medium to low -	Medium to low
Direct loss and displacement of faunal community due to habitat loss, mortality and disturbance (noise, dust, vibration), including the reduced dispersal/migration of fauna	Construction	Medium to high -	Medium to low -	Medium to low -
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	Medium to high -	Medium to low -	Medium to low -
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	Construction	Medium to high -	Medium to low -	Medium to low -
Introduction of alien species, especially plants	Construction	Medium to high -	Low -	Medium to low -
Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.	Operational	Medium to high -	Medium to low -	Medium to low -
Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna	Operational	Medium to high -	Medium to low -	Medium to low -
Continued encroachment by alien and invasive plant species	Operational	Medium to High -	Low -	Low -
Environmental pollution due to pipe leakage	Operational	Medium to High -	Medium to low -	Medium to low -

Table 78 shows the significance of potential impacts associated with the proposed activities and alternative pipeline route, on biodiversity before and after the implementation of mitigation measures.

Table 78: Summary assessment of significance of potential impacts on terrestrial biodiversity associated with the project for the Mponeng Lower Compartment and Return Water Dam (The Biodiversity Company, 2026)

Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Significance
Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community, and the loss of floral SCC.	Construction	Medium to low -	Medium to low -	Medium to low -
Direct loss and displacement of faunal community due to habitat loss, mortality and disturbance (noise, dust, vibration), including the reduced dispersal/migration of fauna	Construction	Medium to high -	Medium to low -	Medium to low -
Clearing of vegetation leading to soil erosion and loss of topsoil.	Construction	Medium to high -	Medium to low -	Medium to low -

Impact	Phase	Pre-Mitigation	Post-Mitigation	Final Significance
Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.		Medium to high -	Medium to low	Medium to low
Introduction of alien species, especially plants		Medium to high -	Low -	Low -
Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.	Operational	Medium to high -	Medium to low -	Medium to low -
Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna		Medium to high -	Medium to low -	Medium to low -
Continued encroachment by alien and invasive plant species		Medium to High -	Low -	Low -
Continued risk of contamination (soil and water resource) from fuel spills and hazardous materials.		Medium to High -	Low -	Low -
Continuous stripping of topsoil, leading to ongoing land degradation, including erosion		Medium to High -	Medium to low -	Medium to low -
Environmental pollution due to water/ Acid Mine drainage runoff.		Medium to High -	Medium to low -	Medium to low -

8.3.10.3 CUMULATIVE IMPACT

Species of conservation concern and protected species were identified within the study, especially along the proposed route. Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change. The impact is likely to result in irreplaceable loss of resources over along both the proposed pipeline route and the alternative pipeline route without mitigation. However. Considering the proposed mitigation measures, the cumulative impact can be reduced to moderate-low provided the mitigations are adhered to for either route.

8.3.10.4 PROPOSED MITIGATION MEASURES

The proposed mitigation measures to avoid adverse impacts on terrestrial biodiversity due to the proposed activities are provided below:

- Areas of high Site Ecological Importance must be avoided as far as possible. Construction of pipelines within High SEI areas along the route is permissible as long as the existing pipeline infrastructure, or modified areas within the High SEI areas or additional mitigation measures, are utilised.
- All plant SCC along pipeline route must be avoided, and the 200m buffers be strictly adhered to, if these buffers cannot be avoided then necessary permits must be obtained.
- A protected plant and SCC search and rescue plan should take place occur to record locations of all SCC and protected species.
- Existing access roads must be made use of as far as possible. The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon.
- Areas of indigenous vegetation, even secondary communities outside of the direct footprint of the development, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.

- It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.
- An emergency preparedness plan that incorporates a detailed pipe leak spill management plan must be put in place to ensure that should there be any pipe leaks, bursts or overflow that it does not run into the surrounding areas. This includes the installation of leak warning and detection systems. Precautions must be taken against the erosion damage that would be caused by unplanned pipe leaks, such as the planting of dense indigenous pioneer grass seeds across all bare earth areas surrounding the pipes.
- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.
- Monitoring of the pipeline must be undertaken to detect leaks and monitoring should be undertaken at least once a week. Water monitoring must also be undertaken to ensure that there has been no runoff into the nearby water resources.
- Monitoring of adjacent watercourses must be undertaken to assess the impact of runoff to these systems. Aquatic monitoring must be done, this includes ground water and surface water.
- Contain all dirty water in the RWD. Contaminated water must not be discharged into the watercourses.
- Clean and dirty water must be separated.
- Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.
- A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.
- All structure footprints are to be rehabilitated and landscaped after installation is complete where relevant. Rehabilitation of the disturbed areas existing in the proposed development area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.
- Any individual of any protected plant species that is present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. High visibility flags must be placed near any threatened/protected plants in order to avoid any damage or destruction of the species. If left undisturbed, the sensitivity and importance of these species needs to be part of the environmental awareness program. Infrastructure, development areas and routes where protected plants cannot be avoided should be removed from the soil and relocated/ re-planted in similar habitats.
- A qualified environmental control officer must be appointed before construction begins.
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- Compilation and implementation of an alien vegetation management plan. An acceptable plan must be in place prior to the commencement of construction activities.
- Environmental Awareness Training discussions/training must include (but not limited to): Speed limits, General rules of road use, not limited to Avoiding the widening of the road and Environmental sensitivity of surrounding habitat.
- Inspect vehicles and machinery on a daily basis for fuel and oil leakages and repair such.
- There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas (as a result of the project construction) with local indigenous plants from the area. Dust-reducing mitigation

measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.

- Any materials may not be stored for extended periods of time and must be removed from the study area once the construction phase has been concluded. No permanent construction phase structures, apart from approved structures, must be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated areas.
- No trapping, killing, or poisoning of any wildlife is to be permitted. This should be included in Environmental Awareness Training and signs must be put up to enforce this
- It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the site apart from rehabilitation purposes. No plant species whether indigenous or exotic should be brought into/taken from the site, to prevent the spread of exotic or invasive species or the illegal collection of plants.
- Outside lighting, if used, should be designed and limited to minimise impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.
- Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the Project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night. Holes must be subsequently inspected for fauna prior to backfilling.
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.
- All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
- Environmental Awareness Training discussions/training must include (but not limited to): Speed limits, General rules of road use, not limited to Avoiding the widening of the road and Environmental sensitivity of surrounding habitat.
- The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.
- The duration of the activities should be minimised to as short a term as possible, to reduce the period of disturbance on fauna.
- Considering that many of the mammal fauna recorded within the study area are nocturnal, no road activity is to occur at night.
- A habitat rehabilitation and revegetation plan must be developed and implemented to reduce the occurrence of bare soil areas and the associated damage due excessive erosion.
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat.

- Speed limits must be put in place to reduce erosion. All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities.

8.3.11 VISUAL IMPACTS

This section presents the identified visual impacts as per the Visual Impact Assessment undertaken by Graham Young Landscape Architect (Graham Young) (2025).

8.3.11.1 DESCRIPTION OF IMPACTS

Impacts on views are greatest when viewers are sensitive to landscape changes and focus on those changes. The visual impact of the Project will cause minor landscape alterations that are noticeable to viewers from the N12 and farmsteads south and southeast of the site. These visual impacts are likely in the short to medium term. Still, they will result in only a minor loss to the baseline landscape and visual resources, leading to a low to negligible impact. Mitigation measures would help maintain a low negative impact.

The cause of the anticipated visual impacts would be:

a) Operational Phase

- The physical presence of the rising sides of the TSF; and
- The potential light pollution along the boundary of the properties and the cause of spotlight effects.

b) Post-closure and rehabilitation

- Rehabilitation activities at the TSF's side slopes and surface area until the areas are self-sustaining.

8.3.11.2 IMPACT RATING

The potential impact ratings are based on the worst-case scenario when considering all aspects of the Project together. It is expected that visual impacts could occur from activities and infrastructure throughout all Project phases, including operation and decommissioning. It is also noted that the results for the Project did not identify visual and landscape impacts as being sensitive, nor did it identify a visual and landscape assessment for inclusion in the assessment report. **Table 79** below summarises the potential magnitude of visual impact for all phases of the project.

The worst-case effect on the visual environment during the operational phase is assessed to have a low magnitude (i.e. where the impact affects the environment so that natural, cultural, and social functions and processes are slightly affected). It would occur over the short term (a maximum of 5 years). The unmitigated impact would be localised but extend beyond the site to adjacent areas. The significance of the effect, pre-mitigation, is predicted to be LOW (i.e., the impact would not directly influence the decision to develop the area if it is mitigated). The project can be authorised but monitoring and mitigation are essential. Implementing mitigation measures could slightly reduce the anticipated impact, which would remain at LOW. Refer to **Table 80** below.

Table 79: Magnitude of Visual Impact (Graham Young, 2025)

	High	Moderate	Low	Negligible
Receptors	None	None	For receptors travelling along the N12.	For receptors, southeast of the site at more than 3,0km from the closest edge of the TSF (i.e. background of a view)
Impact Description	Major loss of or alteration to the baseline's key elements/features/characteristics near the site. **High visual impacts would result.**	Partial loss of or alteration to the baseline's key elements/features/characteristics. **Moderate visual impacts would result.**	Minor loss of or alteration to the baseline's key elements/features/characteristics. **Low visual impacts would result.**	Negligible loss or alteration to the baseline's key elements/features/characteristics. **Negligible scenic quality impacts would result.**

The extent of the impact on the visual environment during the post-closure and rehabilitation phase is considered minor, meaning it affects the environment in a way that does not impact natural, cultural, or social functions and processes (with no associated consequences), and would occur over the short term. The unmitigated impact would be localised but could extend beyond the Project sites. The significance of the impact is predicted to be LOW. Refer to **Figure 112** and **Table 80** below.

Table 80: Summary of impacts related to visual impacts (Graham Young, 2025)

Impact	Phase	Pre-Mitigation	Post-mitigation	Final Significance
Change to the landscape characteristics and key views	Operation Phase	Medium -	Low -	Low -
	Post-closure and Rehabilitation	Low -	Low -	Low -

8.3.11.3 **CUMULATIVE IMPACT**

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate from it) or actions that occurred in the past, present, or are likely to happen in the foreseeable future. They may also affect how the landscape is experienced, and cumulative effects may be positive or negative. They may be considered part of the mitigation measures, where they comprise a range of benefits. Cumulative effects can also arise from the intervisibility of a range of developments and the combined effects of individual components of the proposed development occurring in different locations or over time. The separate effects of such individual components or developments may not be significant. However, they may create an unacceptable degree of adverse impact on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, vegetative cover or other visual obstruction, elevation, and distance, as this affects visual acuity, which is also influenced by weather and light conditions (LI-IEMA, 2013).

The Mponeng Lower Compartment TSF project would add to existing mining land-use activities prominent in the subregion. The current Mponeng Lower Compartment TSF has been in place for decades. The proposed project aims to recommence deposition which will increase the height of the existing TSF. Therefore, the overall effect of the project, which is also near existing mine activities, would be LOW. That is, considering potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will lead to spatial and temporal cumulative change.

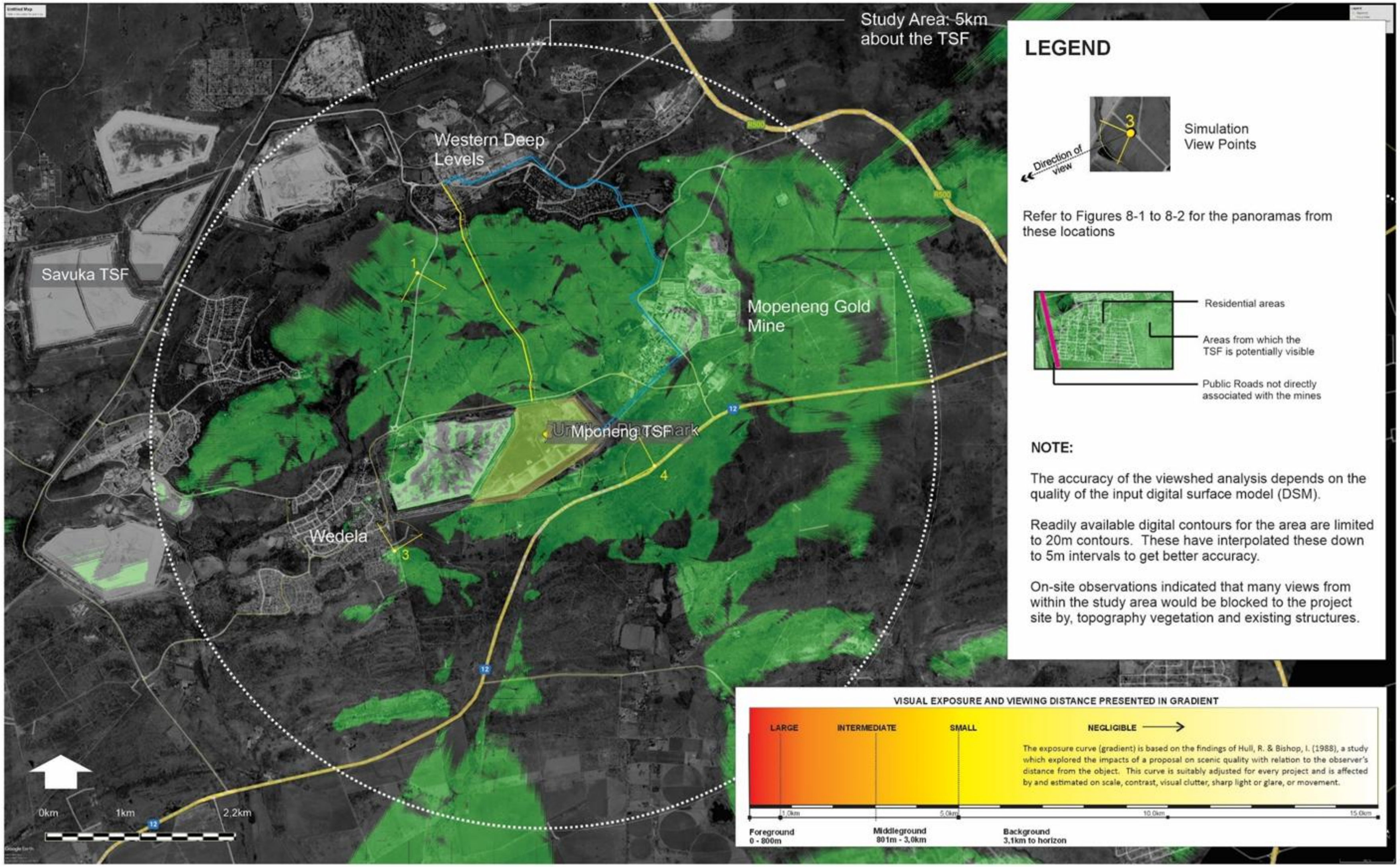


Figure 112: Mponeng Lower Compartment TSF Viewshed Analysis (Graham Young Landscape Architect, 2025)

8.3.11.4 PROPOSED MITIGATION MEASURES

The proposed mitigation measures to avoid adverse impacts on palaeontological heritage features due to the proposed activities are provided below:

- Apply dust suppression methods to limit the dust generated during the establishment phase.
- Ensure the post-closure rehabilitation plan is geared toward acceptable topographic and ecological conditions.
- Where new vegetation is proposed to be introduced to the site (on the rising side slopes), an ecological approach to rehabilitation should be adopted. For example, communities of indigenous plants (primarily grasses) will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods, and the introduced landscape would be more sustainable.
- “Housekeeping” procedures should be developed for the project to ensure that the site and adjacent areas are kept clean of debris and that dust generation is limited.
- The following are measures to minimise light pollution beyond the perimeter of the site that must be considered in the lighting design of the Project:
    - Should light fixtures be installed, ensure precisely directed illumination to reduce light “spillage” beyond the site's immediate surroundings.
    - Avoid high pole-top security lighting along the periphery of the site and use only lights that are activated upon illegal entry.
    - Minimise the number of light fixtures to the bare minimum, including security lighting.

8.3.12 DAM / STRUCTURAL SAFETY IMPACTS

This section presents the identified potential safety impacts which may emanate from the proposed activities.

8.3.12.1 DESCRIPTION OF IMPACTS

Unstable and/or unsafe TSF practices can result in the TSF breaking the dam wall, resulting in massive sudden uncontrolled flood of liquid sludge. Fears of such an event occurring remains high especially amongst communities living within proximity of TSFs as result of the Jagersfontein TSF Dam Wall Collapse in September 2022. The failure resulted in the sudden and uncontrolled release of more than 6 million m^3 of liquid sludge, smothering nearly 200 nearby houses and approximately 1600 ha of agricultural and grazing land (Marais et al., 2024). Two people died, and one person believed to have been swept away is still declared missing. The surrounding communities may have negative perceptions relating to the risk of TSF failure which Golden Core Trade and Invest should address.

8.3.12.2 IMPACT RATING

The impact ratings associated with the proposed activities related to dam safety are indicated in **Table 81**.

Table 81: Summary of impacts related to dam safety

Impact	Phase	Pre-Mitigation	Post-mitigation	Final Significance
TSF breaking the dam wall, resulting in massive sudden uncontrolled flood of liquid sludge	Construction Phase	Medium -	Low -	Low -
	Operation Phase	Very High -	Medium -	Medium -
	Post-closure and Rehabilitation	High -	Medium -	Medium -

8.3.12.3 CUMULATIVE IMPACT

The cumulative impact of additional deposition onto the existing Mponeng Lower Compartment TSF adjacent to the Upper Mponeng Lower Compartment TSF is generally significant, often creating intensified environmental, social, and geotechnical risks which can result in structural failure of the dam wall especially considering the position of the bigger Upper Compartment located immediately west to the Mponeng Lower Compartment TSF. While it may allow for better consolidation of waste and "design for closure," the combined effect of multiple facilities can exacerbate stability risks especially with the proposed additional deposition to the Mponeng Lower Compartment TSF. Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is likely that the impact will result in spatial and temporal cumulative change of high to very high negative significance without mitigation and medium-high negative with mitigation.

8.3.12.4 PROPOSED MITIGATION MEASURES

The proposed mitigation measures to avoid adverse impacts on dam / structural safety due to the proposed activities are provided below:

- Developer must undertake the Dam Safety Technical Assessment and register with the DWS Dam Safety Office;
- There must be focus on maintaining geotechnical stability, controlling water, and ensuring structural integrity, as outlined in the Global Industry Standard on Tailings Management (GISTM).
- Constructing a buttress or similar structure at the downstream toe of the existing embankment is critical and must be considered to manage higher phreatic surfaces and increased shear strength requirements.
- Limiting the rate of rise must be implemented to allow for adequate consolidation and prevent pore pressure buildup, particularly when placing fresh tailings over older, softer materials.
- Constructing of robust spillways and emergency containment ponds to manage extreme weather events and/or emergency situations.
- Robust emergency preparedness plan inclusive of dam / structural failure must be compiled and must form part emergency drills and environmental awareness training.
- Potential affected groups / communities must be made aware of the emergency plan and how they should react to emergency situations.
- Dam / structural failure sirens must be permanently installed to warn the community in the unfortunate event of a dam / structural failure of the TSF.
- Developer should make the reports relating to structural monitoring and integrity of the TSF available the I&APs to address the negative perceptions relating to the risk of TSF failure.
- Ground improvement, such as dynamic compaction, is recommended to densify the underlying landfill material, reduce voids, and improve uniformity in stiffness and bearing capacity across the area.
- All measures in the EMPr, conditions of the Environmental Authorisation and Water Use License should be implemented especially those related to structural integrity and safety.

8.3.13 SOCIAL IMPACTS

This section presents the identified potential socio-economic impacts which may emanate from the proposed activities.

8.3.13.1 DESCRIPTION OF IMPACTS

The project (if approved by the competent authority) will ensure job security for currently employed personnel at the Mponeng and Savuka operations as they will be able to continue with their current jobs. This impact would be experienced on a wider level since it will allow them to meet the needs of their family members as well partake in economic activities in the area. The job continuation will be a significant positive impact during the operational phase.

However, as the proposed TSF forms part of an existing mining operation, the potential for new job creation is limited. Some jobs will be created during planning and construction. The majority of the employment opportunities are related to the future ongoing operation of the Savuka and Mponeng Plant which requires additional deposition space in order to continue operations. Employment opportunities for some unskilled, skilled labour as well as providing services during construction (e.g. accommodation, transportation, etc.) may arise from this project. It is important to note that employment opportunities for locals will be minimal as the project entails aspects which require qualified and skilled personnel especially for the operational phase. The proposed activities also cover a small footprint and a short period of construction. Therefore, there will be minimal opportunities for locals for tasks largely related to unskilled labour, resulting in low positive cumulative impact on socioeconomics.

8.3.13.2 IMPACT RATING

The impact ratings associated with the proposed activities related to dam safety are indicated in **Table 82**.

Table 82: Summary of impacts related to socioeconomics

Impact	Phase	Pre-Mitigation	Post-mitigation	Final Significance
Employment opportunities and livelihood	Construction	Low +	Low +	Low +
	Decommissioning	Low +	Low +	Low +
	Post-closure and Rehabilitation	Medium -	Low -	Low -

8.3.13.3 CUMULATIVE IMPACT

Employment opportunities for some unskilled, skilled labour as well as providing services during construction (e.g. accommodation, transportation, etc.) may arise from this project. It is important to note that employment opportunities for local will be minimal as the project entails aspects which require qualified and skilled personnel. The proposed activities also cover a small footprint and a short period of construction time where most opportunities will be created. Therefore, there will be minimal opportunities for locals for tasks largely related to unskilled labour, resulting in low positive cumulative impact on socioeconomics.

8.3.13.4 PROPOSED MITIGATION MEASURES

The proposed mitigation measures to avoid adverse impacts on socioeconomic aspects of the community due to the proposed activities are provided below:

- Developer must allow for a transparent employment opportunity for locals.
- Local suppliers and workers must be prioritised as far as possible for economic and professional growth.
- Implement a grievance mechanism and ensure that it is community friendly. There must be a record of community grievances and actions undertaken to address the grievances.

8.3.14 HYDROPEDOLOGY IMPACTS

This section presents the identified potential Hydropedological impacts which may emanate from the proposed activities.

The study area transects site land type data (Land Type Survey Staff, 1972 - 2006) confirmed the hillslopes transects and the modelled conceptual models of delineated soil hydropedological groups resources in the catchment with the proposed Mponeng Lower Compartment Tailings Storage Facility (TSF) project, as presented in **Section 7.6**. Four main hillslope hydropedological patterns were identified which are applicable to the catchment of influence with the proposed development (see **Section 7.6, Table 25**). The majority of the slopes for the first and second distinctive hydropedological patterns are characterised by recharge (shallow or shallow) hydropedological types. These patterns occur from the crest to the midslope transecting to either a recharge (shallow or deep) at the valley bottom merging to a watercourse. The majority of the slopes for the third distinctive hydropedological patterns are characterised by recharge (shallow) and responsive (shallow) hydropedological types. These patterns occur from the crest to the lower midslope transecting to responsive (shallow) at the valley bottom merging to a watercourse. The fourth distinctive hydropedological patterns are characterised with recharge (shallow) and responsive (shallow and wet). These patterns occur from the crest to the midslope with a responsive (shallow) type transecting to recharge (shallow) at the midslope transecting to responsive (wet) in valley bottom section merging to the watercourse.

Several model exercises were undertaken to determine the catchment extent of the sub-basin for the wetlands (**Section 7.8.6**) associated with the project area. These models indicate minimal impacts are expected as most of the proposed infrastructure exists. The site is in a land type commonly associated with shallow recharge hydropedological soils groups (Mispah), recharge (deep) hydropedological types (Carolina), responsive shallow hydropedological types (Witbank) and responsive saturated hydropedological types (Stilfontein) see **Figure 113**. It is worth considering the source of water associated with the moisture content within the watercourse.

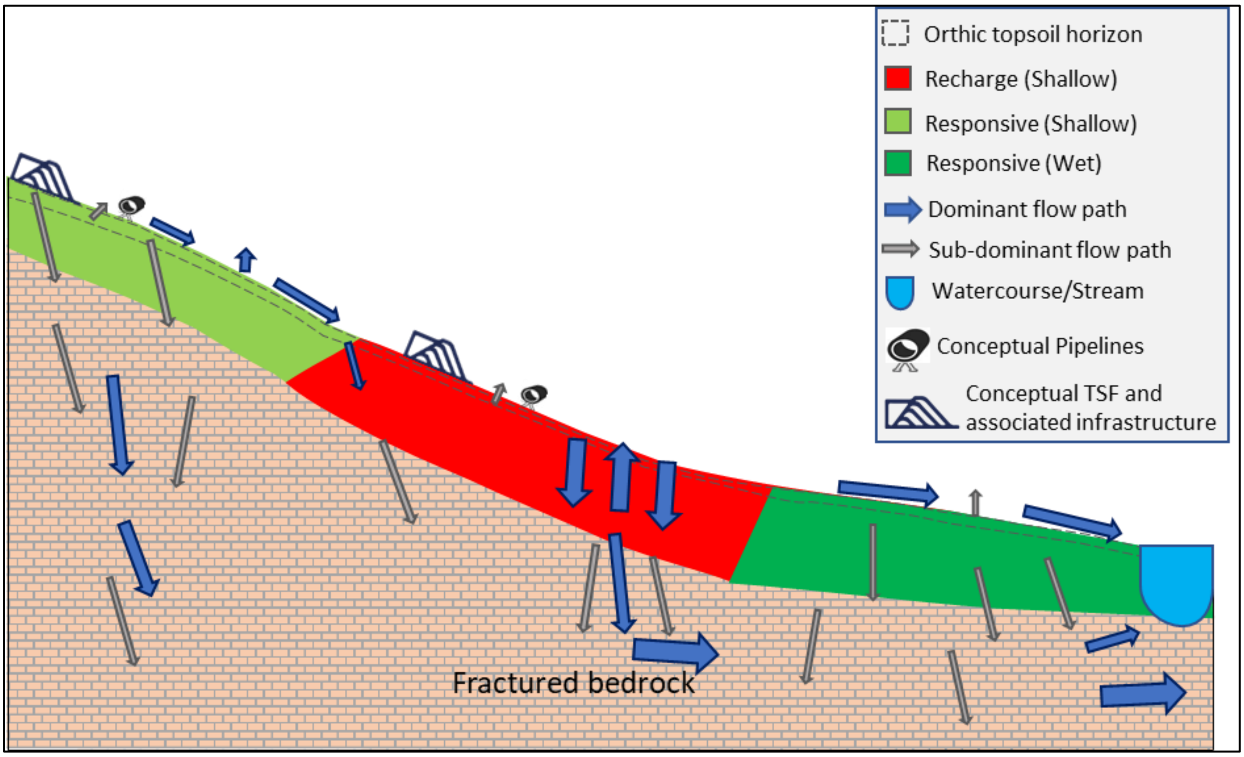


Figure 113: The Conceptual hydropedological flows after the Mponeng Lower Compartment Tailings Storage Facility (TSF) project (The Biodiversity Company, 2026)

The reach of the water resources adjacent to the proposed Mponeng Lower Compartment TSF project and associated infrastructure derives most water flows from the catchments north-east and south east, which are characterised with recharge (Shallow and deep). This indicates that surface and also subsurface recharge flows are predominantly responsible for the level of moisture in the watercourses. Commencement of activities to re-deposit for the project will have an acceptable impact on the recharge and lateral soils in proximity to the site`s catchment as dominant vertical and sub-dominant lateral flows towards the water table recharge stores (shallow, slow and deep recharge) will be minimally impeded see **Figure 113**. Limited impacts can also be expected where the existing upgrades of the pipeline intercept the hillslopes with some lateral flows and responsive shallow. Flow impediments due to impermeable layers can occur promoting surface return flows. Usually, flow changes in the hillslopes will respond to vertical flow paths still recharging the catchment water stores sufficiently. It is however worth noting that, even though the impact is minimal, due to the presences of lateral flows from recharge (shallow) soils at the soil rock interface (Mispah soil form) associated with the project area should also be properly managed. This can minimise surface return flows or drainage problems which commonly promote loss of water as surface run-off or evaporation demands increasing the total catchment deductible water losses. The areas with responsive wet (saturated) soils (i.e., Stilfontein soil forms) mostly associated with artificial saturation or natural wetlands in the project area will be avoided.

When comparing the size of the project area with that of the combined sub-basins responsible for providing moisture content to the wetland systems, it is clear that the potential worst-case scenario loss of moisture to the wetland is approximately < 4% of the total water regime on a catchment scale as these areas where previously developed and the existing pipelines. Therefore, when considering a percentage loss of total streamflow and groundwater recharges, negligible losses are expected, predominantly due to the fact that the bulk of the moisture and waterflows already originates well upstream of the project area and around the catchment.

The existing pipelines, currently contribute minimally to catchment hydrology through limited lateral seepage and episodic surface runoff during rainfall events, which are largely managed via engineered containment systems. These contributions are constrained by the dominant hydropedological setting, which is characterised by vertical recharge patterns through well-drained soils such as Mispah and Carolina. The proposed pipeline upgrade is not anticipated to significantly alter this status. Catchment-scale modelling confirms that the overall impact on water regime stores is negligible, with potential losses accounting for < 1% of the total catchment water balance. Importantly, the TSF footprint expansion avoids responsive saturated zones, and the hydropedological flow regime, particularly vertical infiltration, remains largely intact. Consequently, the pipeline upgrades will also not materially affect the subsurface or surface water contributions to adjacent watercourses, provided that current seepage and stormwater controls are maintained.

Therefore, it is the specialist's opinion that the proposed Mponeng Lower Compartment Tailings Storage Facility (TSF) project and associated infrastructure will not result in a significant loss of total streamflow and groundwater recharge water regime stores. It is therefore recommended that the proposed activities proceed as planned and no further hydropedology assessments are necessary. The proposed mitigation measures indicated on soils and agricultural potential (8.3.9.4) and wetlands (8.3.3.1.2) are recommended for managing hydropedological impacts.

8.3.15 IMPACTS SUMMARY

An EIA impact assessment matrix for all identified impacts (including pre- and post-mitigation assessment), and taking into account the cumulative potential for each impact is shown in **Table 83** below - refer to **Appendix H** for a larger A3 version

Table 83: Summary of identified potential impacts associated with the proposed activities

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
1.1	Disturbance / destruction of sites of heritage significance	TSF and Associated Infrastructure: Pipeline Route 1	All	Normal operations or events	-6,75	Medium to low -	-3,5	Low -	High	2	3	1,38	-4,81	Medium to low -
1.2		TSF and Associated Infrastructure: Pipeline Route 2	All	Normal operations or events	-6,75	Medium to low -	-3,5	Low -	High	2	3	1,38	-4,81	Medium to low -
2.1	Disturbance / destruction of palaeontological resources	TSF and Associated Infrastructure: Pipeline Route 1	All	Normal operations or events	-11,25	Medium to high -	-6	Medium to low -	Medium	1	3	1,25	-7,50	Medium to low -
2.2		TSF and Associated Infrastructure: Pipeline Route 1	All	Normal operations or events	-11,25	Medium to high -	-6	Medium to low -	Medium	1	3	1,25	-7,50	Medium to low -
3.1	Soil compaction, Soil erosion, Land degradation and Soil contamination, Soil fertility losses	All	Construction	Normal operations or events	-5,5	Medium to low -	-2	Low -	Medium	2	3	1,38	-2,75	Low -
3.2		All	Operation	Normal operations or events	-4,5	Medium to low -	-1,5	Low -	Medium	2	3	1,38	-2,06	Low -
3.3		All	Decommissioning	Normal operations or events	-4	Low -	-3,5	Low -	Medium	2	2	1,25	-4,38	Medium to low -
3.4		All	Closure and Rehabilitation	Normal operations or events	-3,5	Low -	-1,5	Low -	Medium	1	2	1,13	-1,69	Low -
3.5	Loss of Land Capability	All	Construction	Normal operations or events	-8,25	Medium to low -	-3,5	Low -	Medium	2	2	1,25	-4,38	Medium to low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
3.6		All	Operation	Normal operations or events	-6	Medium to low -	-1	Low -	Medium	2	1	1,13	-1,13	Low -
3.7		All	Decommissioning	Normal operations or events	-4	Low -	- 1,25	Low -	Medium	2	1	1,13	-1,41	Low -
3.8		All	Closure and Rehabilitation	Normal operations or events	-4,5	Medium to low -	-1,5	Low -	Medium	2	2	1,25	-1,88	Low -
4.1	Air quality impacts due to current operations at Mponeng Mine	All	Operation	Normal operations or events	-12	Medium to high -	-7,5	Medium to low -	Medium	1	1	1,00	-7,50	Medium to low -
4.2	Increase in air quality impacts due to recommencement of deposition on Mponeng Lower Compartment TSF	All	All	Normal operations or events	-12	Medium to high -	-7,5	Medium to low -	Medium	1	1	1	-7,5	Medium to low -
5.1	Exhalation and dispersion of radon gas to the atmosphere during the operational phase of the redepositioning of tailings at the lower Mponeng TSF	All	Operation	Normal operations or events	-5,5	Medium to low -	- 2,75	Low -	Medium	1	1	1,00	-2,75	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
5.2	Emission and dispersion of particulate matter that contains radionuclides to the atmosphere during the operational phase of the proposed redepositioning of tailings	All	Operation	Normal operations or events	-5	Medium to low -	-2,5	Low -	Medium	1	1	1,00	-2,50	Low -
5.3	Implementation of the NNR-approved decommissioning plan for the redepositioning of tailings	All	Closure and Rehabilitation	Normal operations or events	16	High +	16	High +	Medium	1	1	1,00	16,00	High +
5.4	Exhalation, emission and dispersion of radon gas and particulate matter that contains radionuclides during the post-closure phase of the redepositioning of tailings at the lower Mponeng TSF	All	Closure and Rehabilitation	Abnormal or unplanned events	-5	Medium to low -	-2,5	Low -	Medium	1	1	1,00	-2,50	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
5.5	Leaching and migration of radionuclides from the TSF during the post-closure phase of the redepositioning of tailings at the lower Mponeng TSF	All	Closure and Rehabilitation	Normal operations or events	-6	Medium to low -	-5,5	Medium to low -	Medium	1	1	1,00	-5,50	Medium to low -
6.1	Noise Pollution on Humans and Fauna	All	Construction	Normal operations or events	-7,5	Medium to low -	- 6,75	Medium to low -	Medium	1	1	1,00	-6,75	Medium to low -
6.2		All	Operation	Normal operations or events	-6,75	Medium to low -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
6.3		All	Closure and Rehabilitation	Normal operations or events	-6	Medium to low -	-3,5	Low -	Medium	1	1	1,00	-3,50	Low -
7.2	Nuisance and Impact on Sense of Place	All	Construction	Normal operations or events	-6	Medium to low -	- 5,25	Medium to low -	Medium	1	1	1,00	-5,25	Medium to low -
7.3		All	Operation	Abnormal or unplanned events	-7,5	Medium to low -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
7.4		All	Operation	Normal operations or events	-9	Medium to high -	-5,5	Medium to low -	Low	1	1	1,00	-5,50	Medium to low -
7.5		All	Closure and Rehabilitation	Normal operations or events	-6	Medium to low -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
8.1	Groundwater contamination from	Unlined TSF	Operation	Normal operations or events	-16	High -	-16	High -	Medium	2	2	1,25	- 20,00	High -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
8.2	Mponeng Lower Compartment TSF	Lined TSF	Operation	Normal operations or events	-16	High -	-6	Medium to low -	Medium	2	2	1,25	-7,50	Medium to low -
8.3		Scavenger Boreholes	Operation	Normal operations or events	-16	High -	-7,5	Medium to low -	Medium	2	2	1,25	-9,38	Medium to high -
8.4		Unlined TSF with Phytoremediation	Operation	Normal operations or events	-16	High -	-6,75	Medium to low -	Medium	1	1	1,00	-6,75	Medium to low -
8.5		Unlined TSF	Decommissioning	Normal operations or events	-16	High -	-16	High -	Medium	2	2	1,25	-20,00	High -
8.6		Lined TSF	Decommissioning	Normal operations or events	-16	High -	-6	Medium to low -	Medium	2	2	1,25	-7,50	Medium to low -
8.7		Scavenger Boreholes	Decommissioning	Normal operations or events	-16	High -	-7,5	Medium to low -	Medium	2	2	1,25	-9,38	Medium to high -
8.8		Unlined TSF with Phytoremediation	Decommissioning	Normal operations or events	-16	High -	-6,75	Medium to low -	Medium	2	2	1,25	-8,44	Medium to low -
9.1	Hydrological - Erosion of Soils	All	All	Normal operations or events	-10	Medium to high -	-3,75	Low -	Medium	2	1	1,13	-4,22	Low -
9.2		All	Operation	Normal operations or events	-7,5	Medium to low -	-2,5	Low -	Medium	2	1	1,13	-2,81	Low -
9.3		All	Construction	Normal operations or events	-8,25	Medium to low -	-2,75	Low -	Medium	3	1	1,25	-3,44	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
9.4	Hydrological - Pollutants Entering the Surface Water Environment	All	Operation	Normal operations or events	-13,5	Medium to high -	-4,5	Medium to low -	Medium	3	1	1,25	-5,63	Medium to low -
9.5		All	Decommissioning	Normal operations or events	-13,5	Medium to high -	-4,5	Medium to low -	Medium	3	1	1,25	-5,63	Medium to low -
9.6		All	Closure and Rehabilitation	Normal operations or events	-14	High -	-3,5	Low -	Medium	3	3	1,50	-5,25	Medium to low -
9.7	Hydrological - Increase in Runoff	All	Construction	Normal operations or events	-10	Medium to high -	-10	Medium to high -	High	1	1	1,00	- 10,00	Medium to high -
9.8		All	Operation	Normal operations or events	-10	Medium to high -	-10	Medium to high -	High	1	1	1,00	- 10,00	Medium to high -
9.9		All	Decommissioning	Normal operations or events	-10	Medium to high -	-10	Medium to high -	High	1	1	1,00	- 10,00	Medium to high -
9.10		All	Closure and Rehabilitation	Normal operations or events	-6,25	Medium to low -	- 6,25	Medium to low -	High	1	3	1,25	-7,81	Medium to low -
9.11	Hydrological - Flood Risk	All	Construction	Normal operations or events	-3	Low -	-3	Low -	Medium	3	2	1,38	-4,13	Low -
9.12		All	Operation	Normal operations or events	-3,75	Low -	- 3,75	Low -	Medium	3	3	1,50	-5,63	Medium to low -
9.13		All	Decommissioning	Normal operations or events	-3,75	Low -	- 3,75	Low -	Medium	3	3	1,50	-5,63	Medium to low -
9.14		All	Closure and Rehabilitation	Normal operations or events	-3	Low -	-3	Low -	Medium	3	2	1,38	-4,13	Low -
10.1	Direct loss, disturbance and degradation of wetlands.	All	All	Normal operations or events	-6	Medium to low -	-3	Low -	Medium	2	2	1,25	-3,75	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
10.2	Alteration of surface topography (excavations, reshaping and compacting)	All	Construction	Normal operations or events	-8	Medium to low -	- 5,25	Medium to low -	Medium	2	2	1,25	-6,56	Medium to low -
10.3	Increased bare surfaces, runoff and potential for erosion	All	Construction	Normal operations or events	-8,25	Medium to low -	-4	Low -	Medium	2	2	1,25	-5,00	Medium to low -
10.4	Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	All	Construction	Normal operations or events	-7,5	Medium to low -	-3,5	Low -	Medium	2	2	1,25	-4,38	Medium to low -
10.5	Waste and pollutant spills	All	Construction	Normal operations or events	-9	Medium to high -	-6	Medium to low -	Medium	2	2	1,25	-7,50	Medium to low -
10.6	Increased sediment loads to downstream reaches	All	Construction	Normal operations or events	-7,5	Medium to low -	-3,5	Low -	Medium	2	2	1,25	-4,38	Medium to low -
10.7	Contamination of wetlands with hydrocarbons due to machinery leaks and eutrophication of wetland systems with human sewerage and other waste.	All	Construction	Normal operations or events	-8,25	Medium to low -	-4,5	Medium to low -	Medium	2	2	1,25	-5,63	Medium to low -
10.8	Terrain alteration for pipeline and bridges	All	Construction	Normal operations or events	-7,5	Medium to low -	-3	Low -	Medium	2	2	1,25	-3,75	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
10.9	Final Landscaping and reshaping	All	Construction	Normal operations or events	7,5	Low to medium +	4	Low +	Medium	2	2	1,25	5,00	Medium to low +
10.10	Alteration of surface drainage and runoff	All	Construction	Normal operations or events	-12	Medium to high -	-4,5	Medium to low -	Medium	2	2	1,25	-5,63	Medium to low -
10.11	Stormwater	All	Operation	Normal operations or events	-9	Medium to high -	-3,5	Low -	Medium	2	2	1,25	-4,38	Medium to low -
10.12	Disruption of wetland soil profile, hydrological regime and increased sediment loads	All	Operation	Normal operations or events	-8,25	Medium to low -	-4	Low -	Medium	2	2	1,25	-5,00	Medium to low -
10.13	Degradation of wetland vegetation and the introduction and spread of alien and invasive vegetation	All	Operation	Normal operations or events	-7,5	Medium to low -	-3,5	Low -	Medium	2	2	1,25	-4,38	Medium to low -
10.14	Slurry and pollutant spills into water resources	All	Operation	Normal operations or events	-11,25	Medium to high -	-9	Medium to high -	Medium	2	2	1,25	-11,25	Medium to high -
10.15		All	Operation	Abnormal or unplanned events	-16	High -	-8	Medium to low -	Medium	2	2	1,25	-10,00	Medium to high -
10.16	Water quality impairment	All	Operation	Normal operations or events	-12	Medium to high -	-7,5	Medium to low -	Medium	2	2	1,25	-9,38	Medium to high -
11.1	Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community, and the loss of floral SCC.	TSF and Associated Infrastructure: Pipeline Route 1	Construction	Normal operations or events	-20	High -	-10,5	Medium to high -	High	1	2	1,13	-11,81	Medium to high -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
11.2	Introduction of invasive and alien species, especially plants	TSF and Associated Infrastructure: Pipeline Route 1	Construction	Normal operations or events	-11	Medium to high -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
11.3	Direct loss and displacement of faunal community (including SCC) due to habitat loss, mortality and disturbance (noise, dust, vibration), including the reduced dispersal/migration of fauna	TSF and Associated Infrastructure: Pipeline Route 1	Construction	Normal operations or events	-13	Medium to high -	-4,5	Medium to low -	High	2	3	1,38	-6,19	Medium to low -
11.4	Destruction of non-resilient habitats (Rocky Outcrops)	TSF and Associated Infrastructure: Pipeline Route 1	Construction	Normal operations or events	-15	High -	-13	Medium to high -	High	1	2	1,13	- 14,63	High -
11.5	Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	TSF and Associated Infrastructure: Pipeline Route 1	Construction	Normal operations or events	-11	Medium to high -	-7,5	Medium to low -	High	1	2	1,13	-8,44	Medium to low -
11.6	Clearing of vegetation leading to soil erosion and loss of topsoil.	TSF and Associated Infrastructure: Pipeline Route 1	Construction	Normal operations or events	-9,75	Medium to high -	- 8,25	Medium to low -	High	1	1	1,00	-8,25	Medium to low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
11.7	Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.	TSF and Associated Infrastructure: Pipeline Route 1	Operation	Normal operations or events	-9,75	Medium to high -	-7,5	Medium to low -	High	1	2	1,13	-8,44	Medium to low -
11.8	Continued encroachment by alien and invasive plant species	TSF and Associated Infrastructure: Pipeline Route 1	Operation	Normal operations or events	-10	Medium to high -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
11.9	Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance, including the reduced dispersal/migration of fauna	TSF and Associated Infrastructure: Pipeline Route 1	Operation	Normal operations or events	-14	High -	-9	Medium to high -	High	1	2	1,13	- 10,13	Medium to high -
11.10	Environmental pollution due to pipe leakage	TSF and Associated Infrastructure: Pipeline Route 1	Operation	Normal operations or events	-12	Medium to high -	-7,5	Medium to low -	High	1	2	1,13	-8,44	Medium to low -
11.11	Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community, and the loss of floral SCC.	TSF and Associated Infrastructure: Pipeline Route 2	Construction	Normal operations or events	-14	High -	-9	Medium to high -	High	1	1	1,00	-9,00	Medium to high -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
11.12	Introduction of invasive and alien species, especially plants	TSF and Associated Infrastructure: Pipeline Route 2	Construction	Normal operations or events	-11	Medium to high -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
11.13	Direct loss and displacement of faunal community (including SCC) due to habitat loss, mortality and disturbance (noise, dust, vibration), including the reduced dispersal/migration of fauna	TSF and Associated Infrastructure: Pipeline Route 2	Construction	Normal operations or events	-13	Medium to high -	-4,5	Medium to low -	High	2	3	1,38	-6,19	Medium to low -
11.14	Destruction of non-resilient habitats (Rocky Outcrops)	TSF and Associated Infrastructure: Pipeline Route 2	Construction	Normal operations or events	-14	High -	- 8,25	Medium to low -	High	1	1	1,00	-8,25	Medium to low -
11.15	Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	TSF and Associated Infrastructure: Pipeline Route 2	Construction	Normal operations or events	-11	Medium to high -	-7,5	Medium to low -	High	1	2	1,13	-8,44	Medium to low -
11.16	Clearing of vegetation leading to soil erosion and loss of topsoil.	TSF and Associated Infrastructure: Pipeline Route 2	Construction	Normal operations or events	-9,75	Medium to high -	- 8,25	Medium to low -	High	1	1	1,00	-8,25	Medium to low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
11.17	Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.	TSF and Associated Infrastructure: Pipeline Route 2	Operation	Normal operations or events	-9,75	Medium to high -	-7,5	Medium to low -	High	1	2	1,13	-8,44	Medium to low -
11.18	Continued encroachment by alien and invasive plant species	TSF and Associated Infrastructure: Pipeline Route 2	Operation	Normal operations or events	-10	Medium to high -	-4	Low -	Medium	1	1	1,00	-4,00	Low -
11.19	Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance, including the reduced dispersal/migration of fauna	TSF and Associated Infrastructure: Pipeline Route 2	Operation	Normal operations or events	-11	Medium to high -	-6	Medium to low -	High	1	2	1,13	-6,75	Medium to low -
11.20	Environmental pollution due to pipe leakage	TSF and Associated Infrastructure: Pipeline Route 2	Operation	Normal operations or events	-11	Medium to high -	-6	Medium to low -	High	1	2	1,13	-6,75	Medium to low -
11.21	Destruction, further loss and fragmentation of the habitats, ecosystems vegetation community	TSF & RWD	Construction	Normal operations or events	-8,25	Medium to low -	-6	Medium to low -	High	2	1	1,13	-6,75	Medium to low -
11.22	Introduction of invasive and alien species, especially plants	TSF & RWD	Construction	Normal operations or events	-12	Medium to high -	-3,5	Low -	High	2	1	1,13	-3,94	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
11.23	Direct loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna	TSF & RWD	Construction	Normal operations or events	-11	Medium to high -	-5,5	Medium to low -	High	2	1	1,13	-6,19	Medium to low -
11.24	Increased risk of contamination (soil and water resource) from fuel spills, construction waste, and hazardous materials.	TSF & RWD	Construction	Normal operations or events	-13	Medium to high -	-7,5	Medium to low -	High	2	1	1,13	-8,44	Medium to low -
11.25	Clearing of vegetation leading to soil erosion and loss of topsoil.	TSF & RWD	Construction	Normal operations or events	-12	Medium to high -	- 8,25	Medium to low -	High	1	1	1,00	-8,25	Medium to low -
11.26	Continued destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community.	TSF & RWD	Operation	Normal operations or events	-10	Medium to high -	- 6,75	Medium to low -	High	2	1	1,13	-7,59	Medium to low -
11.27	Continued encroachment by alien and invasive plant species	TSF & RWD	Operation	Normal operations or events	-11	Medium to high -	-3,5	Low -	High	2	1	1,13	-3,94	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
11.28	Ongoing loss and displacement of faunal community due to habitat loss, mortality and disturbance (road collisions, noise, dust, vibration), including the reduced dispersal/migration of fauna	TSF & RWD	Operation	Normal operations or events	-13	Medium to high -	- 8,25	Medium to low -	High	1	1	1,00	-8,25	Medium to low -
11.29	Continued risk of contamination (soil and water resource) from fuel spills and hazardous materials.	TSF & RWD	Operation	Normal operations or events	-10	Medium to high -	-4	Low -	High	1	1	1,00	-4,00	Low -
11.30	Continuous stripping of topsoil, leading to ongoing land degradation, including erosion	TSF & RWD	Operation	Normal operations or events	-11	Medium to high -	- 6,75	Medium to low -	High	2	1	1,13	-7,59	Medium to low -
11.31	Environmental pollution due to water/ Acid Mine drainage runoff.	TSF & RWD	Operation	Normal operations or events	-9	Medium to high -	-4,5	Medium to low -	High	2	1	1,13	-5,06	Medium to low -
12.1	Visual - Change of Landscape Character	Pipelines	Operation	Normal operations or events	-6,75	Medium to low -	-4	Low -	High	1	1	1,00	-4,00	Low -
12.2		TSF & RWD	Operation	Normal operations or events	-7,5	Medium to low -	-4	Low -	High	1	1	1,00	-4,00	Low -

Identifier	Impact	Project Aspect / Alternative	Phase	Event	Pre-Mitigation Significance Score	Pre-Mitigation Significance	Post-mitigation Significance Score	Post-Mitigation Significance	Confidence	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score	Final Significance
12.3		Pipelines	Closure and Rehabilitation	Normal operations or events	-3,5	Low -	-2	Low -	High	1	1	1,00	-2,00	Low -
12.4		TSF & RWD	Closure and Rehabilitation	Normal operations or events	-3,5	Low -	- 1,75	Low -	High	1	1	1,00	-1,75	Low -
13.1	Socio-economic: Upliftment of communities / employment opportunities, integration of Merafong City IDP and perceptions relating to the risk of TSF failure	All	All	Normal operations or events	6	Low to medium +	6,75	Low to medium +	Medium	1	1	1,00	6,75	Medium to low +
13.2		All	All	Normal operations or events	6,75	Low to medium +	5	Low to medium +	Medium	1	1	1,00	5,00	Medium to low +
13.3		All	All	Normal operations or events	4,5	Low to medium +	4	Low +	Medium	1	1	1,00	4,00	Low +
13.3		All	All	Abnormal or unplanned events	-17,5	High -	- 10,5	Medium to high -	Low	2	1	1,13	- 11,81	Medium to high -
13.4		All	All	Normal operations or events	3,5	Low +	3	Low +	Medium	1	1	1,00	3,00	Low +

9 SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is refined by specialists' input within each respective specialist field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of sensitive areas within and surrounding the proposed application area. **Table 84** provides an overview of the sensitivity ranking system.

This sensitivity mapping approach allows for the identification of lower risk areas for positioning the project infrastructure whilst protecting identified sensitive environmental areas/ features through more rigorous mitigation (where possible). Areas identified as no-go would be fully excluded from any project related development regardless of the level of mitigation put forward. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of environmental assessment processes.

This sensitivity mapping approach allows for the proposed activities to be undertaken whilst protecting identified sensitive environmental areas / features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes. **Table 84** below provides a breakdown of the sensitivity rating and weightings applied to determine the sensitivity score of each aspect. **Figure 114** and **Figure 115** presents the sensitivity map for the project. Identified sensitivities indicated in **Figure 114** include the following:

- High Heritage Sensitivity on the proposed pipeline route 1 (Mnr1 and Mnr2);
- Species of conservation concern and protected species on the proposed route;
- Protected species on the alternative pipeline route;
- Class 2 Gauteng Ridge;
- Critical Biodiversity Areas 2 and Ecological Support Areas 1; and
- Watercourses including Elandsfonteinspruit and Channelled Valley Bottom Wetlands.

The compilation of this map has taken into consideration the individual raking of sensitivity by all the identified specialist disciplines (e.g. Air Quality, Geohydrology, Terrestrial and Aquatic Ecology, Heritage, Social, etc.). Work within the various sensitivity rankings must be managed according to the EMPr as well as the recommendations in the individual specialist reports. As indicated in **Section 8.3.7.4** and on the EMPr (**Appendix I**), to mitigate impacts all Archaeological sites will require monitoring during site clearing within a 20m radius from the identified archaeological sites through the implementation of an archaeological watching brief. Archaeological sites MPnr1 and MPnr2 are to be avoided by a 15m buffer as per s25 of the NHRA. If the construction cannot deviate from the original layout, then further full mitigation and a destruction permit from SAHRA will be required. In addition, during the construction phase, it is important to recognise any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that a Chance Finds Procedure (CFP) be followed for the activities. While to mitigate the potential impacts on the SCCs and protected plants, all plant SCC along pipeline route must be avoided, and the 200m buffers be strictly adhered to, if these buffers cannot be avoided then necessary permits must be obtained. Furthermore, a protected plant and SCC search and rescue plan should take place occur to record locations of all SCC and protected species as indicated in Section 8.3.10.4 and on the EMPr (**Appendix I**).

Table 84: Sensitivity rating and weighting

Sensitivity Rating	Description	Weighting
Least concern	The inherent feature status and sensitivity is already degraded. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for mining or infrastructure placement.	0
Low	The proposed development will have not have a significant effect on the inherent feature status and sensitivity.	1
Medium	The proposed development will negatively influence the current status of the feature.	2
High	The proposed development will negatively significantly influence the current status of the feature.	3
No-Go	**The proposed development cannot legally or practically take place. No development permitted under any circumstances.**	99

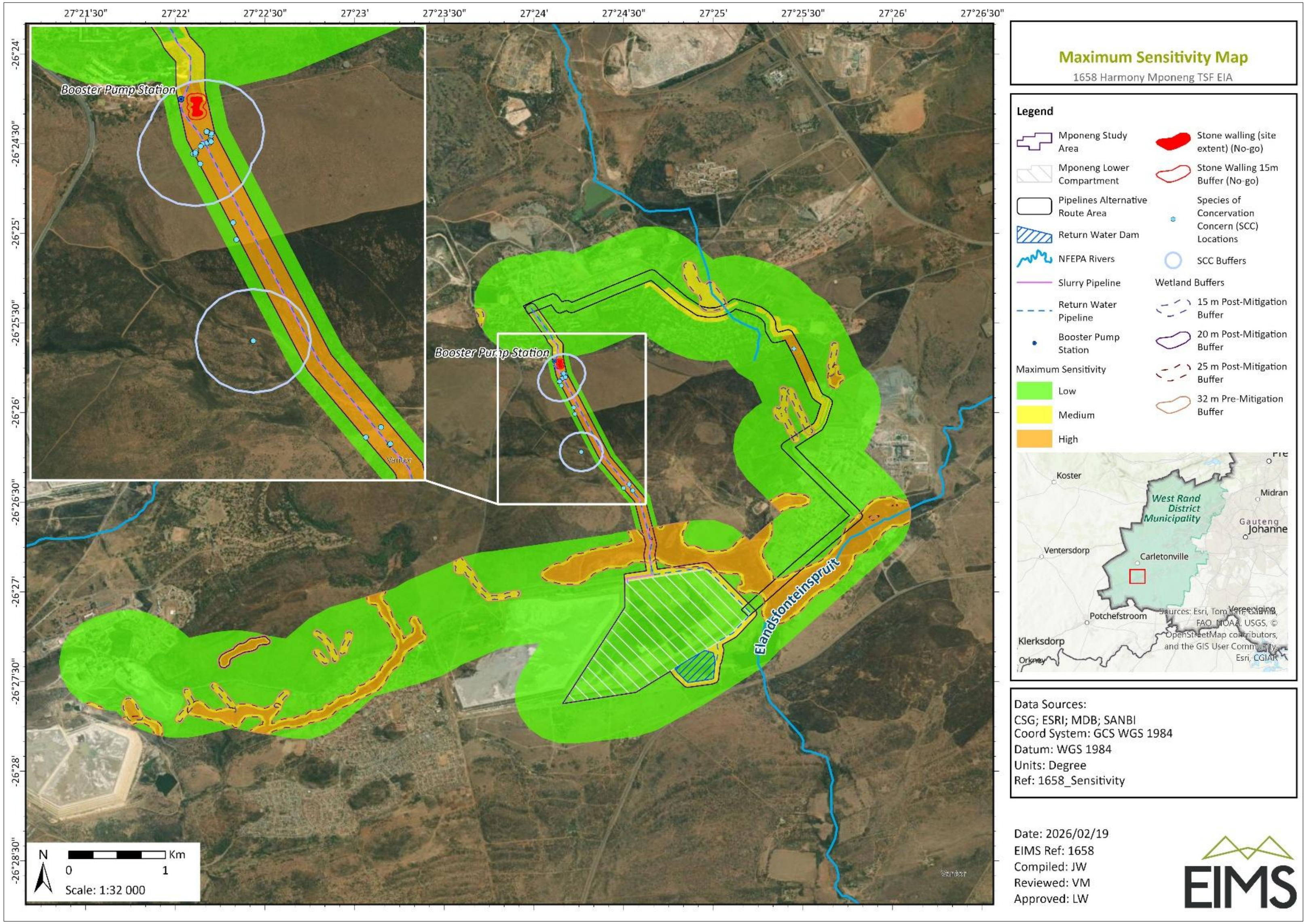


Figure 114: Site-specific environmental sensitivity map

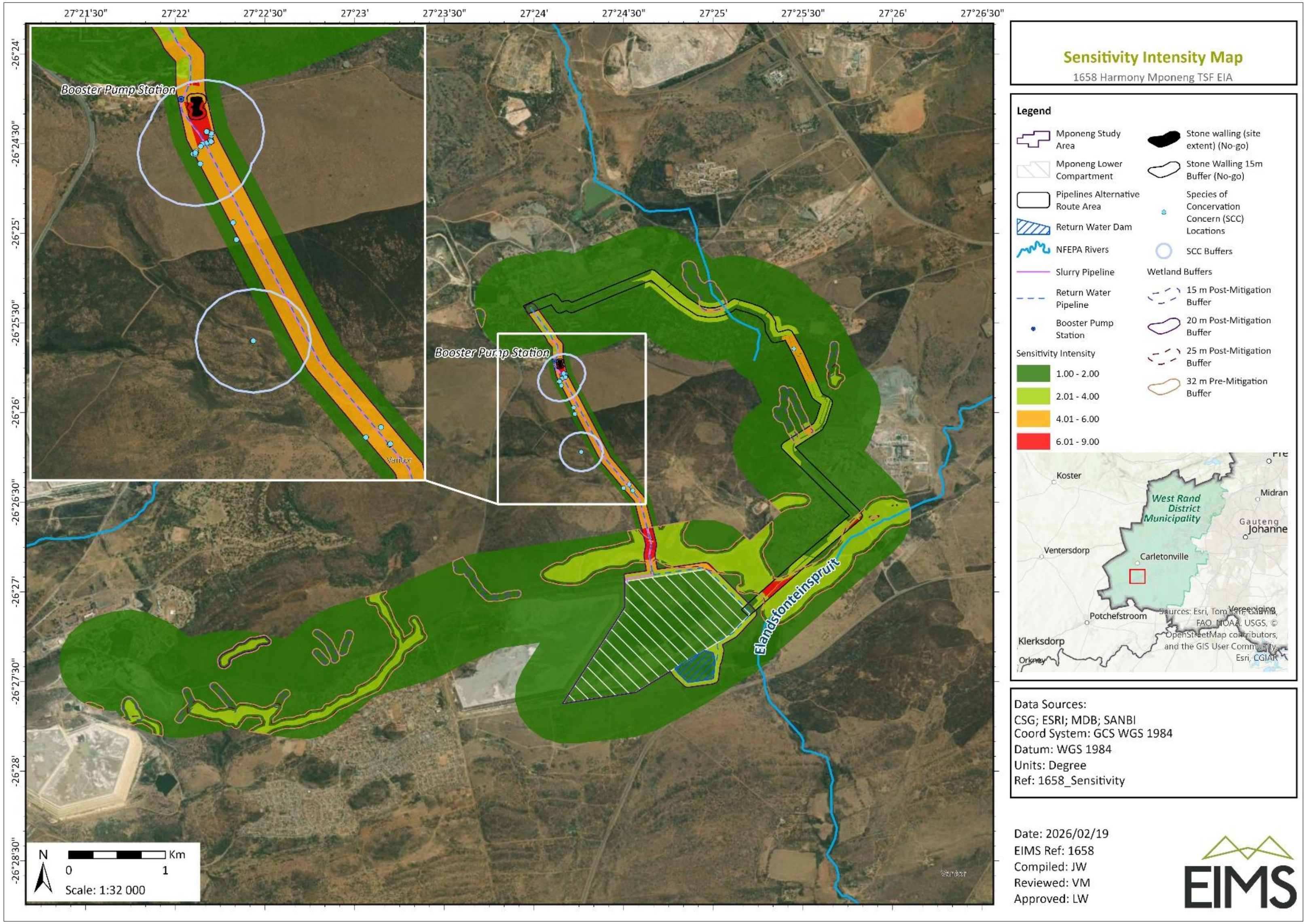


Figure 115: Site-specific environmental intensity sensitivity map

10 CLOSURE COSTING

Apart from the short short-term objectives and strategies that will require implementation and monitoring over the full life of mine, even after closure of operation, The specific objectives that Harmony will adopt for rehabilitation and closure are to:

- Comply with national regulatory requirements;
- Protect the environment and public health and safety by using safe and responsible closure practices;
- Improve water quality;
- Establish self-sustaining vegetation that will stabilize the TSF;
- Develop end land uses that incorporate beneficial uses;
- Prevent health and safety risks to the surrounding community;
- Reduce the requirement for long-term monitoring and maintenance by establishing stable landforms;
- Enhance a positive socio-economic impact by achieving a sustainable land-use condition or alternatively as agreed upon with the applicable government regulator and affected communities; and
- Avoid or reduce costs and long-term liabilities to the company, government and public.

MineLock Environmental Engineers (MineLock) was commissioned to develop a report with conceptual volumes and scheduled and unscheduled NEMA Closure Costing as part of the EIA and WULA for the proposed Mponeng Lower Compartment TSF.

It must be noted that funds must be available at any time, equal to the sum of the actual costs of implementing the plans and reports for a period of 10 years (as per Section 7, Chapter 2 of the Financial Provisions Regulations). NEMA Financial Regulations specify a level of accuracy of ± 50% for operations with more than 30 years from closure. Motivation must be provided to indicate the accuracy in the reported number and as accuracy improves, what actions resulted in an improvement in accuracy. The remainder of this section provides details on the proposed closure cost.

10.1 UNSCHEDULED CLOSURE COSTING

The unscheduled closure allowances for the determination of the closure costs are reflected below. The spreadsheets detailing the closure costs are included in the Closure Costing Report (**Appendix G**). Two alternatives were assessed during unscheduled closure, an unlined facility (Alternative A) as per Eco Elementum's design (**Appendix F**), and a lined facility (Alternative B) for comparative purposes.

For unscheduled closure, only infrastructure implemented within a year from the start of construction was considered. According to the design engineer at Eco Elementum, the construction of the Mponeng Lower compartment is planned to take a year, thus the earthworks, bottom liner system (Alternative B) and supporting infrastructure is to be decommissioned during unscheduled closure.

The following items were considered for the unscheduled closure costing:

- Removal of bottom barrier system (Alternative B only);
- Removal of underdrainage system;
- Demolition of all embankments;
- Rehabilitation of Mponeng Lower compartment area; and
- Decommissioning of Return water dam and supporting infrastructure.

10.2 SCHEDULED CLOSURE

The scheduled closure allowances for the determination of the closure costs are reflected below. The following items were considered for the scheduled closure costing:

- Decommissioning;
- Infrastructural Area;
- Closure of final filled Tailings Storage Facility;
- Shaping of final filled TSF;
- Capping of TSF;
- Stormwater Management Infrastructure;
- Closure Phase Monitoring;
- P&Gs and Contingencies; and
- Post Closure Rehabilitation and Monitoring.

10.3 CLOSURE COST DETERMINATION

This closure cost is based on 2025 values and will require annual reassessment, revision and escalation by the mine. The closure liability is summarised in **Table 85**.

Table 85: Scheduled and Unscheduled costing (MineLock, 2026)

CATEGORY	UNSCHEDULED COSTS Alternative A – unlined TSF	UNSCHEDULED COSTS Alternative B – lined TSF	SCHEDULED COSTS
Decommissioning	R 6 199 375.50	R 6 199 375.50	R 6 199 375.50
Infrastructural Area	R 6 199 375.50	R 6 199 375.50	R 6 199 375.50
Decommissioning of TSF bottom liner system	R 28 250 378.14	R 35 322 134.05	R -
Removal of bottom liner system	R 4 009 208.53	R 11 080 964.44	R -
Demolition of embankments	R 3 707 636.43	R 3 707 636.43	R -
Rehabilitation of TSF area	R 20 533 533.18	R 20 533 533.18	R -
Closure of final filled TSF	R -	R -	R 208 408 122.43
Shaping of final filled TSF	R -	R -	R 51 511 567.34
Capping of TSF	R -	R -	R 101 399 315.82
Stormwater Management Infrastructure	R -	R -	R 53 968 530.81

CATEGORY	UNSCHEDULED COSTS Alternative A – unlined TSF	UNSCHEDULED COSTS Alternative B – lined TSF	SCHEDULED COSTS
Closure Phase Monitoring	R -	R -	R 1 528 708.47
P&Gs and Contingencies	R 7 578 945.80	R 9 134 732.10	R 47 213 649.55
Annual Rehabilitation Costing	R -	R -	R -
Post Closure Phase	R 3 589 207.83	R 3 589 207.83	R 4 553 059.86
Monitoring	R -	R -	R 963 852.03
Rehabilitation of RWD	R 3 589 207.83	R 3 589 207.83	R 3 589 207.83
TOTAL	**R 45 617 907.27**	**R 54 245 449.49**	**R 266 374 207.35**

11 CONCLUSIONS AND RECOMMENDATIONS

The Scoping Phase of the EIA process identified potential issues and impacts associated with the proposed project and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report provides sufficient information regarding the potential impacts and the acceptability of these impacts in order for the Competent Authority to make an informed decision regarding the proposed project. The release of an EIA Report for public review provides stakeholders with an opportunity to verify that the issues they have raised through the EIA process had been captured and adequately considered.

The EIA Phase aimed to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed coal mine extension project and associated infrastructure.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.

11.1 CONCLUSIONS FROM SPECIALIST STUDIES

The conclusions and recommendations of this EIA are the result of the assessment of identified impacts by specialists, and the parallel process of public participation. The public consultation process has been extensive, and every effort has been made to include representatives of all stakeholders in the study area. The main conclusions from each of the specialist studies are presented below.

11.1.1 AIR QUALITY

The main findings of the impact assessment for current and future operations are as follows:

- Simulated $PM_{2.5}$ concentrations comply with the NAAQS at all AQSRs including the ones closest to the project site (viz. Elandsrand, Wedela and Harmony Hostel), both for current and future operations. By adding the assumed background concentration to the future daily concentrations, the range is between 11.8 µg/m^3 and 20.1 µg/m^3, resulting in compliance with the NAAQS.
- Simulated PM_{10} concentrations comply with the NAAQS at all AQSRs including Elandsrand, Wedela and Harmony Hostel, both for current and future operations. By adding the assumed background concentration to the future daily concentrations, the range is between 21.5 µg/m^3 and 89.8 µg/m^3, resulting in potential non-compliance with the NAAQS at Elandsridge and Wedela. However, up to four days of exceedances are allowed and it is not known whether the background concentration will result in more than the allowed exceedances.
- Simulated dustfall rates are above the NDCR limits for residential areas at one AQSR (Elandsridge[5]) both during current and future operations, with a 3.5 km area of exceedance of the agricultural limit (400 mg/m^2-day). Measured dustfall rates are however below the NDCR limit for residential areas at all AQSRs, for the past three years, implying a possible overprediction of simulated dustfall rates.
- The environmental risk due to unmitigated future operations is classified as **Medium** based om the Mponeng operations**,** with minor spatial and temporal cumulative change**.** With mitigation (80% CE through grassing of TSF side slopes and wet slurry deposition) the risk is classified as **Low**

[5] Same area as where the “South of Savuka” DMU is located. Not to be confused with Elandsrand which is the area where the Elandsrand Fire Station (Golf) DMU is located.

With the potential impacts from windblown dust from the active TSFs, especially for the proposed redeposition on Harmony Mponeng Lower Compartment TSF, the following recommendations are proposed:

- Dustfall monitoring continues to ensure dustfall rates are in compliance with the NDCR limits;
- PM10 concentrations to be measured at Elandsrand and Wedela, and
- Mitigation measures aimed at reducing wind erosion from the active TSFs, i.e. the grassing of TSF side slopes.

In conclusion, it is the specialist opinion that the project may be authorised provided that the recommended air quality management measures are implemented.

11.1.2 HEALTH AND RADIOLOGY

Given that the project has not been implemented yet, the radiological assessment is prospective based on available information and reports generated as part of the ESHIA/EIA process. The results and conclusion are presented here for the conditions and parameter values assumed in the assessment. These may change in future iterations as site-specific data and information become available and are used.

The following was concluded from the total effective dose assessment results:

- The contribution from the groundwater pathway was evaluated, with the [Keywords] TSFs being the primary contributing source. It was shown that the potential radiological impact is only visible over thousands of years, with a maximum total effective dose of less than 100 µSv.year^{-1}, indicating that it cannot be considered a contributing pathway for the Commercial Agricultural Exposure Condition during the operational phase of the project.
- The most significant contribution from the atmospheric pathway is inhalation of airborne radon. This is due to the presence of Ra-226 in the source material.
- The results for the two public exposure conditions were presented as dose isopleths for the different age groups, with more detailed exposure route-specific results at the receptor locations conservatively selected to be close to the infrastructure of the project. The results show that, despite the proximity of the receptor locations to surface infrastructure, the doses remain below the dose constraint for all age groups, with a maximum contribution from the atmospheric pathway of less than 250 µSv.year^{-1}.

It can, therefore, be concluded with a reasonable level of assurance that members of the public who can associate themselves with one of the exposure conditions will not be subject to a total effective dose of more than the public dose constraint of 250 µSv.year^{-1}. The project can therefore be authorized provided the recommended mitigation measures are implemented.

The proposed radiological monitoring programme for the project includes recommendations for monitoring surface water, groundwater, sediment, environmental radon, and dust fallout, including the frequency and type of analyses. Most proposed monitoring points coincide with the environmental pathways monitoring programme (e.g., soil, surface water, and groundwater), which is consistent with the current Public Radiation Protection Programme (PRPP). Considering the surface infrastructure that will be developed for the project, the following was noted:

- The surface water monitoring locations should align with the existing surface water monitoring points in the public RPP. The principle to be applied is that the monitoring locations should be upstream and downstream of the project area in potentially affected surface water streams, as well as upstream and downstream of potential discharge points.
- The sediment monitoring locations should coincide with the surface water monitoring points, applying the same principles.
- The groundwater monitoring points should align with the existing ones. The principle to be applied is that the monitoring locations should be upstream and downstream of the project area, as well as

upstream and downstream of specific surface facilities. The exact location will be determined by the availability of water-bearing boreholes in the specific area.

- The dust fallout monitoring locations should coincide with the monitoring points (dust buckets) proposed in Airshed (2026).
- The environmental radon monitoring locations need not coincide with specific locations. The principle is to apply it across the mining rights area, in the dominant wind direction where receptors are located, and to complement it with monitoring locations in the background. The exact location is often determined by the availability of a secure location, which can improve the recovery rate of RGMs.

11.1.3 GEOHYDROLOGY

The primary risk that this proposed project poses is the seepage of contaminants into the aquifer, and the migration of these contaminants into down-gradient receptors (Elandsfontein Spruit). The following mitigation measures were included in the assessment:

- For the "do-nothing" option, the Mponeng Lower Compartment TSF remains unlined. The only mitigation is the rehabilitation and decommissioning of the TSF during the closure (decommissioning) phase.
- For option 2, the Mponeng Lower Compartment TSF will be lined. This option will change the risk from High Negative to Low Negative during the operational and closure phases. This option has the best rating.
- For option 3, the drilling of scavenger boreholes were considered. This option will change the risk from High Negative to Low Negative during the operational and closure phases. This option has the lowest rating due to the maintenance requirements for scavenger boreholes.
- For Option 4, the Mponeng Lower Compartment TSF will remain unlined, but the proposed phyto-remediation will be fully functional. This option will change the risk from High Negative to Low Negative during the operational and closure phases. This option has lower rating than a liner, but a better rating than the scavenger boreholes and is the recommended long-term management option.

It is evident from the assessment that the phyto-remediation is effective, and it is the specialist's opinion that the project can be authorised and recommended that this option be considered. The installation of a liner and / or scavenger boreholes may improve the rehabilitation of the groundwater, but it is considered unnecessary as the phyto-remediation is effective on its own.

11.1.4 HYDROLOGY

There are parts of the TSF that are within sensitive areas; however, the TSF is already in existence. The pipelines are noted as intersecting many different sensitivity classifications, with the alternative pipeline crossing more rivers and a greater length of sensitive classifications than the primary pipeline route.

Flooding and pollutants entering the surface water environment are the two primary impacts to this project, whether or not indicated by the impact assessment. Both impacts are poorly represented in the impact assessment due to their probability of occurrence (improbable). In the case of flooding, there is flooding originating beyond the TSFs and flooding originating from the TSFs (due to a TSF failure). The latter presents the most significant risk to this study (that of flood risk and pollutants entering the surface water environment). A secondary pollutant risk is poor management of the TSFs (and by association the RWD) or pipelines, resulting in a spill. The results of flood modelling should ideally be considered in the development of the pipelines and should undoubtedly be considered with regard to adequate flood protection of the Lower TSF Compartment and associated RW Dam.

Regular surface water quality monitoring is required to enable change detection, concerning the potential contamination of surface water by any deposition line leaks. A surface water monitoring plan is already underway with a wide coverage of monitoring points, with only one additional monitoring point proposed. The position of the TSF and associated pipeline within the greater Harmony Operation warrants a more comprehensive assessment of surface water monitoring points than based on this project alone. An assessment of flooding, particularly with regard to the adequate offset of the pipeline above river crossings and in relation to adequate flood protection of the TSF and RW Dam should be undertaken. A review of Mponeng's surface water monitoring plan will also be required to ensure that the TSF and pipeline are adequately considered (as it relates to monitoring positions).

In considering the pipeline options, the resulting impact scoring shows no preference for either; however, the shorter (western) pipeline route would tend to be more favourable, given its reduced length and lower incidence of watercourse proximity. The proposed recommencement of deposition at the Mponeng TSF Lower Compartment can be authorised with regard to the hydrological (surface water) environment, inclusive of the recommended mitigation measures.

11.1.5 FRESHWATER AND WETLANDS

Four distinct wetland types, each corresponding to a Hydrogeomorphic (HGM) unit, have been identified in relation to the proposed project site and its respective study area. These wetland types are classified as follows: one channelled valley-bottom (HGM 1), one Unchannelled valley bottom (HGM 2), one hillslope seep (HGM 3) and one seep (HGM 4) wetland. All of the identified HGM units except for HGM 4 were intersected by the proposed infrastructure.

In addition to these four HGM units, several artificial watercourses were identified within the study area. These artificial watercourses include wetlands (seep), dams (holding dam, in-stream and off-channel dam) and artificial features. Furthermore, multiple non-perennial drainages were identified within the study area, along with a spring within the existing Mponeng Lower Compartment TSF, which is also being used as a holding dam and landfill facility.

Wetlands were delineated for a broader area; however, only those wetlands relevant to the proposed development were included in the assessment. As a result, HGM units 4, the non-perennial features and the dams were excluded from the functionality assessment. The spring was identified to be at risk and was included in the DWS impact assessment however, no functional assessments was conducted for this feature due to it not being a true wetland.

A risk assessment was conducted for the proposed project. The post-mitigation risks for the project presented within the "Moderate and Low Risk" significance categories. Additionally, a second impact assessment was undertaken for the project and the pre-mitigation impact ratings were mostly observed to range between "Medium and Low", whereas most the post-mitigation impact ratings were "Low.

It is the opinion of the specialists that the project can be considered for authorisation by the Competent Authority under these conditions: Where possible, the spring needs to be intercepted, deviated and allowed to pump into HGM 2, south of the TSF. All areas within affected watercourses should be rehabilitated post-construction. Post-construction rehabilitation of the watercourses is perceived to result in positive impacts and will be an effort to compensate for the loss and disturbance of the wetlands as result of the proposed activities.

11.1.6 SOILS AND AGRICULTURE

Six (6) soil forms were identified within the proposed project area namely; Carolina, Glenrosa, Mispah, technosols (Stilfontein, Johannesburg and Witbank). The proposed project area falls predominately on the disturbed soils i.e. Witbank, Johannesburg and Stilfontein, which are characterised by low potential soils. Areas along the pipeline comprised of restrictive soils including the Mispah and Glenrosa soil forms, which are characterised by a low agricultural potential. Lastly, a marginal area within the proposed project area comprised of moderate potential soils i.e. the Carolina soil form.

The land capability sensitivity (DAFF, 2017) indicated that the proposed project area falls evenly within the "Low to Moderate" and "Moderate to High" land capability sensitivity, with a marginal portion having "Very low to Low" land capability sensitivity. The verified findings dispute all areas associated with "Moderate to High" land capability. They further correlate with some few portions characterised with "Low to Moderate". All areas that were demarcated with a "Very low to Low" land capability sensitivity were confirmed.

It is the specialist's opinion that the proposed project and the associated infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed project and associate infrastructure may be favourably considered for development.

11.1.7 TERRESTRIAL BIODIVERSITY

Given the fact that the proposed development is largely composed of linear infrastructure, which refers to pipelines, the actual footprint of the infrastructure has a small, localised impact on the terrestrial biodiversity. In comparison, the creation of the TSF is a more important aspect to note. By minimising impacts in these areas and implementing strict mitigation measures, they will continue to support and sustain biodiversity. Both pipelines overlap with CBA 2, according to the provincial conservation plan, and 'High' SEI areas. It is therefore important to follow the mitigations outlined in this report to reduce the overall impacts. The preferred pipeline route has an overall higher impact on the terrestrial biodiversity as full clearance is to occur and no existing infrastructure exists, in comparison to the alternative pipeline route.

The study area has been impacted both historically and currently, primarily due to mining activities and current livestock grazing. These activities have impacted both the fauna and flora, with notable disturbances to the bushveld and grassland characteristics. Even the disturbed habitats are important within the local and regional landscape. They serve as fauna habitat, foraging grounds, and movement corridors in a landscape fragmented by anthropogenic influence.

The terrestrial biodiversity assessment confirms the varied sensitivity of the study area but disputes the screening report's findings. The habitat sensitivity of these areas varies, with the Natural Rocky Gauteng Shale Mountain Bushveld, Rocky Rand Highveld Grassland and Water Resources habitat being of a 'High' SEI due:

- Having a lower resilience to development; and
- Supporting various organisms, including flora SCC and protected species.

It is the opinion of the specialists that the proposed project may be favourably considered, provided all prescribed mitigation measures and supporting recommendations are implemented (including all protected species and SCC mitigations). Construction of the alternative pipeline route will aid in avoiding large impacts on High SEI areas, as well as the 200 m flora SCC buffers, that don't have existing infrastructure passing through. However, the proposed pipeline route is equally favourable provided that the necessary mitigation measures are adhered to.

11.1.8 ARCHAEOLOGICAL AND CULTURAL HERITAGE

The HIA identified two heritage resources within the study area (MPnr1 and MPnr2), which consist of archaeological resources which are rated as having a high heritage significance and will require the proposed pipeline to deviate outside the applicable 15m buffers around the site's extent. If the pipeline cannot deviate, then further mitigation work will be required before the project can continue. Furthermore, it must be noted that there are various additional stonewalling sites adjacent to the study area. However, the alternative route does not impact any known heritage resources and if a chance find is identified, then the relevant chance finds procedure must be implemented.

It is the combined considered opinion of the heritage specialists that the proposed pipeline route may have an impact (before mitigation) on several identified heritage resources rated being of medium to high heritage significance. The alternative route, on the other hand, will have no impact on known heritage resources. However, with the implementation of recommended mitigation measures including the deviation around the 15m buffer, the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project regardless of the route approved. Environmental awareness and training on heritage features and buffer requirements must form part of the scope of work of the environmental control officer who must be appointed prior the construction phase. In addition, a chance fossil find protocol is implemented during construction activities. Therefore, it is the specialist's opinion that the project can be authorised provided the mitigation measures / recommendations are adhered to.

11.1.9 PALAEONTOLOGICAL HERITAGE

Based on the outcomes of both the field investigation and supporting desktop research, it is concluded that palaeontological heritage resources of scientific or conservation value are rare within the proposed assessment area. This finding is in contrast to the High Palaeontological Sensitivity rating assigned to the area by both the SAHRIS PalaeoSensitivity Map and the DFFE Screening Tool. The construction phase of the Mponeng Lower Compartment TSF study area has been assigned a Medium to High Palaeontological Significance rating prior to mitigation, which is expected to be reduced to Low Significance following the implementation of appropriate mitigation measures. Notably, the construction phase is the only phase of the development expected to impact fossil heritage. The operational and decommissioning phases are not anticipated to pose any significant palaeontological impact. Under the No-Go Alternative, where no development occurs, and the current land use remains unchanged, the palaeontological impact would be neutral. The cumulative palaeontological impacts of the proposed development area are assessed as Medium-High before mitigation and Low after mitigation, and fall within acceptable limits for such a project.

Based on these findings, the proposed development is not expected to result in significant or irreversible impacts on palaeontological resources. It is therefore recommended that development proceed as planned, as the site is not considered sensitive from a palaeontological perspective. No further palaeontological studies, ground-truthing, or specialist mitigation are deemed necessary, provided that a chance fossil find protocol is implemented during construction activities. Environmental awareness and training on heritage features and buffer requirements must form part of the scope of work of the environmental control officer who must be appointed prior the construction phase. In addition, a chance fossil find protocol is implemented during construction activities.

11.1.10 VISUAL

The current visual state of the landscape that could be affected by the proposed project has been described. The scenic quality of the study area has been rated from low to high within the context of the subregion. The project footprint is in a landscape type with low scenic quality. Sensitive receptors, viewing areas, and landscape types have been identified and mapped, suggesting a potentially low sensitivity to the project.

Impacts on views are most significant when receptors are identified as sensitive to landscape changes, and their views are focused on and dominated by these changes. The results of the public participation process at the time of drafting the report, and broad sensitivities were used to suggest that visual issues would be of low concern to the I&APs as no issues on visual impacts were raised by the I&APs.

The project continues with an activity currently taking place in the subregion, which would cause a minimal cumulative change to the key features and characteristics of the baseline during the operational phase. The pre-development landscape and views will not be significantly affected by this activity, which is typical of the mining subregion when positioned within the attributes of the receiving landscape. The project would mainly impact receptors travelling through the study area on the N12 south of the project site and farmsteads living in the southeastern parts of the study area.

The effect (worst-case scenario) on the visual environment during both phases of the project is assessed to be of LOW significance and would occur over the short term (up to 5 years). A low negative impact is when the impact does not directly influence the decision to develop in the area. The effect is reversible in all phases, although it may incur time and cost during the operational phase.

Implementing mitigation measures could lessen the predicted impact, and the effect would still be of low significance. Monitoring and mitigation are advised in both phases to ensure that the potential negative impact stays low. Therefore, it is the specialist’s opinion that the project can be authorised provided the mitigation measures / recommendations are adhered to.

11.2 CONCLUSION FROM THE ALTERNATIVE ASSESSMENT

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. The conclusions and recommendations of this EIA on project alternatives are the result of input from the specialist, process of public participation and requirements from relative Departments. The main conclusions from each of the alternative is presented below.

11.2.1 DESIGN ALTERNATIVES

Design alternatives are the consideration of different designs for technical efficiency, aesthetic purposes or different construction materials in an attempt to optimise local benefits and sustainability. The following design alternatives were considered for the project.

Tailings can be stored in a variety of ways: which way depends on numerous factors, for instance the local topography, how much rainfall an area gets, whether there is regular or irregular seismic activity recorded, the type of metal or mineral being mined and how close the mine is to populated areas. There is no one-size-fits-all solution, each tailings storage facility is unique. Considering that the engineering designs are still in progress, the assessment made in this report is based on the following TSF designs aspects which are discussed below:

(a) **Wall construction designs**:

iv) Downstream;

v) Upstream; and

vi) Centreline.

(b) **Lining Desings**:

i) Lined TSF; and

ii) Unlined TSF.

(c) Pipeline Designs

i) Above-ground pipelines; and

ii) Below-ground pipelines.

Based on the advantages and disadvantages indicated in **Table 19**, each deposition method has its own pros and cons. Overall, Filtered Tailings / Dry-Stack Tailings appear to be the more favourable designs. Based on the Engineering Design Report (**Appendix F**), the upstream construction with hydrocyclone deposition is proposed. There is no fatal flaw with the proposed designs and considering that the method was previously used for the existing tailings as well as being the commonly used deposition method in the area, the history, knowledge and track record can be motivated to the proposed redeposition. The engineering and implementation teams should ensure that necessary measures are in place to ensure structural integrity of the TSF during and post closure is maintained in a safe manner.

Based on the advantages and disadvantages indicated in **Table 20**, **Lined TSF's can be considered as favourable designs. However, the benefit is minimal when comparing it to the phytoremediation option, which is achieves similar environmental conditions for significantly lesser financial costs. This option is therefore recommended by the geohydrologist as a suitable management option**. The installation of a liner and / or scavenger boreholes may improve the rehabilitation of the groundwater, but it is considered unnecessary as the phytoremediation is effective on its own.

Based on the advantages and disadvantages indicated in **Table 21,** it is the **EAPs opinion that above-ground pipelines are the more favourable designs**. Based on the project description, the proposed Mponeng Lower Compartment TSF will follow the above-ground pipelines design.

11.2.2 PROCESS ALTERNATIVES

There are various deposition techniques which are applicable to tailings storage facilities. Once the tailings slurry (dilute or paste consistency) has arrived at the tailings storage area, there are several possible ways it can be deposited. These include the spigotting method, cyclone deposition and the paddocking method. Currently cyclone deposition is the vastly preferred method of deposition for the majority of Harmony's current TSF operations due to the various reasons described in **Section 5.2.1.** The environmental impacts associated with each deposition method are similar, however **cyclone deposition has higher water recovery rates and is also preferred from a geotechnical perspective.** Specifically, hydrocyclones can process large volumes of material, making them efficient for high-capacity applications. They can operate at high temperatures and can handle both liquid mists and dry materials, depending on the application.

11.2.3 PIPELINE ROUTING ALTERNATIVES

Consideration of alternative routes generally applies to linear developments such as power lines, transport and pipeline routes. In route investigations, various corridors are investigated and compared in terms of their impacts. Although the project is largely a footprint development and route alternatives are usually not applicable to such developments, route alternatives are applicable to this project due to the proposed residue pipeline from Savuka Plant to Mponeng Lower Compartment TSF which has two optional routes.

- Savuka Plant to Mponeng Lower Compartment TSF proposed pipeline route:
    - The proposed slurry and return water pipes extend from the south of Savuka Plant at starting point 26°25'24.95"S; 27°23'58.94"E, extending southwards, parallel to each other until reaching the northern extent of Mponeng TSF where they split. Thereafter, the slurry pipeline extends to west before connecting to Mponeng TSF while the return water pipeline extends east then south around the TSF to the return water dam.
    - The slurry pipeline is approximately 3.36km long extending from the Savuka Plant at 26°25'24.77"S; 27°23'58.84"E and ending at the Mponeng Lower Compartment TSF northern edge at 26°26'57.60"S; 27°24'31.59"E.
    - The return water pipeline is approximately 4.85km long extending from the Savuka Plant at 26°25'24.77"S; 27°23'58.84"E and ending at the Mponeng Lower Compartment TSF return water at 26°27'23.09"S; 27°25'0.37"E.
    - **It should be noted that there are heritage features (stonewalling) on this alternative at 26°25'43.88"S; 27°24'8.47"E which the engineers have deviated around the 15m buffer to avoid impacting on the heritage features**.
- Savuka Plant to Mponeng Lower Compartment TSF pipeline route alternative:
    - There alternative slurry and return water pipeline route extends to the east through Western Deep Levels then south along Mponeng Gold Mine before heading to the west where it connects to Mponeng.
    - The alternative slurry and return water pipelines route follow the same path. Both commence at the Savuka Plant at 26°25'24.77"S; 27°23'58.84"E and connect to the Mponeng Lower Compartment TSF on the southeastern section at 26°27'6.62"S; 27°25'10.61"E where the slurry pipeline ends while the return water pipeline extends slightly further to connect to the return water dam at 26°27'23.09"S; 27°25'0.37"E. Subsequently, the alternative slurry pipeline is 6.73km long while the alternative return water pipeline is 7.4km long.

Based on route analysis, the **proposed route** is preferable to the alternative route provided the mitigation measures indicated in this report and the EMPr are adhered to.

11.2.4 NO-GO ALTERNATIVE

The no go alternative would imply one of two scenarios; either continue deposition on the other nearby TSF which are already nearing their capacity or stop the operations. The first option would result in overburdening the Mponeng Upper Compartment TSF and/or Savuka TSFs. The aforementioned TSFs are already nearing their carrying capacity and would therefore make the TSFs unstable and unsafe and possibly breaking their walls. As indicated above, these facilities are approaching their final and approved height, and the current planned Life of Mine (LOM) for the West Wits Region exceed the available deposition capacity of these TSFs. The Savuka tailings facility has reached the end of its lifecycle and is undergoing a short-term extension of two years.

Following this period, tailings from Savuka will need to be diverted to an alternative facility. The second option would mean once the Mponeng Upper Compartment and Savuka TSFs reach their carrying capacity and approved height, deposition would stop which would mean the mining activities would come to a halt. That would negatively affect the future viability of Harmony's West Wits mining operations and massive socio-economic impacts would emanate due to lack of deposition space. This would also negatively affect the company's financial closure and rehabilitation plans. Subsequently, the No-Go Alternative, would have a significant financial impact on not only Harmony, but also have a direct negative impact on the workforce on the mine and surrounding businesses and communities that are directly or indirectly linked to the operations. As such, **the no go alternative is considered not feasible or reasonable** for this project.

11.3 ENVIRONMENTAL IMPACT STATEMENT

The findings of the specialist studies conclude that there are no environmental fatal flaws that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the mine, the findings of the EIA studies, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures.

Despite the negative impacts caused by the project, it must be considered that there are positive impacts as well, mostly based on the employment opportunities and SLP initiatives. Based on the nature and extent of the proposed and the predicted impacts as a result of the construction, operation and closure of the facility, the findings of the EIA, and the understanding of the mostly low - moderate post-mitigation significance level of potential environmental impacts, it is the opinion of the EIA project team that the environmental impacts associated with the application for the proposed recommencement of deposition of Mponeng Lower Compartment project can be mitigated to an acceptable level and the project should be authorized.

11.4 RECOMMENDATIONS FOR INCLUSION IN THE INTEGRATED ENVIRONMENTAL AUTHORISATION

The following key specialist recommendations are made for inclusion in the EA for the project:

- The TSF Barrier design and implementation must be in line with DWS requirements for the facility.
- Developer must undertake the Dam Safety Technical Assessment and register with the DWS Dam Safety Office.
- There must be focus on maintaining geotechnical stability, controlling water, and ensuring structural integrity, as outlined in the Global Industry Standard on Tailings Management (GISTM).
- Robust emergency preparedness plan inclusive of dam / structural failure must be compiled and must form part emergency drills and environmental awareness training.
- Potential affected groups / communities must be made aware of the emergency plan and how they should react to emergency situations.
- Dam / structural failure sirens must be permanently installed to warn the community and/or motorists on the N12 in the unfortunate event of a dam / structural failure of the TSF.
- Apply dust suppression methods to limit the dust generated during the establishment phase.
- If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these developments.
- Implement a GN 704 compliant stormwater management plan to manage run-on towards the TSF.
- Pipelines are to be installed above-ground on pre-cast concrete plinths.

- Implementing a spring capture system to divert clean groundwater away from the TSF.
- Diverting clean stormwater runoff from the northern area to prevent it from entering the seepage control infrastructure.
- Ensure that flood protection of the TSFs is sufficient to manage flood risk from both adjacent river systems (north and south) and stormwater run-on.
- A hydrocarbon and chemical spill management plan must be put in place to ensure to manage any hazardous spills. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.
- All Archaeological sites will require Monitoring during site clearing in a 20m radius from the identified archaeological sites through the implementation of an archaeological watching brief. Archaeological sites MPnr1 and MPnr2 are to be avoided by a 15m buffer as per s25 of the NHRA. If the construction cannot deviate from the original layout, then further full mitigation and a destruction permit from SAHRA will be required.
- All plant SCC along pipeline route must be avoided, and the 200m buffers be strictly adhered to, if these buffers cannot be avoided then necessary permits must be obtained.
- An Alien Invasive Species Management Plan must be compiled and implemented especially for the category 2 AIP Fabaceae (Acacia melanoxylon) commonly known as the Australian blackwood.
- If soil erosion is detected, the area must be stabilised using geo-textiles and facilitated re-vegetation.
- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.
- All construction/operational and access must make use of the existing roads as much as possible, the creation of new roads should be limited.
- All footprints to be rehabilitated after construction is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.
- 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.
- 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.
- The wetland areas outside of the specific project site area must be avoided where possible.
- As far as possible, the associated pipelines for the project should be relocated to outside of the wetland buffer zones, which would significantly reduce potential impacts to the said systems.
- 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 site 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.
- 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.
- A Dust Management Plan should follow an iterative process, including: implementation, monitoring, reporting, reviewing and adjustment to the necessary steps.
- The TSF must form part of an Air Quality Management Plan. If one does not exist, a new one must be developed for the proposed TSF, including air quality monitoring to ensure compliance at upwind and downwind locations.
- Vegetation of exposed areas of the TSF and wind barriers to reduce wind erosion and/or the application of dust suppressants should be incorporated.
- A vegetation covering layer should be provided over the exposed areas of the TSF to reduce wind erosion and radon exhalation.
- Safe operating systems and procedures are to be implemented during operation of the facility.
- The mine must implement a community-friendly external grievance mechanism in conjunction with communities. The mine must develop a community relations strategy to plan for and guide its involvement with the community. The strategy should include feedback mechanisms about aspects of concern to the community.
- The mine should put measures in place to ensure the most effective local employment strategy, in conjunction with local leadership.

12 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations relating to this EIA phase assessment should be noted:

- The application is limited to the proposed Mponeng Lower Compartment TSF and associated infrastructure near Carletonville within the Merafong City Local Municipality, Gauteng Province.
- The information provided by the applicant is considered accurate, adequate, unbiased, and no information that could change the outcome of the EIA process has been withheld.
- The information provided by the specialists is considered accurate, adequate, unbiased, and no information that could change the outcome of the EIA process has been withheld.
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.
- This study not based on preliminary engineering information with the final designs still being completed.
- It is assumed that an inverted barrier system with equivalent performance to a Class C barrier can be motivated for implementation if the facility needs to be lined.
- In accordance with the Protection of Personal Information Act (Act 4 of 2013), personal information (emails, contact numbers, address) were blanked out and/or excluded during the Public Participation and only provided to the competent authority officials.
- Personal information of I&APs made available to the competent authority will only be used by the authorities to confirm or obtain information regarding this specific project.
- The information presented in this report was the most accurate and relevant at the time of compilation of the report.
- The Competent Authority did not have any objections on the Draft Scoping Report.

It must be noted that specialist gaps, assumptions and limitations relevant to their studies are indicated in the respective specialist reports (**Appendix G**).

13 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I **Vukosi Mabunda** herewith undertake that the information provided in the foregoing report is correct to the best of my knowledge, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report where applicable.

…………………………….

Signature of the EAP

Date: 2026/02/24

14 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I **<u>Vukosi Mabunda</u>** herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

…………………………….

Signature of the EAP

Date: 2026/02/24

15 REFERENCES

Airshed Planning Professionals. 2026. Air Quality Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

Almond, J., Pether, J, and Groenewald, G. 2013. South African National Fossil Sensitivity Map. SAHRA and Council for Geosciences. Schweitzer *et al*. (1995) pp p288.

Altermann, W. 2001. The oldest fossils of Africa – a brief reappraisal of reports from the *Archaean. African Earth Sciences 33, 427-436.*

Altermann, W. & Nelson, D.R. 1998. Detrital zircon age patterns of the Kaapvaal Craton and their significance for the crustal evolution of southern Africa. Precambrian Research, 91, 193–228.

AngloGold Ashanti. 2018. Operational Profile 2019 – Mponeng South Africa. Available online: https://www.aga-reports.com/19/download/AGA-OP19-mponeng.pdf (Accessed 3 September 2025).

AquiSim Consulting. 2026. Radiological Impact Assessment for Mponeng Lower Compartment

Banzai Environmental. 2026. Baseline Palaeontology Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

Brink, A. B. A. 1979. Engineering Geology of Southern Africa, Vol. 1 – The first 2 000 million years of geological time. Building Publications, Pretoria.

Button, A. 1986. Transvaal Supergroup. In: An Explanation of the 1:1,000,000 Geological Map, Council for Geoscience, South Africa.

Cachier, H. (1992). Biomass burning sources.

Council for Geoscience. 1998. 1:250 000 West Rand 2626 Geological series. Council For Geoscience, Pretoria.

Council for Scientific and Industrial Research. 2024. West Rand District Municipality: Climate Risk Profile Report. Climate and Disaster Resilience Fund & Santam

Department of Agriculture, Forestry and Fisheries. 2017. *National land capability evaluation raster data: Land capability data layer*, 2017. Pretoria

Department of Environmental Affairs. 2013. List of Activities which Result in Atmospheric Emissions which have or may have a Significant Detrimental Effect on the Environment, Including Health, Social Conditions, Economic Conditions, Ecological Conditions or Cultural Heritage. Government Gazette No. 37054.

Department of Environmental Affairs. 2013. National Dust Control Regulations. Government Gazette No. 36974.

Department of Environmental Affairs. 2018. South Africa's Third National Communication Under the United Nations Framework Convention nn Climate Change.

Department of Environment, Forestry and Fisheries. 2020. Protocols for Specialist Assessments. Published in Government Notice No. 320 Government Gazette 43110.

Department of Water Affairs and Forestry, 1998. National Water Act, Act 36 of 1998

Department of Water Affairs and Forestry, 1999, "Government Notice 704 (Government Gazette 20118 of June 1999)

Driver, A., Nel, J., Snaddon, K., Murray, K., Roux, D., Hill, L., Swartz, E., Manuel, J., & Funke, N. 2011. Implementation Manual for Freshwater Ecosystem Priority Areas.

Eco Elementum and Engineering (Pty) Ltd. 2025. Mponeng Lower Compartment Tailings Storage Facility Pre-Feasibility Study Report.

Eriksson, P.G. & Catuneanu, O. 1999. The sequence stratigraphic concept and the Precambrian rock record: an example from the 2.7-2.1 Ga Transvaal Supergroup, Kaapvaal craton. Precambrian Research 97, 215-251.

Eriksson, P.G., Catuneanu, O., Nelson, D.R., Elburg, M.A. & Hatton, C.J. 2001. *The Transvaal Supergroup and its Precursors*. Journal of African Earth Sciences, 33(3–4), 237–281.

Fourie, W. 2008b. Archaeological Impact Assessments within South African Legislation in South African Archaeological Bulletin, 63(187): 77 – 85.

Graham A Young Landscape Architect. 2025. Visual Impact Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

Haldar, S. K. 2018. (2nd Edition) Mineral Exploration - Chapter 13 - Mineral Processing, p 259-290. Available online: https://www.sciencedirect.com/science/article/pii/B9780128140222000137 (accessed 01 September 2025).

Huffman, T.N. 2007. Handbook to the Iron Age: The archaeology of Pre-Colonial Farming Societies in Southern Africa. University of KwaZulu-Natal Press, Scottsville.

Hydrologic Consulting. 2026. Baseline Hydrological Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) 2006. The Geology of South Africa. Geological Society of South Africa, Johannesburg and Council for Geoscience, Pretoria.

Krusemann, G.P.. De Ridder, N.A. 1991. Analysis and evaluation of pumping test data - ILRI Publications, No. 47, 2. Ed., 377 pages, Wageningen.

Land Type Survey Staff. 1972 - 2006. Land Types of South Africa: Digital Map (1:250 000 Scale) and Soil Inventory Databases. Pretoria: ARC-Institute for Soil, Climate, and Water.

Marais, L., Kemp, D., van der Watt, P., Matebesi, S., Cloete, J., Harris, J., Li Ern M., Owen, J. 2024. *The catastrophic failure of the Jagersfontein tailings dam: An industrial disaster 150 years in the making*, International Journal of Disaster Risk Reduction, Volume 109. Available online: https://www.sciencedirect.com/science/article/pii/S2212420924003479 (accessed 01 September 2025).

Merafong City Local Municipality Draft Integrated Development Plan 2025-2026. Available online: https://merafong.gov.za/wp-content/uploads/2025/04/Draft-IDP-Document-March-2025-2026.pdf (accessed 01 September 2025).

Minelock Environmental Engineers. 2026. Mponeng Lower Compartment Closure Costing.

Mucina, L. & Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

MvB Consulting. 2025. Geohydrological Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

Parsons C. F., and Killick A. M. 1985. The Surface Geology of Part of the W.A.G.M. Property and Environs. J.C.I. Research Unit Report 200 (unpublished report).

Parsons, C. F. 1991. The Geology of the Gemsbokfontein Dolomitic Groundwater Compartment and Possible Effects of Dewatering. JCI Report No. 210.

Parsons R. 1995. A South African Aquifer System Management Classification. WRC Report No KV 77/95, Pretoria.

PGS Heritage. 2026. Heritage Impact Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

SANS 241-2. (2011). South African National Standard. Drinking Water – Part 2: Application of SANS 241-1.

Schulze, R.E. and Lynch, S.E., 2006. “South African Atlas of Climatology and Agrohydrology”, WRC Report 1489/1/06,

Smith, B. 2006. The Farming Handbook. Netherlands & South Africa: University of KwaZulu-Natal Press & CTA

Soil Classification Working Group. 1991. Soil Classification: A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

Soil Classification Working Group. 2018. Soil Classification a Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

South African Heritage Resources Agency 2012. Minimum standards: palaeontological component of heritage impact assessment reports, 15 pp. South African Heritage Resources Agency, Cape Town.

South African National Biodiversity Institute - South African National Biodiversity Institute, 2018, “Vegetation Map of South Africa, Lesotho and Swaziland 2018”

The Biodiversity Company. 2026. Aquatic Biodiversity and Wetlands Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

The Biodiversity Company. 2026. Soils and Agriculture Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

The Biodiversity Company. 2026. Terrestrial Ecology Assessment for the Harmony Mponeng Lower Compartment TSF, Gauteng.

Truswell, J.F. .1977. The geological evolution of South Africa.

Water Research Commission, Pretoria Water Research Commission 2002. “Design Rainfall Estimation in South Africa”. WRC Report No. K5/106